ACER
Agency for the Cooperation of Energy Regulators

EUROPEAN GAS TARGET MODEL REVIEW AND UPDATE

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European Gas Target Model review and update

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Executive summary

Our vision: a competitive, secure European gas market that benefits all consumers

In the "Bridge to 2025", regulators set out their thinking on the key challenges and the possible responses to secure the appropriate regulatory framework for the coming decade. The present document renews and updates the Gas Target Model (GTM) developed in 2011. The core principles that underpin our vision for European gas markets will remain the same today as when the GTM was first published. This vision is of a competitive European gas market, comprising entry-exit zones with liquid virtual trading points, where market integration is served by appropriate levels of infrastructure, which is utilised efficiently and enables gas to move freely between market areas to the locations where it is most highly valued by gas market participants. However, the European gas market and the uncertainties and challenges it faces have changed fundamentally, and this requires a new mind set in order to adopt the correct regulatory approach when looking forward to the next decade.

The Network Codes will bring Europe closer to this vision. Implementing them in full and on schedule is the right priority and the focus for regulators and other stakeholders today. However, the Network Codes alone are unlikely to deliver a "well-functioning transparent gas wholesale … market" that benefits consumers across Europe, as required by Regulation (EC) No 715/2009[1]. Consequently, this revised GTM not only guides the coherent development and implementation of the Network Codes, but also specifies the steps required to realise liquid and dynamic gas markets thereby enabling all European consumers to benefit from secure gas supplies and effective retail competition.

Increasing uncertainty in supply and demand

An important factor in revising the GTM has been changing gas market dynamics. The supply and demand picture has become increasingly uncertain in recent years. For a long period, gas demand had been rising relentlessly. A combination of factors has changed that. In particular, the shale gas revolution in America has put gas-intensive European industrial enterprises at a competitive disadvantage. At the same time, the coal displaced from the American generation mix has lowered coal prices in Europe such that coal-fired generation is now far more profitable than running gas-fired power stations. The low emission allowance price has also exacerbated this phenomenon. On the supply side, European Union (EU) production, which is located largely in the UK and the Netherlands, is declining. Whilst unconventional gas production will be a positive development as far as domestic output is concerned, it is unlikely to have a significant impact on gas supplies, even in the most optimistic scenarios, until well into the 2020s.

Competitive markets ensure Security of Supply

Security of Supply and competition work in concert; the more pluralistic upstream supply is in Europe, the less we will depend on any one source of supply that may be subject to either physical restrictions or political interference. Our research shows that thirteen Member States do not meet the original GTM target of a Residual Supply Index (RSI) of over 110% of demand, whilst most Eastern European countries cannot currently hit this target.

The GTM strongly affirms that well-functioning gas markets remain essential providers of supply security. Building on the original GTM, we recommend further enhancements to market-based measures, such as

[1] See Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0036:0054:en:PDF

ensuring that imbalance prices remain dynamic throughout an emergency, with no cap on prices (up to the value of lost load, or VoLL), in order to strengthen incentives for market participants (including storage users) to deliver supply security. In addition, we propose full unbundling of storage products and setting appropriate network tariffs for storage users. We note that it can be difficult to give Transmission System Operators (TSOs) incentives to work together to build large, complex projects from relatively distant regions (and such projects are often unable to access capital markets). Relevant public bodies should give priority status to such infrastructure investments and be able to promote them as projects of common interest (PCIs)[2].

Wholesale market functioning

The GTM interprets the Gas Regulation requirement of "facilitating the emergence of a well-functioning and transparent wholesale market" as implying a liquid spot market and, crucially, a liquid wholesale forward and/or futures market, so that cost-effective wholesale market risk management is possible. For example, this means that a new entrant can sell a fixed-price contract to a consumer for delivery of gas in a year's time, and in turn purchase the required gas at a fixed price in the wholesale gas market. Research we have undertaken shows that forward trading is highly limited across the EU. This point is of critical importance.

Interconnections have a key role to play in achieving a functioning EU market. The Capacity Allocation (CAM) Network Code and the Congestion Management Procedures (CMP) Guidelines represent a fundamental step forward, but are not sufficient in many cases. The updated GTM therefore includes an assessment of the functioning of wholesale markets at national level, developing a revised series of metrics to assess whether a wholesale market is 'well-functioning'. These metrics are based on the analysis of data and information not available when the first GTM was drafted and can be grouped into two key characteristics of markets:

1. They meet **market participants' needs**: products and liquidity are available that enable effective management of wholesale market risk; and,

2. They have **"market health"**: the wholesale market is demonstrably competitive, resilient and has a high degree of Security of Supply.

The self-evaluation process

We propose that all Member States assess whether they are likely to meet, or continue to meet, these revised GTM metrics by 2017 (and every three years thereafter) in order to determine whether their market will be well functioning. If it will not, the GTM suggests considering structural market reforms. Three market integration tools have been identified (this list is not exhaustive):

1. Full market merger: full merger of two or more adjacent markets by merging their virtual trading points and balancing zones;
2. Trading region: partial merger of two or more adjacent markets at the wholesale level by merging their virtual trading points and establishing a cross-border trading balancing zone; and,
3. Satellite market: substantial linking (via pipeline capacity) of a non-functioning gas market to a directly neighbouring, well-functioning wholesale gas market.

Additional tools, including market coupling, can have a beneficial effect by facilitating coordinated, simultaneous access to capacity and spot gas markets.

[2] See Art 2 (4) Regulation (EU) No 347/2013 on Guidelines for Trans-European Energy Infrastructure: "*Project of common interest means a project necessary to implement the energy infrastructure priority corridors […] and which is part of the Union list of projects of common interest […]*"

Any reforms undertaken by Member States should be based on an appropriate cost-benefit analysis to ensure their economic viability.

The role of gas in complementing renewable energy source generation

We believe that more can, and should, be done to ensure that regulatory and market arrangements allow for more efficient use of gas-fired power plants. We predict that significant gas-fired generating capacity is likely to be needed to provide flexible back up to renewable energy sources (RES) whilst also running at a far lower load factor than was previously the case. To optimise the joint working of the electricity and gas sectors, we propose that gas and electricity TSOs should be legally obliged to cooperate with one another. This could include: (i) improved information flows so that system operators and market participants benefit from more timely information, allowing all parties to make more optimised operational decisions; and, (ii) a cooperative review of gas and electricity industry timelines, among other things.

New developments in the gas supply chain

We have also considered new developments in the use of gas. These include: (i) the intensification of gas use in the transportation sector (in both liquefied (LNG) and compressed natural gas (CNG) forms); (ii) small-scale applications of LNG and CNG, including alternative means of distribution such as virtual pipelines; and, (iii) pioneering technologies that facilitate the storage of electricity in the form of hydrogen or synthetic gas ("power to gas" or P2G).

As regulators, it is important that we facilitate the emergence of these new uses of gas through appropriate and limited interventions only. The areas we have considered in our review include:

- Clarification as to which of these activities require regulatory intervention (in particular loading/bunkering activities at LNG storage facilities);
- Ensuring that LNG and CNG filling stations are not considered as suppliers of gas, and consequently should not be subject to third party access (TPA) or licensing procedures;
- Facilitating a level-playing field between piped and non-piped supplies, so that gas-to-gas competition is possible if the market demands it; and,
- Particularly in the case of P2G, the technical provisions for injecting hydrogen and synthetic gas in the gas system, the pricing regime, the role of the P2G operators, the balancing aspect and integration in the electricity system.

Conclusion

Our 2014 Market Monitoring Report[3] estimated that insufficient interconnection of wholesale gas markets led to a gross-welfare loss of approximately EUR 7 billion in 2013. The implication is that functioning European gas markets which meet the needs of EU gas consumers are the exception rather than the rule in 2014, when the internal energy market was due to be completed. Security of gas supplies is again the focus for policymakers across the EU and the costs of dependence on a single supplier have again been made clear. This revised GTM identifies how Europe can realise its potential and reap the vast benefits of a secure, fully implemented internal gas market for all its citizens.

[3] ACER/CEER Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013, http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER_Market_Monitoring_Report_2014.pdf

1 Introduction

1.1 The "Bridge to 2025" and Gas Target Model

In 2013-14 European energy regulators re-examined the key challenges and possible responses that regulators must consider in the period to 2025. The results of this project were published in "Energy Regulation: A Bridge to 2025, Conclusions Paper"[4]. In parallel, this paper for the review and update of the Gas Target Model (GTM) identifies issues that justify the need to further develop the vision of the gas market model. Here, we seek to elaborate on some of the topics and ideas presented in the overarching "Bridge to 2025" paper. These two activities were very closely related and both took into account similar considerations. As a result, the two processes ran in parallel and were closely aligned, so that each could benefit from the other, as well as from stakeholders' contributions.

1.2 Background

Following the 18th Madrid Forum in 2011, the Council of European Energy Regulators (CEER) developed a vision for the European gas market (the Gas Target Model, or GTM). The GTM was geared towards creating a coherent framework from the various streams of policy under development by European energy regulators and the European Commission, with a view to implementing the Third Energy Package[5] and establishing a functioning internal market.

The implementation of the Third Energy Package with respect to gas markets is consistent with the evolution envisaged in the GTM, and covers matters such as the full unbundling of network operators, the establishment of congestion management procedures (CMP) and the development of Network Codes (NCs), e.g. for capacity allocation mechanisms in gas transmission systems (CAM NC), gas balancing (Balancing NC), interoperability and data exchange (Interoperability NC) and tariff structure harmonisation (Tariff NC). For European energy regulators, the implementation of the Third Energy Package, as well as the continuing development and implementation of the Framework Guidelines and binding Network Codes, remain key priorities.

At the same time, with the 2014 deadline for the completion of the internal energy market (IEM) rapidly approaching, there is a need for strategic foresight to guide our post-2014 work. To ensure that all of these aspects fit together, we need to review and update our vision of what the European gas market will look like by 2025 and what building blocks required to achieve this might be missing. The updated GTM does not question the goals, content and functioning of the existing Network Codes and those under development, but provides overall guidance for drafting further Framework Guidelines and Network Codes, which are in turn ideal instruments for defining detailed rules on specific matters and paving the way for the integrated market.

[4] Energy Regulation: A Bridge to 2025 Conclusions Paper, 19 September 2014, ACER, http://www.acer.europa.eu/Media/News/Pages/Regulators%E2%80%99-Bridge-to-2025-energy-proposals-should-guide-the-new-Commission%E2%80%99s-energy-priorities.aspx

[5] The term "Third Energy Package" refers collectively to: Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 (Gas Directive); Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 (Electricity Directive), concerning common rules for the internal market in natural gas and electricity respectively; Regulation (EC) No 714/2009 of the European Parliament and the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003; Regulation (EC) No 715/2009 of 13 July 2009 of the European Parliament and the Council on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005; and, Regulation (Ec) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators.

The GTM 2011[6] set out the vision of the European gas market as follows: *"In their approach, regulators see a competitive European gas market as a combination of entry-exit zones with virtual hubs. Their vision suggests that the development of competition should be based on the development of liquid hubs across Europe at which gas can be traded (these may be national or cross-border). Market integration should be served by efficient use of infrastructures, allowing market players to freely ship gas between market areas and respond to price signals to help gas flowing to where it is valued most. The target model has to allow for sufficient and efficient levels of infrastructure investment, in particular where physical congestions hinder market integration".*

The first GTM was developed under the European legal framework and market structure of 2010-11. Its conclusions stated that the model should be evaluated and if necessary developed further in light of the ongoing work on the Network Codes and taking into account future changes. ACER[7] undertakes this review and update the Target Model as required without changing the fundamentals of the gas market vision outlined above.

1.3 Process

This document sets out the results of this review and the areas where ACER considers further measures are necessary (based on an analysis of the status quo and future trends) and proposes such measures to achieve the goals of the GTM. This builds on regulators' work to date – in particular on Framework Guidelines and Network Codes in the specific areas – as well as on the feedback from three dedicated stakeholder workshops and one workshop discussing the views of representatives of the academic community. The measures also reflect discussions with the experts of the ACER ad hoc advisory panel, the outcome of the "Bridge to 2025" process and consultation, as well as discussions at the 23rd to 25th Madrid Forums and dialogue with Member States at informal meetings (held on 21 January,11 July and 4 November 2014).

1.4 Content

This updated vision is aimed at further enhancing competition for the whole of Europe (i.e. including those areas where competition is currently less developed), contributing to supply security and, as the European Commission stressed at the October 2013 Madrid Forum[8], ensuring that gas can continue to play a part in a competitive energy market and contribute to achieving climate targets in general and energy efficiency targets in particular.

The remainder of this paper is structured as follows:

- Section 2: Context – this section briefly describes the global and European context of our evaluation and potential future developments in gas markets. It also considers the current gas market vision embedded in the Network Codes.
- Section 3: Security of Supply and upstream competition – this section looks at and develops recommendations to enhance producer competition, as well as reflecting Security of Supply considerations.

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[6] CEER Vision for a European Gas Target Model Conclusions Paper, December 2011, http://www.ceer.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/GAS/Gas_Target_Model/CD/C11-GWG-82-03_GTM%20vision_Final.pdf

[7] While the "Vision for a European Gas Target Model" was developed by CEER in 2010/11, the update of the GTM was carried out by the European Energy Regulators under the umbrella of ACER, supported by CEER.

[8] Madrid Forum presentation by the European Commission, DG ENER, October 2013, http://ec.europa.eu/energy/gas_electricity/gas/forum_gas_madrid_en.htm

- Section 4: Wholesale market functioning – this section considers the steps required to ensure that all EU gas consumers benefit from well-functioning wholesale gas markets. We provide a framework to assess such functioning and present the status quo of wholesale market functioning on the basis of an extensive quantitative analysis. Furthermore we propose options for structural change, as well as best practice in gas market design.
- Section 5: The role of gas in completing renewable energy source electricity generation – in this section, we discuss the role of gas in moving towards a low-carbon energy system. Focusing on gas-fired power generation, we examine whether the current framework of legislation and regulation is sufficient to overcome coordination problems between the gas and electricity sectors.
- Section 6: New developments in the gas supply chain – the last section refers to the analysis of whether the existing regulatory framework might unnecessarily hinder developments along the gas value chain and makes proposals on how to overcome such potential obstacles.

2 Context

In this section we describe the global and European context of our evaluation and potential future developments in gas markets. This section also considers the current vision for the gas market enshrined in the Network Codes.

Gas demand in Europe has decreased since 2008, and most projections predict a continuous decrease until 2025. The global and European gas markets have undergone significant, unprecedented changes in the last four years due to:

- Declining demand in Europe;
- Changes in global gas prices; and,
- Concerns over Security of Supply.

However, along with other energy sources, we expect gas to be used to provide flexible electricity generation to compensate for the fluctuating output from renewables. We also believe that new, environmentally beneficial uses for gas, such as in the transportation sector, are likely to become more widespread. Consequently, an adaptable and flexible approach to regulating gas networks and markets will be needed.

2.1 Demand

There is considerable uncertainty regarding the future gas needs of European end users.

European gas demand has decreased in the last few years (see Figure 1). In 2013, natural gas demand in the EU-27 countries declined by 1.2% compared with 2012, following year-on-year decreases of 2.2% in 2012 and 10.5% in 2011[9]. A number of assumptions and forecasts predict a continued decline in aggregate European gas demand (e.g. the International Energy Agency (IEA) states that in the EU, an unfavourable combination of prices for gas, coal and CO_2, and the rising share of renewables in the electricity sector means that demand will struggle to return to 2010 levels by 2035[10]), whereas others (such as Gazprom and Deutsche Bank) are more positive about the speed of the revival in gas demand.

The factors contributing to decreasing gas demand trends include:

- An expected slow decline in demand for gas in the heating sector owing to improved energy efficiency (for example, through the use of insulation) and the more widespread use of electric heating (for instance, heat pumps);
- The level of demand for gas for industrial processes relies heavily on the competiveness of gas pricing in the EU compared to other regions and fuels. At the moment, Europe is at a serious competitive disadvantage compared to North America and areas of the Middle East. Compared to the US, there has been a significant price spread over the past few years (see Figure 2). The spread in hub-traded prices has been about EUR 10-15 per MWh. Industries which rely on gas and compete globally may be tempted to relocate to regions with lower gas prices if the current situation persists. According to the IEA, large

[9] ACER/CEER Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013, http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER_Market_Monitoring_Report_2014.pdf

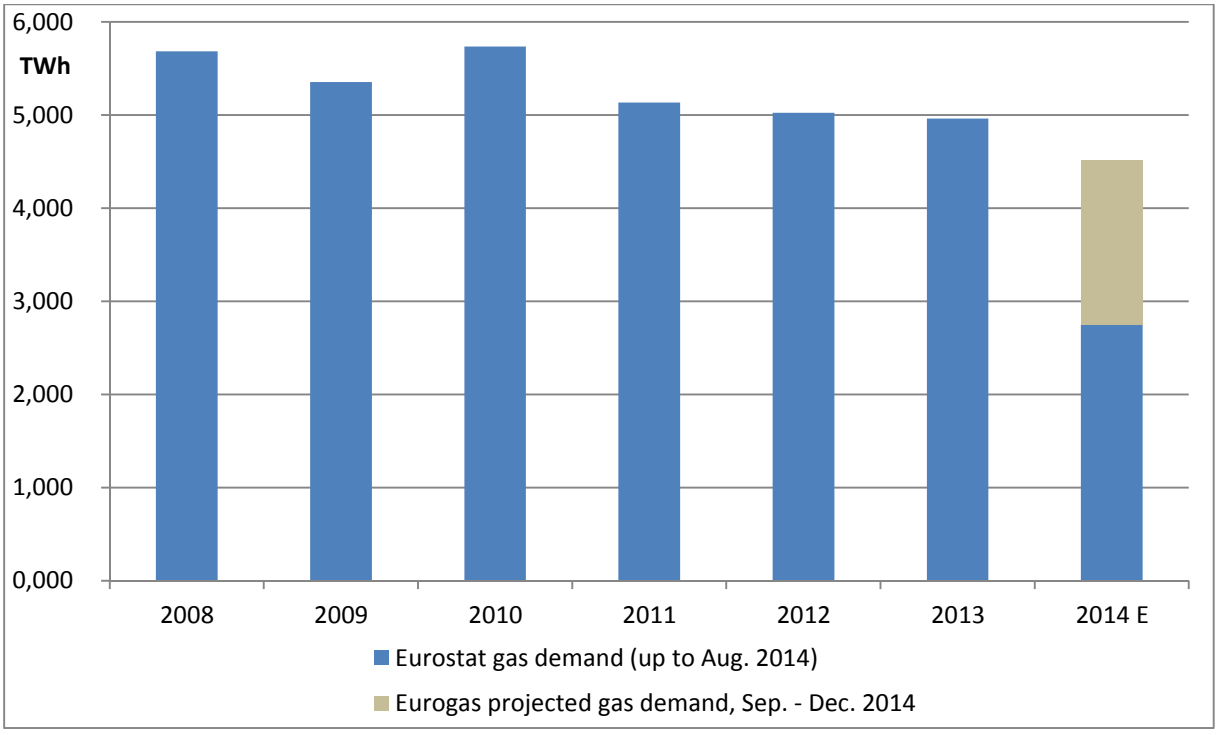
[10] International Energy Agency, World Energy Outlook 2013, 12 November 2013

regional natural gas price differentials are expected to persist in the coming decades and the EU's share of global export markets for energy-intensive goods is expected to decline[11]; and,

- The role of gas in power generation is under threat as European gas prices are currently too high (relative to coal and CO_2 prices) to make gas-fired power generation economically viable. Increasing electricity production from subsidised renewable energy sources (RES) (which frequently has a marginal cost close to zero) decreases gas-fired electricity production (slow substitution of gas through RES production) and keeps electricity prices low. While gas-fired plants may provide important back-up capacity for intermittent renewable generation, they can run for far fewer hours and burn less gas if the gas price is not competitive. Gas can only play a prominent role in Europe's transition to a low-carbon electricity system if gas prices are significantly lower than their current levels, or if electricity/CO_2/coal prices increase substantially; at today's gas price, it is rarely profitable to run gas-fired power plants. In addition, the future use of gas in power generation is unlikely to be uniform across the EU, reflecting varying levels of political commitment to phasing out coal-fired generation, and the fuel mix of existing generating assets.

It is difficult to predict whether these trends will continue in the future. Furthermore, the scenario of declining total demand might not necessarily be associated with a decline in peak demand: on cold days, households could still have significant heating requirements. If gas serves as a back-up for intermittent renewable generation, significant volumes of gas will be required within a short time period (for instance, when there is no wind and/or sun). Therefore, even if total demand declines, the infrastructure to meet that peak demand will still need to be in place.

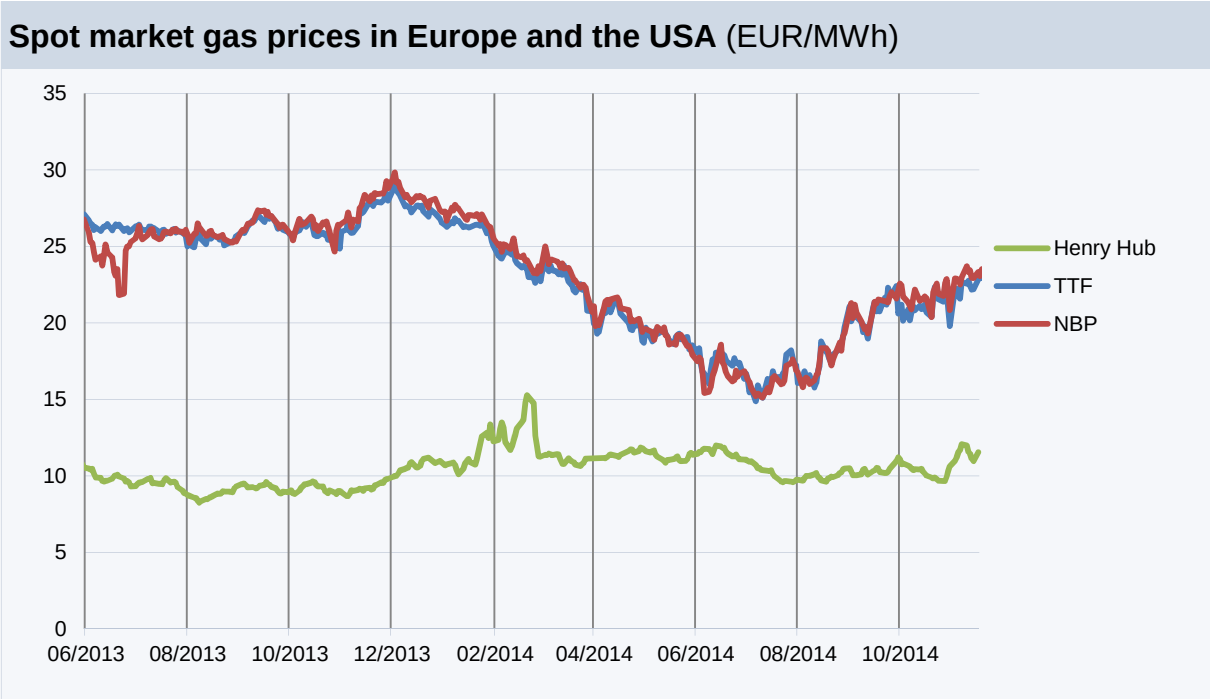
Figure 1 Gas demand in the EU-27, 2008-2014 (TWh)



Source: ACER/CEER Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013 (ACER, Eurostat); note: Gross inland gas consumption (GIC)

[11] International Energy Agency, World Energy Outlook 2013, 12 November 2013, p 288, Figure 8.17.

Figure 2 European and US wholesale gas prices



Source: ICIS Heren, GoBoerse, OenB, and E-Control calculations

However, some developments point to a scenario in which total demand does not decline:

- European economic growth, depending on its pace and durability, could drive increased gas use, even if as noted above intensive gas users relocate to areas with lower gas price and growing energy efficiency limits its impact.
- Use of gas in the transport sector: compared to oil-based road transportation, natural gas has advantages in terms of price and environmental impact (greenhouse gas emissions and local pollutants); unlike electric vehicles, which are still costly and have limits for users, it is a tried-and-tested technology. In addition, the use of liquefied natural gas (LNG) in maritime and inland waterways transport, or for fuelling heavy duty vehicles, is also a high-potential area currently under development.
- Complementing decentralised electricity generation: decentralised renewable generation, backed up by centralised thermal power generation, implies significant requirements for electricity grids in terms of costly grid expansion. Gas-fired combined heat and power (CHP) generators can be installed in public or apartment buildings, or even in households (micro-CHP). They provide both space heating and hot water, as well as electricity to reduce or replace grid supply.

The impact of these scenarios on a European and national scale will also depend on developments on the supply side.

2.2 Supply

Domestic production has been declining in EU Member States, especially in the UK and the Netherlands (although there is some uncertainty about the rate of decline). Assuming this trend continues, without a significant reduction in demand this will likely require more imports and – where existing import capacity is insufficient – new investments in infrastructure. However, other developments may limit the rate of decline in domestic EU gas production. These positive domestic drivers of EU gas supply could include:

- Unconventional gas production in Europe: while exploration is on hold in a number of Member States (for example, due to the negative environmental impact and safety concerns), others appear keen on developing the industry. According to most estimates, higher costs, lower resources and different conditions (such as population density) may prohibit a shale gas boom on the scale of that in the US, but this could nonetheless have an impact on the sector in the medium and longer term.
- Biogas and "power-to-gas" technologies might offer potential growth on the supply side, although their scalability is still uncertain. Biogas is increasingly being injected into the pipeline transmission grids as a source of domestic supply, and if "power-to-gas" technologies become economically viable, they may enable "storage" of renewable electricity in the natural gas system.

2.3 Conclusions from demand and supply trends

Significant uncertainties on both the supply and the demand side require a flexible regulatory framework that promotes the continued development of an efficient and competitive gas market. More specifically, we draw the following conclusions from the trends in gas demand and supply:

- The future for gas is difficult to predict, partly due to the uncertainties resulting from the economic downturn, which makes assessing future demand particularly difficult. Certain trends are clearer and irreversible (e.g. decline of domestic gas production and reduced gas use in the heating sector), but even where the broader trend is more certain the consequences are far from obvious.
- Some of the factors that are currently causing a decline in gas demand are clearly policy-related (such as the design of the EU Emissions Trading System (ETS) and the resulting – currently low – CO_2 prices). Further policy intervention is required to reverse this trend, preferably globally, but without unduly distorting the European internal market. The CO_2 prices required to stabilise gas demand would currently have to be between EUR 40 and EUR 50 per tonne. It is unclear whether the policy decisions taken will be able to change CO_2 prices to such an extent. National Regulatory Authorities (NRAs) play an important role in ensuring that conditions in the gas market promote competition. However, such policy issues are outside the regulators' domain.
- Apart from demand and supply dynamics, the market itself is also evolving in other ways. There is a general trend towards more flexible and shorter-term contracts at all points of the value chain. The impact of a shift from long-term to short-term contracts, and the stranded assets this could give rise to, need to be understood[12].
- Declining natural gas production, increasing imports and the absence of a global gas price (resulting in LNG cargos being shipped to continents other than Europe) have an effect on competition in the European gas market. As a result of these developments, diversification of sources and the establishment of well-functioning gas trading hubs are more important than ever to ensure the operation of gas markets.
- The uncertainty of market developments calls for a regulatory framework for European natural gas supply that caters for various scenarios (including local variations in supply, demand and market dynamics). Whereas a scenario of declining demand for natural gas may result in the risk of stranded assets becoming the more prominent concern, uncertainty of future gas demand may lead to underinvestment in new infrastructure, hampering the development of market integration and competition, and impacting

[12] The European Commission analysed and assessed the benefits and risks of an increase in short-term contracts across the entire value chain in the EU gas market, with a particular focus on the impact of an increase in short-term contracts on security of supply and competition; see: Study on LT-ST markets in gas, final report, 31 August 2013, study for the European Commission by DNV KEMA and COWI Belgium.

negatively on Security of Supply. The implication is that Europe's GTM must remain flexible in the face of evolving conditions and local dynamics, rather than being a rigid, one-size-fits-all model.

2.4 Gas market vision and European-wide Network Codes

Gas market vision

It is crucial that the right structural framework exists to allow functioning gas markets to emerge. The European gas market will consist of interconnected entry-exit zones with virtual trading points (virtual hubs). Shippers should be able to trade gas freely within each entry-exit zone, with the size of each zone being as large as the existing infrastructure allows (i.e. such that internal physical congestion does not unduly restrict gas trading within zones). As a general rule, entry-exit zones should not be defined on the basis of national boundaries, but based on physical realities and market needs. Achieving the single gas market requires sufficient interconnection between markets, so the regulatory regime should include mechanisms that allow the market to signal where investment is needed and provide Transmission System Operators (TSOs) with a predictable framework for generating sufficient revenues to cover the costs of infrastructure. Once built, interconnection capacity needs to be easily accessible to shippers on a non-discriminatory basis, and at a transparent and fair price. The capacity offered to the market needs to be maximised and contractual congestion should be mitigated, in order to deter capacity hoarding. Shippers need both long-term and short-term capacity as gas may be traded both long- and short-term. Sufficient and accessible interconnection will promote liquidity in hub-based trading, which in turn will assist with the development of market-based balancing.

In addition, the European gas market will provide Europe-wide principles for running auctions and open season procedures. This will facilitate cross-border, market-based investment procedures for offering incremental and new capacity, as well as common rules to ensure that TSOs operate their businesses and communicate with one another in a manner that does not restrict cross-border gas trading.

The role of the Network Codes in achieving the market vision

The Gas Regulation puts forward objectives and principles describing the ideal single energy market, with a focus on arrangements for non-discriminatory access to gas infrastructure. The GTM takes this as a starting point and builds on access issues, while establishing a broader analytical context linking it with the need for wholesale market development.

The Gas Regulation anticipates the development of Network Codes for cross-border and market integration issues. These technical rules, which turn regulatory policies (Framework Guidelines) into operational rules, follow the principles and objectives of the Gas Regulation and are aimed at improving access arrangements in the internal market in specific areas (CMP Guidelines, Network Codes on CAM, Gas Balancing, Interoperability and Data Exchange Rules, and Harmonised Transmission Tariff Structures).

The further development and implementation of Framework Guidelines and Network Codes has been ACER's main priority. However, in a number of markets the full implementation of Europe-wide Network Codes on their own will not have the desired effect of establishing a "well-functioning and transparent" wholesale (and retail) gas market. In addition, progress to date has been uneven across the EU, so increased efforts that possibly go beyond the implementation of existing rules might be necessary (see also Section 0).

3 Security of Supply and upstream competition

This section looks at and develops recommendations for enhancing producer competition, as well as reflecting Security of Supply considerations.

Geopolitical events continue to threaten the security of Europe's gas supplies. For regions in which a supply security problem is identified, we propose potential measures to enhance Security of Supply (and with it upstream competition) that can largely be categorised as follows:

- Measures to increase the extent to which existing sources can replace any source that is lost;
- Measures to make the most appropriate use of gas storage and LNG facilities; and,
- Measures to diversify upstream supply sources.

In any case, a competitive, liquid, flexible, diversified and single European natural gas wholesale market, well connected to various upstream sources, will provide the most efficient delivery of Security of Supply in Europe.

3.1 Introduction

The EU wishes to achieve a high level of supply security and to improve competition in upstream wholesale markets. These are related objectives in the sense that the means of achieving them overlap significantly. The more diverse the EU's upstream supply is, the less the EU will depend on any one source of supply that may be subject to either physical failure or political interference. Similarly, in general, the more diverse upstream supply is, the more competitive the upstream wholesale market will generally be. This makes it appropriate to consider the two topics together.

3.2 Status quo

The current crisis in Ukraine and the potential threat to the availability of gas from Russia has brought concerns over gas Security of Supply into sharp focus. CEER proposed that all Member States should try to reach a position in which their Residual Supply Index (RSI) exceeded 110% of demand.

Currently, many Member States probably do not have the level of supply security that they would like. Thirteen Member States do not meet the CEER target. These include almost all Eastern European states. Until an LNG floating storage and regasification unit (FSRU) is installed, the Baltic States will remain totally reliant on supply from Russia. However, Western European states are also vulnerable. Italy has an RSI of less than 110%. Germany and France meet the target only because demand has recently declined. They would not do so if demand were to increase slightly.

Not all countries with an RSI above 110% may be immune to problems. For example, a group of countries such as Austria, the Czech Republic and Slovakia may have individually high RSIs owing to the interconnection capacities between them. However, they may ultimately all depend to a large extent on gas from the same source: Russia. A general interruption to supplies from Russia would affect all the countries simultaneously and mean that the mutual support implied by national RSIs would not be available. The RSI of the group – ignoring intra-group flows – could be much lower.

The EU's spare LNG import capacity is a potentially important factor contributing to Security of Supply, although pipeline capacities place limitations on the extent to which that capacity could help secure supplies in areas far removed from LNG terminals.

Realising physical reverse flow capability at all the interconnection points in Europe's current transmission system will play an important role in improving the extent to which all areas of the EU can benefit from the

security offered by both spare capacity at LNG import terminals and the flexibility in other sources of gas. However, reverse physical flow is not expected to be a solution to all supply security problems.

Turning to upstream competition, the marginal source(s) of gas supply meeting EU consumption continue(s) to be those outside the EU, despite declining EU consumption. Even though the EU currently has excess LNG import terminal capacity, LNG prices in Asia mean that in the past few years LNG has not placed competitive constraints on the prices charged by traditional external suppliers, such as those from Russia, Norway and Algeria. However, this may change as more LNG production comes on stream (e.g. in Australia and the US) and if Japanese nuclear power plants are reopened.

Even if changes in the LNG market make LNG more competitive in Europe, the transportation constraints and costs faced by shippers within Europe are likely to carry on inhibiting commercial flows. As a result, several Member States will not benefit from a level of upstream competition commensurate with the oligopolistic structure that supply to the whole of the EU would imply.

3.3 Recommendations

ACER is convinced that achievement of well-functioning, competitive wholesale gas markets, where all the Network Codes have been fully implemented and a European single market in energy is in place, will substantially improve gas Security of Supply. Further intervention may be required in specific cases where the evidence suggests that full implementation of the Third Energy Package may be insufficient to achieve adequate supply security. However, any such interventions should be justified by a cost-benefit analysis and designed to distort the market as little as possible. They should also operate for no longer than is necessary.

The Commission has conducted stress tests aimed at identifying whether and where real issues of supply security exist[13]. The results of the stress tests show that a prolonged supply disruption would have a substantial impact in the EU, with the Eastern European Member States and the Energy Community countries most affected. The assessment of the Security of Supply situation in the future needs to be developed further in order to analyse potential interruptions to supply at a regional level[14]. Such regional assessments should be designed to achieve a clear picture of the areas where there is a problem that is sufficient to warrant a cost-benefit analysis of possible interventions and where there is not.

As the cost of disruption depends on the type of consumer affected, an assessment of the Security of Supply situation will also require consistent definitions of the core consumers that must be protected and an analysis of the extent to which continuous supply to these consumers can be assured. Meaningful and realistic assessments also need to be developed in relation to the scale and speed at which sources such as LNG can be ramped up to address major supply disruptions.

The development of effective demand-side response mechanisms can also enhance Security of Supply. Although it is felt that demand response in the gas sector does not have the same impact as that in the electricity industry, it still has considerable potential.

Further measures may also be put in place to ensure that imbalance prices in a gas-supply emergency create appropriate incentives for gas shippers to balance supply and demand. These would ensure that imbalance prices remain dynamic throughout an emergency, with no cap on prices (other than a Value of Lost Load -

[13] Communication from the Commission to the European Parliament and Council on the short term resilience of the European gas system, COM(2014) 654, 16 October 2014

[14] At present, the risk remains that several Member States assume that the same molecule of gas would be available in their national Security of Supply analysis.

VoLL). If smaller consumers (e.g. domestic households) are interrupted, this would be treated as a balancing action by the system operator and priced at estimated VoLL. Funds recovered through this component of imbalance charges would be used to make payments to interrupted consumers.

Incorporating the cost of an emergency into market prices can create appropriate incentives for market participants (including storage users) to deliver supply security. It ensures that the most efficient actions are taken and that the strength of the incentive is proportional to the risk of an emergency.

In those regions where a supply security problem is identified, the potential measures to enhance Security of Supply (and with it upstream competition) can largely be categorised as follows:

- Measures to increase the extent to which existing sources can replace any source that is lost;
- Measures to make the most appropriate use of gas storage and LNG facilities; and,
- Measures to diversify upstream supply sources.

It is also possible, but certainly not a given, that measures might also be needed to limit the extent to which market outcomes result in an unacceptable reliance on any particular source of gas. Finally, measures may also be needed to ensure that Member States cooperate fully in a supply emergency and do not restrict cross-border flows to protect national interests.

3.3.1 Measures to safeguard and increase existing gas sources

Measures to make sure that the accessibility of existing gas sources outside the EU is more geographically widespread will focus on ensuring that decisions on investment in infrastructure (such as projects of common interest (PCIs) or other projects) adequately reflect the value to be gained from both improved supply security and enhanced upstream competition. As noted, a provision already exists for intervention to require physical reverse flow capability. It is expected to enhance both supply security and potentially competition in some vulnerable parts of the EU.

Both supply security and upstream competition require some diversity and apparent 'redundancy' in transportation capacity. While the recent fall in demand has contributed to this, it is important to note that spare capacity is essential for a secure and competitive system. An existing gas source can neither replace another source in an emergency, nor compete with that other source if there is no spare capacity to carry more gas from that source.

3.3.2 Measures to make appropriate use of storage and LNG

The possible need for measures related to storage has arisen due to declining gas demand in the EU. The decline has had the effect that under normal market conditions, average winter demand can often be met using existing import infrastructure, without the need for substantial withdrawal of gas from storage, at least from the perspective of a market-wide energy balance (disregarding local grid requirements). Consequently, the market-based incentives for seasonal arbitrage (injecting gas into storage during the summer and withdrawing it in winter) have been under pressure. The winter/summer differential fell from around EUR 7 per MWh in 2010 to around approximately EUR 2 per MWh in 2013. The heightened risks associated with the problems in the Ukraine have pushed the spread back up to around EUR 5 per MWh. This provides some assurance that the market will respond, although market failure is still possible, particularly in relation to political interruption, as the risk of interruption will itself be dependent on the scale of gas storage.

There are several measures that are fully aligned with a market approach and would be likely to improve the use of storage with a view to enhancing Security of Supply. These include:

- the full unbundling of storage products which would facilitate the efficient use of storage for different purposes as the gas sector evolves[15];
- ensuring that system balancing prices are allowed to rise to the value of lost load; and,
- ensuring that the methodology for setting entry-exit tariffs recognises the difference between the network costs resulting from injection into and withdrawal from storage, compared with the generality of entry and exit between zones.

However, even with full use of these measures, the market may not be able to fully respond in the event of a politically-motivated physical supply interruption. As a result, some form of regulatory intervention may in principle be justified. However, the design of any such intervention will need to be crafted very carefully to ensure that it does not remove or drastically diminish the incentives that market participants currently have to store gas, which would negatively impact on the business case for existing storage facilities. Intervention should be limited to Member States/regions where it is shown to be necessary and will require very clear specification of how any strategic storage will be filled, as well as the circumstances that will lead to the release of such gas onto the market.

LNG terminals also promote the diversification of the EU's gas supply, supporting both supply security and upstream competition. Market signals should continue to be the dominant factor determining whether and where new LNG import terminals are developed. However, it is possible that Security of Supply considerations may require associated interventions, for example, through funding of PCIs. This may be either:

- to secure complementary pipeline investment that allows for full use of existing LNG facilities to support supply security in locations that are distant from terminals; or alternatively,
- to secure the location of LNG import capacity to support particularly vulnerable areas, where this is more cost-effective than the previous measure.

3.3.3 Measures to diversify upstream supply sources

The diversification of upstream gas sources will also remain a matter for market forces. To support this, it may be necessary to take steps to ensure that European TSOs have incentives to jointly develop very complex projects that can bring conventional gas from relatively distant new sources. This would put the TSOs in a position to leverage international capital markets to finance such Europe-wide projects and to share the risks. Currently, it is not possible to add projects to the PCI list that have not been proposed by a project promoter. Taking a wider view, including beyond the EU's borders, it should be possible for a body acting in the public interest to add such projects to the PCI list. The European regulatory framework also needs to facilitate development within the EU of non-conventional gas sources such as biogas and shale gas where environmental and social concerns allow.

In order to foster upstream competition, especially in Eastern European countries which appear to face gas prices that exceed those in Western Europe – despite the fact that the predominant flow direction is from east to west – non-physical backhaul capacity should be priced at marginal cost. This measure will have a positive effect on the geographic extent to which major external suppliers can compete with each other within Europe.

Regarding non-market-based measures to increase Security of Supply, a number of options are under discussion. When resorting to such measures, care has to be taken not to provoke unintended consequences. Regulators are convinced that strong preference should be given to market-based measures; however, there are instances where market failures and/or strategic considerations call for regulatory interventions. We also note that in a number of Member States, non-market-based measures have already been implemented. For

[15] i.e. ensuring that besides bundled storage products also injection capacity, withdrawal capacity and working gas volume can be booked as separate products.

instance, the Baltic States decided to reduce their complete dependence on imports from Russia by building an LNG terminal and guaranteeing a certain import volume from LNG, thereby diversifying supply sources and routes. Other Member States have adopted similar approaches by mandating suppliers to split their imports over more import points, for example, at least 20% from import points in the west and up to 80% from import points in the east of a country. Furthermore, the use of strategic gas storage remains an option for very vulnerable Member States with non-functioning wholesale markets to ensure a minimum level of storage filling.

If market outcomes, absent intervention, look like they will lead to sustained overdependence on a particular source of gas, a further possible measure could be a legal limitation of the share taken from that source. This measure could be seen as a legitimate way in which the EU chooses to maintain its supply security at least cost. In effect, such a measure would amount to paying a price premium on all gas, thereby creating an incentive for other sources to provide the volume in excess of the limit that would have been supplied by the largest source, rather than paying (largely through the cost of infrastructure) for the option of acquiring incremental gas in an emergency. However, the implementation of limits should be restricted to Member States (or regions) where it is demonstrably necessary and cost-effective. In such cases it will be imperative that the competent authorities develop regulatory arrangements that enable the limit to be imposed in a way that minimises any distortion of the IEM. However, generally speaking, all non-market-based measures should be applied only when markets fail to deliver an appropriate level of supply security, and such measures should not be of a permanent nature.

Finally, the Commission has also noted the need for new contingency coordination mechanisms to ensure an optimal response to an emergency resulting from a major supply interruption. Such mechanisms will become even more important as cross-border and/or central European funding of projects will diminish the extent to which Member States can with any legitimacy claim the exclusive benefits of infrastructure located on their territory.

4 Wholesale market functioning

This section considers what is necessary to ensure that all EU gas consumers benefit from well-functioning wholesale gas markets. We provide a framework to assess this functioning and propose options for structural change.

All European consumers should enjoy the benefits of well-integrated, competitive and liquid wholesale gas markets. In order to achieve this, we propose that each NRA reviews the progress made towards the development of fully functioning wholesale markets based on entry-exit systems. In this regard, the GTM 2011 has promoted the "hub-to-hub" model which aims at constructing an integrated European gas market by creating fully functioning wholesale markets (national or cross-border) and by tightly connecting them by eliminating constraints at the interconnections. However, in many cases, the current characteristics of markets do not allow for the full benefits of competition to be realised.

A set of metrics has thus been developed that seeks to demonstrate whether market participants' needs are met and whether there is broader "market health". The metrics should be used on an indicative basis to assess the functioning of wholesale gas markets.

Concrete market integration tools are proposed as structural measures for gas markets which are unlikely, without intervention, to meet "market participant needs" and demonstrate "market health".

4.1 Objective

All EU customers and their suppliers should have access to a functioning wholesale gas market within their respective balancing zone, subject to a positive cost-benefit analysis. Setting up a functioning wholesale market is necessary to realise the IEM and is an explicit goal of the Third Energy Package.

Article 1 of Regulation (EC) No 715/2009 states that it:

> "… aims at … facilitating the emergence of a well-functioning and transparent wholesale market with a high level of security of supply in gas"

The updated GTM 2014 emphasises that a functioning wholesale market requires a liquid spot market but also, crucially, a liquid wholesale forward and/or futures market to readily enable cost effective wholesale market risk management.

If both liquid spot and forward markets are available in each balancing zone, end users and their suppliers have access to gas where they need it. In turn, this will mean customers and their suppliers can avoid the cumbersome and costly task of accessing markets in other balancing zones for procurement/hedging purposes. New entrants into retail markets in particular frequently lack the widespread market presence that their incumbent competitors already have. Having a liquid spot and forward market available in the balancing zone that also holds the retail customers substantially lowers the entry barrier for potential new retail competitors and is hence an essential prerequisite for fertilising retail competition.

4.2 Defining new criteria to assess the functioning of wholesale markets

Metrics to assess the performance of a wholesale gas market and whether it is 'well-functioning' need to establish whether these two key properties are in evidence:

1. It meets *market participants' needs* – products and liquidity are available such that effective management of wholesale market risk is possible.
2. It has "*market health"* – the wholesale market area is demonstrably competitive, resilient and has a high degree of Security of Supply.

Metrics reflecting these properties, together with threshold values derived from the performance of National Balancing Point (NBP) and Title Transfer Facility (TTF), are set out below (see Annex 5). It is important to have a shared and agreed set of metrics across the EU which, if met, will indicate a wholesale market is functioning on the level of NBP and TTF by showing these elements are in place. These metrics are a refinement of the set of metrics used in the GTM 2011, reflecting in large part improvements in data availability.

The calculation of the metrics shall be conducted separately for each wholesale gas market. For the purpose of this document, a "wholesale gas market" is defined as the sum of gas trading activities (including spot, prompt and forward) with delivery agreed at one specific point and concluded using a transparent trading venue (i.e. exchange, broker platforms). It should be noted that the main delivery points are the virtual points of the entry/exit systems. Distinct delivery points are considered as separate markets.

Annex 3 contains a detailed calculation specification for the metrics proposed in this chapter.

Market participants' needs metrics

	Threshold		
Metric	**Day-ahead product**	**Front month product**	**Forward**
1. Order book volume	≥ 2,000 MW on each bid- and offer-side	≥ 470 MW on each bid- and offer-side	≥ 120 MW on each bid- and offer-side for 17 months ahead
2. Bid-offer spread	≤ 0.4% of bid-price	≤ 0.2% of bid-price	≤ 0.7% of bid-price for 24 months ahead
3. Order book price sensitivity	≤ 0.02% price distance between average price for 120 MW and best price on each bid- and offer-side	≤ 0.1% price distance between average price for 120 MW and best price on each bid- and offer-side	≤ 0.2% price distance between average price for 120 MW and best price on each bid- and offer-side for 24 months ahead
4. Number of trades	≥ 420 trades per day	≥ 160 trades per day	≥ 8 trades per day for 22 months ahead

"Market health" metrics

	Threshold
Metric	**Spot, prompt and forward market together**
5. Herfindahl-Hirschmann Index	≤ 2000
6. Number of supply sources	≥ 3
7. Residual Supply Index	≥ 110%
8. Market concentration for bid and offer activities	≤ 40% market share per company (or group of companies) for the best 120 MW on each bid- and offer-side
9. Market concentration for trading activities	≤ 40% market share per company (or group of companies) for the sale and purchase of gas

Market Participants' Needs

As explained above, the updated GTM 2014 metrics seek to set goals for "forward curve" (i.e. spot as well as forwards and futures) functioning. Such contracts enable market participants to effectively buy or sell gas for a fixed price delivering not only tomorrow, or next month, but several years into the future. This capability is an indicator of competitive wholesale markets, but also an enabler of retail markets. Collectively the market participants' needs metrics indicate whether or not it is possible to transact at a reliable market price, near and far-dated contracts, at all times, and in materially significant volume.

Justification of market participants' needs metrics

1. Order book volume: sufficient bid and offer volumes in the order book for delivery of gas reasonably far into the future allow market participants to buy and sell gas when they need it and support effective risk management.
2. Bid-offer spread: low bid-offer spreads mean low transaction costs for market participants and support market participants who have less flexibility over when they can trade.
3. Order book price sensitivity: low order book price sensitivity means less additional cost for market participants when buying or selling substantial volumes and supports market participants who have less flexibility with respect to when they can trade.
4. Number of trades: sufficient trading activities support market participants' confidence that prices are transparent and represent a reliable market price.

How the threshold values for each metric were determined

ACER conducted a questionnaire among market participants in order to inform its view, not only of the characteristics required for a well-functioning gas wholesale market but also to get some quantitative data on the levels that should be set for certain metrics (see Annex 4). The replies did not reveal a clear picture on the level of performance that should be targeted. However the replies, together with results of consultations from the "Bridge to 2025", and feedback from the AGTM Advisory Panel, did provide a clear consensus that the NBP and TTF are currently the best functioning traded gas markets in Europe and that it would be very beneficial if other wholesale gas markets in Europe achieved the performance demonstrated by NBP and TTF. To this end, ACER has defined the threshold values for the target performance of markets based on the estimated

performance of NBP and TTF in the year 2013[16]. This method of target setting, as well as the actual values, will be reviewed by ACER two years after the AGTM has been published and further stakeholder input will be sought. It is emphasised that measuring the performance of other markets relative to the current performance of NBP and TTF does not imply that NBP and TTF cannot or should not strive to improve even further.

GTM 2011 metrics that have been removed

We no longer have a market zone size metric because it is not an intrinsic wholesale market good. In GTM 2011 it was used as a proxy for liquidity, because a correlation between market size and the number of transactions is expected. As a number of new indicators that directly address market participants' needs have been introduced in GTM 2014, the market size indicator has become redundant. A larger market zone does have significant merits, though, and we accept that a bigger zone is likely to be necessary to support a forward/futures market (as opposed to a liquid, effective balancing market). However, it also could result in substantial socialisation of costs deriving from intra-zone constraints via re-dispatch by the TSO[17]. The optimal market zone size should not be artificially constrained by national borders, and in moving toward a single market larger zones have obvious appeal, but there are necessary trade-offs which must be properly assessed (see point 4.5). The churn rate metric has also been removed as we consider it a blunt measure of liquidity, whose definition is frequently and somewhat fruitlessly debated[18].

4.3 The status quo – assessing the functioning of European wholesale markets

As part of the revision of the GTM, an extensive analysis of traded gas wholesale markets at all the major EU gas hubs[19] has been undertaken. The analysis focused on physical gas contracts (spot, prompt and forward) traded on broker platforms and exchanges[20] in the year 2013.

The analysis determined how well the individual hubs performed regarding the market participants' needs metrics defined above.

The analysis revealed that outside NBP and TTF forward trading liquidity is severely limited, reaching only less than half a year into the future, while the NBP and the TTF trade up to two years into the future in a liquid market environment.

In spot markets, the German hubs NetConnect Germany (NCG) and Gaspool are much closer to NBP and TTF than in forward trading performance, while all other hubs also perform significantly weaker than NPB and TTF in spot markets.

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[16] I.e. the value per metric that either TTF or NBP scored was taken, whichever was less demanding.

[17] See p19: http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/GAS/GTM_CfE/Tab1/LECG%20Gas_Target_Model_0700311.pdf

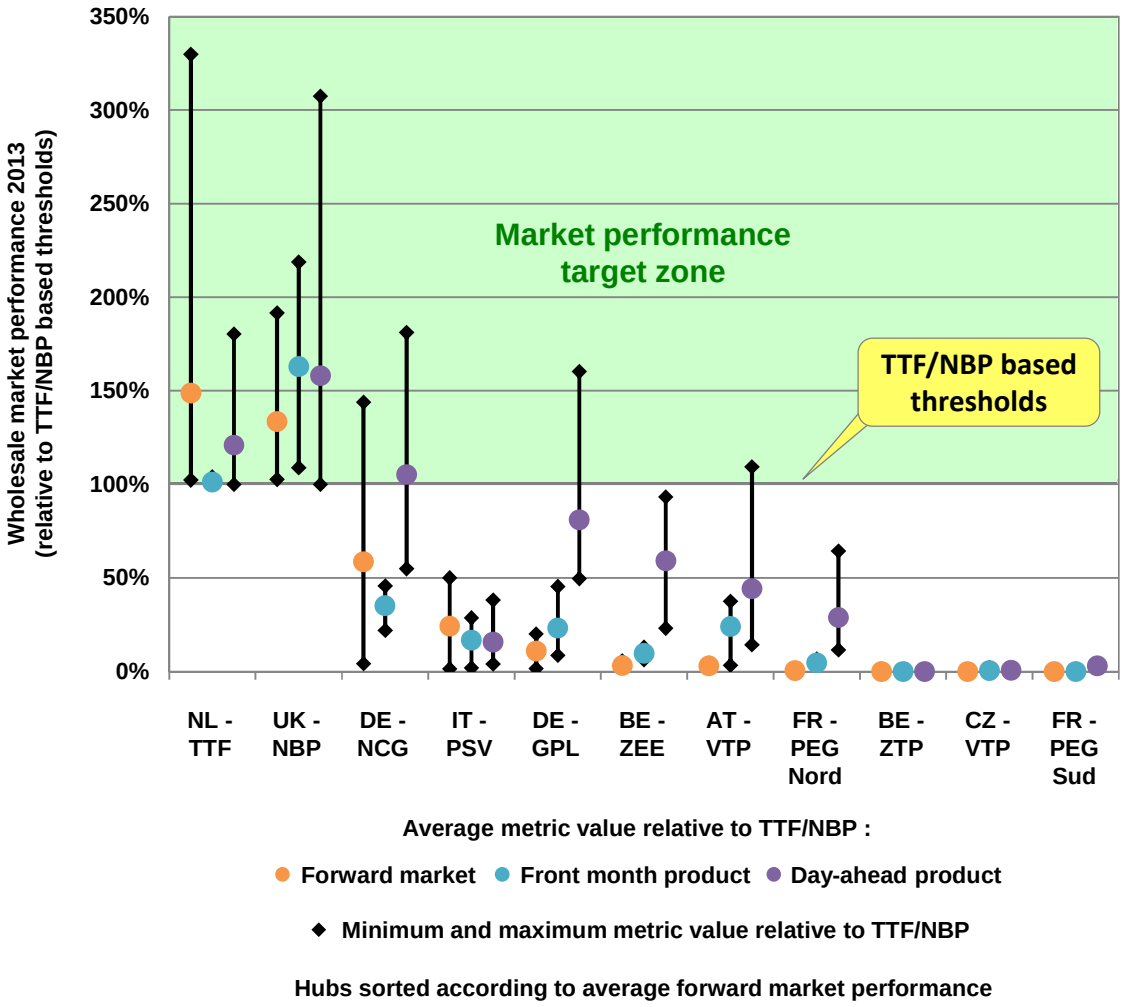
[18] The churn rate in itself does not determine whether or not a market area is well-functioning and liquid (but is merely an indicator of the market turnover). The churn is also computed on nominated volumes declared on a delivery day. Volumes thus correspond to the net of transactions and some of the underlying transactions may have been contracted months before through futures or forward contracts. The churn rate thus is not an objective indicator of traded volumes in e.g. a specific month.

[19] Please note: for the purpose of this document a hub is defined as the virtual point of an entry/exit systems where the TSO (or a separate independent entity dedicated at national level) handles all nominations for the transfer of title to gas between network users (or balancing accounts).

[20] Exchange volumes were taken into consideration for NBP, TTF, Gaspool and NCG; for all other hubs the respective data were not available.

Figure 3 provides the average, minimum and maximum metric values of the analysed hubs relative to TTF and NBP. It shows the sharp performance drop between TTF/NBP and all other markets, especially in the forward (and front month) markets. Detailed results of this analysis are provided in Annex 5.

Figure 3 Wholesale market metric values relative to TTF and NBP in 2013: Forward market, front month product and day-ahead product



For each market absolute values of the four 'market participants' needs metrics' were calculated for the forward, front-month and day-ahead sub-segment. These values were then put in relation to threshold values based on TTF/NBP's performance (→ relative metric values).
The figure above shows for the forward, front-month and day-ahead sub-segment of each hub the minimum, the maximum and the average of the respective relative metric values. Values above 100% mean that the market performs better than TTF/NBP in the respective sub-segment, values below mean the opposite.

Source: Wagner, Elbling & Company

In addition, an assessment of all EU countries against the original GTM 2011 targets has been completed (see Table 1). Only Great Britain (GB) meets all criteria (although other Member States in North-West Europe are close to it). Eastern European gas markets often meet none or only one of them. Furthermore, even in the North-Western European area, which has more highly functioning markets, a number of issues remain.

Table 1: Overall results of GTM 2011 criteria assessment

Member state	Churn rate	Zone size (TWh/year)	Number of sources	HHI	RSI
Austria	3	105	3	7,500	143%
Belgium	6	197	8	1,709	279%
Bulgaria		39	2	7,587	13%
Croatia		535	5	5,987	125%
Czech Republic		95	3	9,051	159%
Denmark		45	2	2,570	22%
Estonia		9	1	10,000	0%
Finland		36	1	10,000	0%
France	3	485	13	1,240	137%
Germany	4	438	4	1,982	116%
Greece		49	9	5,181	131%
Hungary		113	4	3,198	60%
Ireland		52	2	1,215	8%
Italy	3	799	12	2,093	108%
Latvia		15	1	10,000	0%
Lithuania		39	1	10,000	0%
Luxembourg		12	4	3,185	0%
Netherlands	7	424	6	2,488	189%
Poland		193	3	4,550	56%
Portugal		55	6	2,821	93%
Romania		157	4	3,270	104%
Slovakia		70	2	9,595	369%
Slovenia		12	5	5,027	74%
Spain		365	12	2,000	159%
Sweden		13	1	2,766	0%
United Kingdom	15	910	11	950	142%
GTM target	≥ 8	≥ 215	≥ 3	< 2,000	≥ 110

Source: Frontier Economics, based on Eurostat and BP Statistical Review 2013

4.4 The self-evaluation process

Regulators propose a process designed to ensure that in all Member States a regular review of the progress made towards fully functioning gas wholesale markets is undertaken. This will include the following steps:

- The refined set of criteria (see section 4.2) should be used to analyse each wholesale gas market. The set of criteria should be used as an indicative basis for analysis in a holistic way, taking into account market specificities. The aim will be to specify what matters directly to market participants and ultimately consumers;
- Based on the above set of indicative criteria and market facts (including the implementation of Network Codes), NRAs should conduct a periodic analysis (periodic should mean once every three years, unless more frequent review is warranted by significant market developments) of whether or not customers in their respective Member States are within a market meeting these criteria;

- For those markets where these criteria are not met, the NRAs should assess whether the natural evolution of the relevant market (e.g. as a result of implementation of Network Codes or due to expected infrastructure investments, etc.) can reasonably be expected to meet the criteria within a three year period or whether more active intervention is required. In this forward-looking assessment, NRAs should involve relevant national authorities and stakeholders.
- Where more active intervention is required, the NRAs should propose – based on the aforementioned assessment – a plan by which the target criteria can be achieved. This plan should be further developed with the involvement of the Member States and market participants (including public consultations as appropriate). The evaluation of market enhancement should include a cost-benefit analysis.
- For those (non-functioning) markets where the criteria is not met and where deeper market integration is considered the preferred option, the cost-benefit analysis should contain at least the costs of ensuring an adequate level of firm unrestricted capacities and other costs, as well as the benefits of integration (i.e. creation of a single demand and supply curve), benefits to competition (i.e. more efficient gas prices), benefits to Security of Supply and trading benefits (e.g. lower bid-offer spreads, lower risk management costs for market players, lower transaction costs, etc.).
- In cases where none of the three market integration tools as described in section 4.5 delivers a positive cost-benefit analysis result, the NRAs (in close cooperation with Member States) should propose surrogate measures which deliver the equivalent benefits of a fully functioning wholesale market to its end-users.
- As part of the periodic analysis, NRAs should also review the performance of the wholesale market, compared to their proposals and commitments stated in the above plans.
- In all cases, regardless whether the market-functioning criteria have been met, steps to improve hub functioning as outlined in Annex 8 should be pursued.

It is crucial to ensure that these processes are transparent, objective and inclusive. To this end, NRAs should undertake public consultations where necessary and appropriate, ensuring the full involvement of market participants. In cases where the proposed (national or cross-border) solutions will have an effect on neighbouring markets, NRAs should also consult the other relevant NRAs.

4.5 Unable to meet GTM 2014 criteria

If, following the evaluation process described above, a Member State is unlikely to have a functioning wholesale gas market by 2017 (even if by then full implementation of EU Network Codes and Guidelines, as well as implementation of best practice in hub design as per Annex 8 is foreseen), structural market reform is necessary. All such measures should be designed to further the objectives of "market health" and meeting market participants' needs. They must be subject to a rigorous cost-benefit analysis. Options for structural reform may include, but are not limited to, the following market integration tools:[21]

- **Market merger:** full merger of two or more adjacent markets by merging their virtual trading points and their balancing zones creating one unified (cross-border) balancing zone covering all gas networks of the merged markets, which is underpinned by an integrated (cross-border) entry/exit-system.
- **Trading region:** partial merger of two or more adjacent markets on the wholesale level by merging their virtual trading points and establishing a cross-border trading balancing zone, including all gas transmission systems of the merged markets, which is underpinned by an integrated (cross-border) entry/exit-system. End-user balancing remains separate in individual end-user balancing zones for each participating market.

[21] See Annex 6 for a more detailed description of market integration and connection tools.

- **Satellite market:** substantial linking (via pipeline capacity) of a non-functioning gas market to a directly neighbouring functioning gas wholesale market, hence allowing the satellite market to co-use the neighbouring gas wholesale market on the basis of simplified processes while maintaining its own balancing zone.

As noted above, it is important to emphasise the GTM is not prescribing an exhaustive list here. The right structural remedies for a gas market which is unlikely, without intervention, to meet the GTM 2014 criteria must be fundamentally rooted in the specifics of each situation, unconstrained by artificial regulatory and financial barriers. For example, additional tools such as market coupling can have a beneficial effect by facilitating the coordinated access to capacity and spot gas markets at the same time.

4.6 Conclusions

The ACER Market Monitoring report estimated that insufficient interconnection of wholesale gas markets led to an estimated gross welfare loss of roughly EUR 7 billion (bn) in 2013[22]. Functioning European gas markets which meet the needs of EU gas users are also the exception rather than the rule in 2014; the year the IEM is due to be completed.

Therefore ACER proposes an overall process which ensures a regular assessment of the market situation and progress and, as a further step, the development of appropriate proposals as well as the monitoring of the achievement of set goals.

ACER also suggests a range of measures to ensure best practice in gas market design and operation. However, if a Member State is unlikely to achieve a position where gas consumers will have access to a well-functioning wholesale market, further structural measures should be considered. Those measures should be sensitive to, and appropriate for, the specifics of the market area under consideration. They must be subject to a rigorous cost-benefit analysis, and designed to ensure "market health" as discussed above and meet "market participants' needs".

[22] See http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER_Market_Monitoring_Report_2014.pdf.

5 The role of gas in complementing RES electricity generation

This section discusses aspects of the role that gas could play in moving the EU towards a low-carbon energy system.

There will be an increasing need for flexible response, including from gas-fired power stations, to complement the growing volume of intermittent renewable-based electricity generation.

The Agency proposes reviewing national gas network tariff structures and arrangements regarding capacity products that potentially distort market signals which indicate when it is efficient for gas-fired power stations to run.

Furthermore, the Agency proposes to improve collaboration between the gas and electricity sectors, including arrangements for gas and electricity TSOs to cooperate more closely with one another in a number of areas.

5.1 Objective

Given the EU's environmental and energy security policy goals, intermittent RES generation capacities are likely to increase significantly over the coming years. This will create a substantial demand for complementary electricity generation technologies to address the problems that intermittency causes.

The objective is to ensure that regulatory and market arrangements allow efficient use to be made of gas-fired plants as part of an overall policy of minimising the cost of meeting the EU's environmental goals. While the evolving use of gas in power may prompt changes to energy sector arrangements, the intention is not in any way to subsidise gas-fired generation.

5.2 Status quo

A problem with many RES technologies is that output suffers from intermittency. For instance, the output of wind turbines depends on wind conditions, which are continually changing, and the output of photovoltaic installations depends on the level of cloud cover. While energy storage is theoretically a solution to cope with intermittency, the potential of such storage is very limited in most regions of Europe. Therefore other technologies have to be used to ensure the provision of adequate generation capacity during peak load periods, as well as quick responses to changes in RES generation.

Gas-fired power plants are currently the technology most suited to this task. The reasons for this are:

- Plants called on to complement intermittent generation are likely to operate at lower load factors (level of utilisation) than that at which these plants have traditionally operated. From an economic perspective, lower utilisation of a plant makes the capacity cost element more important and gas-fired plants have a lower specific investment cost (i.e. cost per capacity installed) than, for example, a coal plant.
- From a technical point of view, gas-fired plants (particularly open cycle gas turbines) are able to provide the flexibility (that is, fast "ramp up" and "ramp down") that is required in the reserve markets[23].
- Compared to other fossil fuels, gas has a low CO_2 emission factor (natural gas electricity generation can result in half of the emissions of coal-fired electricity generation). Therefore, assuming that some fossil fuel fired generation is still required, using gas-fired power plants, rather than other fossil fuel plants, will contribute to the achievement of European emission reduction goals.

[23] We note that significant improvements have been made in the flexibility (ramp-up rates) of coal fired plants but the capital cost of coal plants remains much higher than for gas-fired plants.

Why may action be necessary?

The way in which gas-fired plants have operated has evolved rapidly in recent years. It is not solely the growth of RES that is responsible for this change: the relative prices of gas, coal and CO_2 have been key drivers. Nevertheless, it is still appropriate to consider whether regulatory and market arrangements remain fit for purpose given this change. There is a case to be made that arrangements both within the gas sector and between the gas and electricity sectors are suboptimal.

For example, in relation to gas sector arrangements, transportation tariffs in some Member States are based on maximum demand within a given month, which can dis-incentivise generation in the latter part of the month if the plant has not already generated in that month. Also, tariffs related to the use of storage and the bundling of storage products often inhibit the efficient use of storage for flexibility, now a key requirement for gas-fired generators filling the 'gap' left by intermittent RES. In relation to coordination between the gas and electricity sectors, generally the absence of effective communication between gas and electricity TSOs, as well as between TSOs and market participants, means that information that could be used to improve operational efficiency is not being made available. For example, in some Members States, gas-fired power generators are exposed to imbalance payments but face unnecessary difficulties assessing current imbalance costs owing to a lack of transparency regarding the imbalance status of the total gas system, information which is known to gas TSOs.

The need to improve arrangements is not obviated by the introduction of electricity market capacity mechanisms. Although capacity mechanisms may compensate generators for certain costs, it remains desirable that energy sector arrangements are made as efficient as possible in order to minimise those costs.

In the context of the GTM, there is therefore a need to consider, not only the Security of Supply for gas, but also the implications that gas arrangements have for the feasibility and cost of Security of Supply for electricity. Both are affected by the operation of the gas network and the extent to which market arrangements are coordinated with the power system.

5.3 Recommendations

In light of the declining gas demand experienced in Europe, ACER proposes a review of existing arrangements with a view to minimising the extent to which, given existing infrastructure, gas users, most notably power plants, are dis-incentivised artificially from operating when it would be efficient for them to do so. This review shall focus on the capacity products offered at the domestic exit points (which are not within the scope of the CAM NC) as well as any multipliers and/or seasonal factors applied at these points (which are not within the scope of the draft Tariff NC). For exit points to gas-fired power plants, the offer of within-day capacity products should be promoted.

ACER also proposes that measures be put in place to ensure that the full efficient use of gas storage is made available to all shippers, especially to those serving unpredictable loads, and that they are able to meet balancing requirements and any within-day obligations in a cost efficient manner. These measures may include the full unbundling of storage products, where this has not yet been offered, in order to facilitate evolving new patterns of gas use.

To improve the joint working of the electricity and gas sectors, ACER proposes that an obligation be placed on gas and electricity TSOs to cooperate with one another. The aim of this cooperation would be to achieve better joint optimisation of the two sectors. This would involve:

- improved information flows, so that system operators and market participants benefit from more timely information, allowing all parties to improve the optimisation of their operational decisions; and,
- a cooperative review of aspects such as:
    - industry timelines to explore, where not already amended by the existing Network Codes, whether any alteration of their relative timings could improve the coordination of markets before and after gate closure (reducing the lead times related to reserve procurement is an area that deserves particular attention); and,
    - the potential for improved coordination in the development of gas and electricity Ten Year Development Network Plans (TYNDPs).

However, ACER notes that measures identified as potentially desirable must be subject to appropriate cost-benefit analysis before implementation. It should also be noted that such measures alone are not expected to solve the economic problems that many operators currently face. However, they can contribute to a more efficient interaction between gas and electricity markets. With the increasing importance of gas for the supply of electricity, these measures will become more important over the coming years and will contribute to a higher Security of Supply in the power system.

While interventions of the type discussed here may offer the possibility of at least some limited improvement in the overall economics of gas-fired power plants, there are other important potential developments in European environmental policy that may also improve the efficiency with which Europe utilises gas in power generation. These include:

- further alignment of environmental policies among Member States; and,
- a reduction in the disparity between the cost of RES support for mature technologies and the pricing of greenhouse gas emissions.

Regulatory arrangements should remove artificial barriers that would otherwise inhibit the extent to which gas-fired plants are able to respond to the improved opportunities through which they can contribute to a sustainable energy future for Europe. Energy regulators will further investigate this area and will fully support the cooperation between gas and electricity TSOs in this respect.

6 New developments along the gas supply chain

This section refers to the analysis of whether the existing regulatory framework might unnecessarily hinder the developments along the gas value chain and identifies proposals on how to overcome such potential obstacles.

Against the backdrop of decreased gas demand in Europe in recent years (see Section 0), certain innovative technological developments, in combination with new legal requirements - several of them driven by environmental concerns[24] - are likely to create new prospects for gas consumption in the EU. These developments may have different roles along the natural gas supply chain: some of them constituting (until recently) atypical uses for final gas consumption, while others relate to other distinct roles along the supply chain, such as new production, storage or gas distribution means.

These new developments relate to the intensification of the use of gas in the transportation sector (in both liquefied (LNG) and compressed natural gas (CNG) forms), small scale applications of LNG and CNG, including alternative distribution means such as virtual pipelines, and pioneer technologies facilitating the storage of electricity generation in the form of hydrogen or synthetic gas ("power to gas"). Some of these techniques are already operative in a number of countries around the world. However, in the EU their present degree of deployment is in general limited.

The estimated potential of each of these developments varies according to the market conditions and their maturity levels. In general, market aspects such as pricing levels, taxation regimes, infrastructure availability and industry commitment will impact the future prospects for their expansion most. Furthermore, the regulatory framework for these activities will also have a certain influence. As part of the GTM update, we are taking these new developments into account with a view to better coordinate NRAs' positions where needed and to collaborate in setting a fair EU regulatory framework that may facilitate their expansion.

6.1 New developments: brief description of the technologies and their presence in the EU[25]

6.1.1 Natural gas vehicles (NGVs):

Natural gas has been gaining ground as an alternative fuel option for land transport in the EU in recent years, as a result of its current competitive price in comparison to petrol and EU policies to minimise air pollution from vehicles.

Natural gas can be stored in a vehicle in either compressed (CNG) or liquefied (LNG) form. It is utilised in either dedicated natural gas engines or dual-fuel engines, which originally burned petrol or diesel. The type of gas utilisation depends mainly on the vehicle usage and location of operation. Each form of utilisation has its advantages and disadvantages:

- CNG is preferable for light duty vehicles moving mostly within a city or its vicinity. CNG is more easily accessible as it can be supplied from filling stations directly connected to the gas network. In contrast, LNG

[24] See for example the EU directive proposal on the deployment of alternative fuels infrastructure: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0018:FIN:EN:PDF

[25] For an extensive review of the specific new developments, technical features and growth forecasts see the ACER study, carried out by Kantor consultancy, on the *Regulatory implications of new developments in the gas supply chain*: http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/Regulatory%20Implications%20of%20New%20Developments%20in%20the%20Gas%20Supply%20Chain.pdf

filling stations require a virtual pipeline for their supply, and as a result LNG stations are more expensive and less common than CNG ones.

- LNG has an energy density that is roughly triple that of CNG as it is a liquid. It is less dependent on refilling stations, which is important for vehicles covering long distances, such as trucks. The more challenging technical requirements for LNG solutions (i.e. the need to maintain a low temperature and boil-off generation that needs to be used up) makes them more appropriate for heavy duty vehicles such as transport fleet trucks than for light duty vehicles.

The current penetration of CNG in the EU land transport sector is very limited, as only 0.4% of the light duty vehicles[26] are NGVs. Italy and Bulgaria are the Member States with the highest proportional penetration, with around 2% of their total fleets. In absolute numbers, Italy[27] and Germany have the largest number of NGVs, as well as by far the most CNG filling stations. Regarding buses, 1.8% of the EU fleet is powered by natural gas, all in the form of CNG.

The use of LNG in the EU land transportation sector is minimal. Currently only 0.04% of the EU's heavy duty vehicles are powered by LNG, and these are able to refuel at only 77 stations. The vast majority of the stations are located in the UK and Spain. The enlargement of the network of LNG filling stations through EU corridors is key to the further expansion of LNG for transportation within the EU.

The retrofitting or new purchase of CNG or LNG vehicles requires extra investment compared to petrol or diesel models. The economic attractiveness of the gas investment hinges on the interplay of three parameters: the amount of the extra-investment[28], the price differential between gas and the fuel it replaces (this differential may vary considerably depending on the EU country, as it is strongly influenced by taxation policies) and the intensity of utilisation of the vehicle. As an illustration, the final pay-back period for a retrofitted CNG car (medium class) in Germany is close to 4.5 years for an annual usage of 30,000 km. In the case of a LNG truck driving 100,000 km per year, calculations point to a 4.7 year pay-back period[29].

Regarding rail transport, the present use of gas in the EU is negligible, and for a variety of reasons it is expected to remain marginal in the foreseeable future: the large proportion of electrified railways, the current non-competitive EU gas prices as a substitute fuel and the amount of coordination that would be required between EU rail operators.

6.1.2 Water transportation

The use of gas in water transportation is driven by environmental concerns and by its price competitiveness compared to other marine fuels. LNG is considered to be economical[30] in comparison to current marine fuels, but the lack of refuelling infrastructure hinders more extensive deployment. The use of LNG in the European water sector is very limited, with Norway possessing most LNG-powered vessels. Bunkering facilities are not

[26] 2013 figures

[27] The fact that Italy has the largest fleet of NGVs in Europe of 850,000 (77% of Europe's fleet) with 912 public CNG filling stations, is a direct result of the government's promotion of a conversion programme through subsidies and the relevant price differential of gas with petrol prices, partly due to taxation.

[28] For example, the cost of retrofitting a new car to storage CNG is about EUR 2,000 in Spain or Germany (source: OEI)

[29] See detailed calculations on the *Regulatory implications of new developments in the gas supply chain* study (footnote 2)

[30] The break-even point of LNG retrofitting technologies depends on the price differential between LNG and marine fuel oil products, in conjunction with the operating hours. Payback periods on average are estimated to be three to five years for deep-sea trading vessels

available at all terminals in the EU, while the current LNG supply chain is designed to handle only large LNG carrier vessels greater than 150,000 m^3. Therefore, adaptations are required to accommodate smaller vessels.

The International Maritime Organization (IMO) has set restrictions of nitrogen oxide (NOx) and sulphur oxide (SOx) emissions from ship exhausts. The more stringent ones are applicable in Emission Control Areas (ECAs). Current EU ECAs are the Baltic Sea and the North Sea, and possible future ECAs are the Scandinavian Sea and the Mediterranean Sea. One of the means by which ships can meet the new requirements is to switch to LNG fuels, so this may have a positive impact on the growth of this technology in the future.

6.1.3 Power to gas (P2G) technologies

P2G technology acts as a link between the electricity and the gas systems. P2G is a technology – water electrolysis combined with hydrogen methanation – that takes electricity as an input and transforms it in either hydrogen or synthetic methane. The output of a P2G unit is injected into the existing natural gas network, thus facilitating the storage and transport of energy. P2G particularly aims to profit electricity curtailed RES generation, but also aims to act as a balancing tool in the electricity market. The advantages of this technology include the ability to separate supply from demand, improved stability in the electricity network and better predictability of renewable energy production.

Germany is leading the way in P2G, with currently around 15 operational pilot and demonstration projects. However, the current lack of large scale P2G applications - and of a clear business case - does not facilitate a clear insight into the future technology's economics in the EU. Several key issues need to be tackled before a large-scale integration of P2G solutions in the network becomes possible. The structure of the electricity markets, their system management rules, and the role of RES producers are the key factors affecting the supply chain of P2G.

6.1.4 Virtual pipelines

A virtual pipeline consists of a supply chain for delivering natural gas to final consumers in the form of CNG or LNG by using road or sea transportation such as trucks or ships. Virtual pipelines have advantages in terms of flexibility in the transportation routes and versatility in the location and dispersion of final consumers; however, they require high investment costs on the final consumer side and usually are more expensive than pipeline solutions[31]. Virtual pipelines are used either as an intermediate step for the supply of regions prior to the implementation of gas networks or in cases where the construction of pipeline systems is not cost effective or technically not feasible.

The existence of LNG consumption sites in certain EU markets such as Spain has led to the deployment of LNG virtual pipelines involving the liquefaction, transportation and storage of LNG. Some Member States, such as France and Sweden, have also recently commenced non-piped gas supplies. In this regard, Spain has shown the most activity in road transportation of LNG, using truck loading terminals at all its LNG import facilities. Virtual pipelines are also developed in the UK, with LNG supplies from liquefaction terminals installed at gas production fields. Additionally, LNG truck loading terminals are available in Belgium, France, the Netherlands and Portugal. The future development of LNG virtual pipelines will be closely connected to that of LNG filling stations, as this is the only supply option for stations located away from LNG terminals. In the case of CNG,

[31] The cost effectiveness of the CNG virtual pipelines depends on the size and location of the final consumers supplied, the distance from the loading terminal and availability of road routes; in general the supply of an end user or distribution network by a virtual pipeline is only economically viable for distances between 150 and 300 km

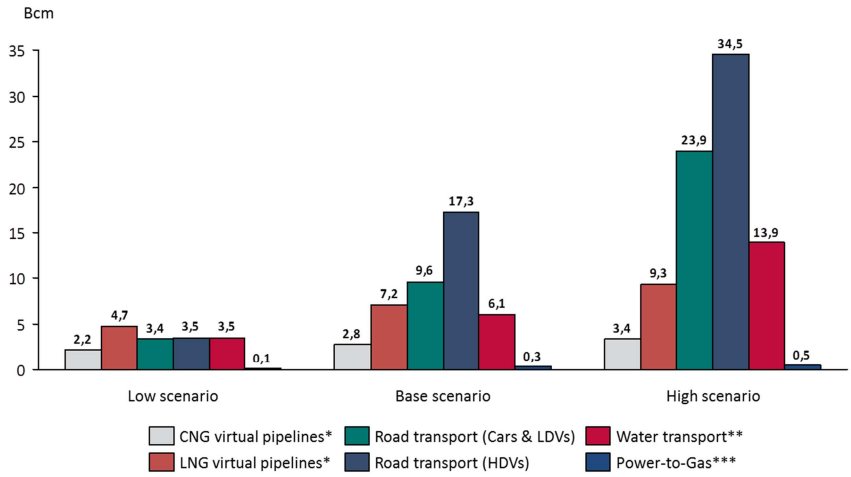
filling stations are generally connected to the network. Nevertheless, present cases of CNG virtual pipeline applications in Europe include the supply of CNG to remote consumers in Italy and Bulgaria.

6.2 Growth forecast

The use of gas in the land transportation sector is expected to have the largest potential of the developments described above, in particular for heavy duty vehicles using LNG. There are also reasonable prospects for the use of CNG in light duty vehicles, given the large fleet of vehicles that could switch to natural gas. The final stage of NGV expansion will depend on a combination of factors such as the infrastructure availability, price differentials with other fuels, environmental obligations, taxation levels, subsidies and supporting programs, industrial commitment and the performance of other competitive technologies such as the electric, hybrid or low-emissions petrol vehicles. Part of this new NGVs' consumption is expected to be supplied by new LNG filling stations and to a lesser extent by CNG filling stations, sourced by virtual pipelines. Water transportation gas demand could also be relevant in certain scenarios. The forecasted volumes for P2G technology are low, as its future is still considered to be uncertain in the short- and medium-term.

Figure 4 summarises the estimated market sizes in 2025 for all these new developments, according to various hypotheses and scenarios included in the recent study commissioned by ACER[32]. The results indicate that the aggregated new developments' yearly consumption could represent between 3% and 15% of total EU gas consumption.

Figure 4: Market sizes for all the analysed new gas supply chain developments in 2025



* Virtual pipelines: supply of CNG and LNG filling stations not included in the values
**Water transport: data used are projections for 2020
*** Power-to-Gas: hydrogen output converted to natural gas equivalent, using GCV of Russian gas

6.3 EU regulation that may influence the growth of the new developments

Even though the expansion of the various developments will be mainly dependent on market aspects, certain regulatory dimensions will also influence the final results, particularly in the case of NGVs. Among the most

[32] See footnote 2.

relevant regulations are the new *Directive on the deployment of alternative fuels infrastructure*[33] (AFI Directive) and the proposed new *Energy Taxation Directive*[34].

The AFI Directive establishes a common framework of measures for the deployment of alternative fuels infrastructure in the EU. The fuels covered in this Directive are electricity, hydrogen, biofuels, synthetic and paraffinic fuels, CNG, LNG and LPG.

The AFI Directive:

- requires EU Member States to develop national policy frameworks setting national targets for the market development of each alternative fuel and the required infrastructure;
- foresees the use of common technical specifications for recharging and refuelling stations[35]; and,
- sets specific targets for the timing of the development of each infrastructure, mainly for around 2020 and beyond.

As the widespread adoption of CNG and LNG as a fuel in the transport sector is highly dependent on the creation of a sufficient network of filling stations, the AFI Directive will play a role in boosting the development of the required network of stations throughout the EU. The AFI Directive aims also to increase the availability of bunkering services at an EU-wide level, to facilitate the refuelling of ships with LNG.

Another key dimension for the development of the market for CNG and LNG in the transport sector are EU and Member States' policies regarding incentives (subsidies), and favourable taxation regimes for natural gas that could result in a competitive advantage for gas compared to other alternative fuels.

The Energy Tax Directive currently in force[36] foresees present favourable taxation levels for natural gas. In 2011 the EC put forward a proposal for a revision of the Energy Tax Directive which recommends updating the rules for setting minimum tax rates for fuels. According to the proposal, the minimum tax imposed on all motor fuels would consist of two parts:

- the energy part, which was proposed to be the same for all fuels (in EUR/GJ) and calculated at the level of petrol; and,
- the CO_2 part, taxing at EUR 20 per tonne CO_2 according to the emissions produced by each fuel.

If the proposal is made effective, the new minimum resulting taxes will converge more closely, as they will be driven by the energy component. In this regard natural gas will not be as competitive in terms of tax when compared to the current situation, though the Directive is proposing minimum levels and the final taxation decision could vary between Member States. Although the proposal has not been adopted, the view of several gas stakeholders is that it undermines the growth of the NGV market.

6.4 ACER and NRAs positions and recommendations

In order to facilitate the aforementioned new developments along the gas value chain, a number of regulatory issues need to be addressed. Addressing such issues does not necessarily mean a harmonised approach at EU

[33] See directive 2014/94/EU on the deployment of alternative fuels infrastructure, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0094&from=EN

[34] See European Commission proposal for a Council directive COM(2011) 169/3http://ec.europa.eu/taxation_customs/resources/documents/taxation/com_2011_169_en.pdf

[35] Specifically for CNG and LNG the technical standards to be applied by the member states are to be developed by the relevant European or International Standards Organisations

[36] Directive 2003/96/EC

level, since the actual level of competition in each country and per activity may play a role. These are some of the key points to be addressed:

- Which of these activities should be regulated (in particular loading/bunkering activities at LNG storage facilities);
- LNG and CNG filling stations should not be considered as suppliers of gas, and consequently should not be subject to TPA or licensing procedures;
- A level-playing field between piped and non-piped supplies must be facilitated, in order for gas-to-gas competition to take place if the market demands it;
- Particularly in the case of P2G: the technical provisions for the injection of hydrogen and synthetic gas into the gas system, the pricing regime, the role of the P2G operators, the balancing aspect and the integration in the electricity system.

ACER and the NRAs are committed to providing a fair regulatory framework which addresses all relevant issues. Therefore, within their area of competence they will be working on the recommendations summarised in Table 2 for each of the new developments assessed.

Table 2: Summary of main ACER and NRAs considered positions to facilitate a fair regulatory framework

New development	***ACER/NRAs position***
CNG virtual pipelines	• The national distribution Network Codes foresee supplies with CNG virtual pipelines, including clear provisions as to the connection of CNG shipments and dispatching of gas from CNG containers.
LNG virtual pipelines	• Examine the appropriateness of establishing an EU-wide approach for cases where LNG storage and loading facilities should be regulated.
CNG/LNG in land transport	• Ensure that CNG and LNG filling stations are considered end customers rather than gas suppliers, and therefore they are not obliged to conform to the requirements imposed on gas suppliers. • NRAs will include the supply of gas to the filling stations in their market monitoring practices.
LNG in water transport	• Establish a common approach setting out whether and when the bunkering of a vessel with LNG is a regulated activity or not. • Where the loading service provided by the LNG terminal is unregulated, enforce provisions accounting for the use of assets for both regulated and unregulated activities and reductions to the operator's RAB, where appropriate.
Power-to-gas	• Examine the regulatory framework and the impact of P2G technology, particularly as a tool for electricity balancing and demand-side response.

Annexes

Annex 1: ACER

The Agency for the Cooperation of Energy Regulators (ACER) is a European Union body established in 2010. ACER's mission is to assist National Regulatory Authorities in exercising, at Community level, the regulatory tasks that they perform in the Member States and, where necessary, to coordinate their action.

The work of ACER is structured according to a number of working groups, composed of ACER staff members and staff members of the national energy regulatory authorities. These working groups deal with different topics, according to their members' fields of expertise.

This report was prepared by the ACER Gas Target Model Task Force (AGTM TF) of the ACER Gas Working Group (AGWG).

Annex 2: Glossary and abbreviations

ACER	European Agency for the Cooperation of Energy Regulators
CAM NC	Capacity allocation mechanism network code
CEER	Council of European Energy Regulators
CHP	(Gas-fired) combined-heat-and-power
CMP	Congestion Management Procedure
CNG	Compressed natural gas
DSO	Distribution system operator
EC	European Commission
ECA	Emission Control Area
EFET	European Federation of Energy Traders
ETS	Emission trading system
EU	European Union
GTM 2011	CEER vision for a European Gas Target Model – Conclusions Paper, Ref: C11-GWG-82-03, 1 December 2011
GTM 2014	European Gas Target Model – review and update, Ref: A14-AGTM-06-03, 2014
HHI	Herfindahl-Hirschman-Index
Hub	The virtual point of an entry/exit system where the TSO (or a separate independent entity dedicated at national level) handles all nominations for the transfer of title to gas between network users (or balancing portfolios).
IEA	International Energy Agency
IEM	Internal Energy Market
IMO	International Maritime Organization
NGV	Natural gas vehicle
LNG	Liquefied natural gas
NBP	(British) National Balancing Point
NC	Network Code
NRA	National Regulatory Authority
P2G	Power-to-gas
PCI	Project of common interest
RES	Renewable energy sources
RSI	Residual Supply Index
TSO	Transmission system operator
TTF	Title Transfer Facility – virtual trading point for natural gas in the Netherlands
TYNDP	Ten-Year Network Development Plan

Annex 3: Calculation specification for wholesale market metrics

Please see separate document.

Annex 4: Stakeholder requirements on gas forward markets: results from the 2014 market inquiry

Please see separate document.

Annex 5: Metrics for market participants' needs: results for selected European gas markets

Please see separate document.

Annex 6: Description of market integration tools

Please see separate document.

Annex 7: Brief description of ongoing cross-border market integration projects

- **COSIMA** project (integration between Austria West and Germany NCG)

General features

Geographic scope: Austria West (Tyrol & Vorarlberg) and Germany (Net Connect area)

Project participants: E-Control, BNetzA, Net Connect Germany, German TSOs (terranets, Bayernets, OGE), Austrian DSOs (TIGAS, Vorarlberger Energienetze), AGGM

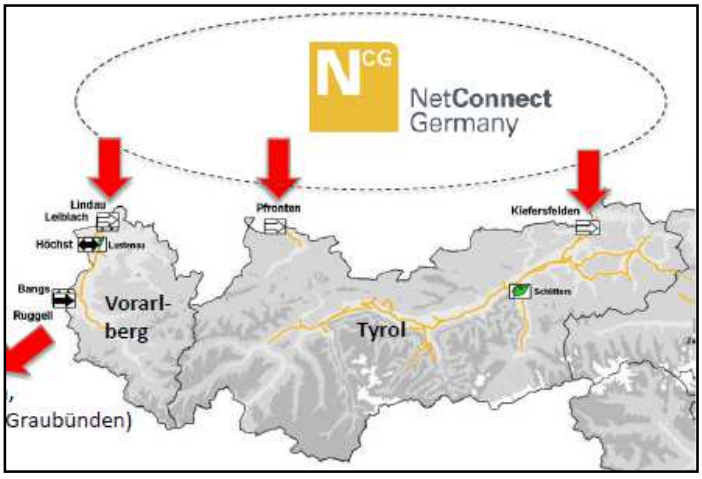
Market integration model: Satellite market (COSIMA: Cross-border Operating Strongly Integrated Market Area)

Current status and timeline: implemented on 1 October 2013, directly integrated into European, Austrian and German legal frameworks

Short description of the project

The gas market model "Cross-border Operating Strongly Integrated Market Area" (COSIMA) has been designed to enable a stronger link between the Tyrol and Vorarlberg market areas, located in Austria, and the market area Net Connect Germany (NCG). The COSIMA model is legally enshrined in the Gas-Marktmodell-Verordnung (Gas Market Model Ordinance) 2012 of E-Control Austria. For suppliers, COSIMA means unobstructed links between the Austrian market areas of Tyrol and Vorarlberg and the German NCG market area. This is achieved by eliminating the need for suppliers to book cross-border capacity: any and all capacity that is needed to supply consumers in Tyrol and Vorarlberg is booked by the Austrian distribution area manager (DAM). It is not necessary to allocate the capacity to individual balance groups in

Germany and Austria. In cases where gas is to be transited through Vorarlberg into Liechtenstein or Grisons, the responsibility to book exit capacity with the system operator terranets bw remains with suppliers.



More information on the project can be found in:

http://www.e-control.at/portal/page/portal/medienbibliothek/gas/dokumente/pdfs/Description_Market%20model_T%2BV_en.pdf

http://www.aggm.at/en/legal-framework/market-model?print=yes

- **CEETR** project (Austria, Czech Republic, Slovakia)

General features

Geographical scope: Austria, Czech Republic and Slovakia

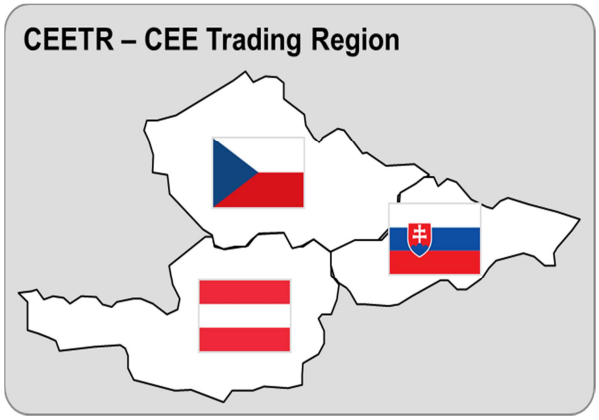
Project participants: NRAs and TSOs from the three countries involved

Market integration model: trading region

Current status and timeline: The project is currently on hold. A feasibility study was conducted in 2012. As a result of the study the CEETR concept was developed with limited changes to existing regulation and without additional investments. The next step (depending on the commitment of the NRAs and TSOs involved) could be an implementation study detailing all processes, contracts, roles, capacity and balancing models required, including an implementation plan. The study results will determine whether the project will be implemented or not.

Short description of the project

The CEETR project aims to integrate the gas markets of Austria, Czech Republic and Slovakia through the creation of a trading region comprising the three countries. E-Control, together with the Czech TSO NET4GAS, the Slovak transmission system operator Eustream and the Austrian gas exchange CEGH, commissioned a consultancy study to develop high level principles for cross-border market integration from an institutional point of view. The case study describes a model for the possible implementation of the trading Region in the Czech Republic, the Slovak Republic and Austria.



More information on this project can be found at:

http://www.e-control.at/en/publications/studies/cross-border-market-integration

- Integration of Spanish-Portuguese gas markets (**Iberian gas market - Mibgas**)

General features

Geographical scope: Spain and Portugal

Project participants: CNMC, ERSE, Enagas, REN, Ministries and stakeholders from both countries

Market integration model: three possible models under study – market area, trading region and wholesale market with implicit capacity allocation

Current status and timeline: an analysis was carried out by the NRAs involved in the first half of 2014 and a report with the current options under investigation was submitted to public consultation in September 2014. The final decision on which model could be implemented will be taken in 2015, taking into account the outcome of this consultation.

Short description of the project

The project aims to integrate the gas markets of Spain and Portugal into a single Iberian Gas Market (Mercado Ibérico de gas, or Mibgas). Several possible integration models are being analysed, in order to evaluate their feasibility, taking into account the current market conditions and their advantages and drawbacks. Attention is also being paid to their requirements in terms of regulatory changes, interconnection capacity and their impact and expected effects.

More information on this project can be found at:

http://www.acer.europa.eu/Gas/Regional_%20Intiatives/South_GRI/Public_Consultations/Pages/PC-on-the-integration-of-the-ES-PT-gas-markets.aspx

- **BeLux** (Belgium and Luxemburg market integration project)

General features

Geographical scope: Belgium and Luxembourg

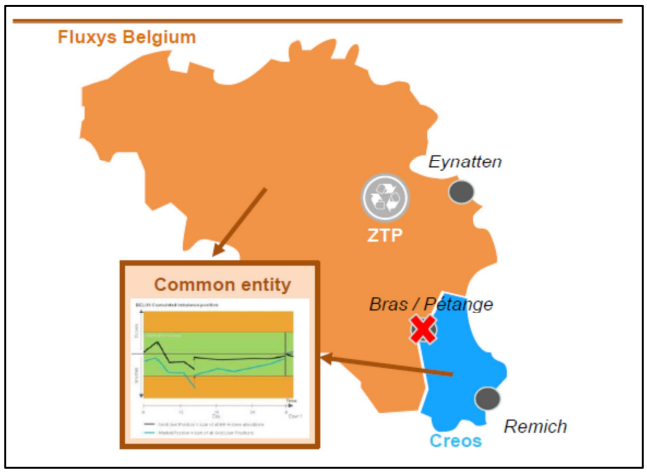
Project participants: CREG, ILR, Fluxys Belgium and Creos Luxembourg

Market integration model: market merger

Current status and timeline: the target launch date is 1 October 2015

Short description of the project

The BeLux project aims to integrate the gas transport markets of the Grand Duchy of Luxemburg (TSO Creos Luxembourg) and Belgium (TSO Fluxys Belgium) (Hgas) in one balancing zone, by creating one common Entry/Exit system with one common balancing regime and one notional trading point (ZTP). There will be one harmonised set of balancing rules and one common balancing contract. The expected benefits of the project are improved market functioning and added value for customers, improved Security of Supply in Luxembourg and efficient implementation of the Network Codes in both countries.



More information on the BeLux project can be found at:

http://www.fluxys.com/belgium/en/NewsAndPress/2014/140522_Press_Creos

http://www.creos-net.lu/fournisseurs/gaz-naturel/marche-gazier-integre-belux.html

- **V4 Roadmap** for the integration of Visegrad countries (Poland, Czech Rep., Slovakia, Hungary)

General features

Geographical scope: Poland, the Czech Republic, Slovakia and Hungary

Project participants: NRAs and TSOs from V4 countries

Market integration model: to be determined

Current status and timeline: a roadmap for the integration of V4 countries was launched under the Polish presidency of the V4 group in the summer of 2013, after being adopted by the V4 Prime Ministers during the V4 summit on 16 June 2013. The next concrete steps for the implementation of the V4 Roadmap have not as yet been defined.

Short description of the project

The project aims to analyse possible ways for market integration within the Visegrad Region (V4 - Poland, the Czech Republic, Slovakia and Hungary) in line with the roadmap towards the common regional V4 gas market. Following the endorsement of such a roadmap in June 2013, the implementation phase is to be developed within the GRI SSE region to ensure consistency with other regional projects in the same field. An agreement between the market parties involved on the specific market model has not as yet been reached.

More information on the project can be found at:

http://www.acer.europa.eu/Gas/Regional_%20Intiatives/South_South-East_GRI/Pages/GRI-SSE-studies.aspx

http://www.visegradgroup.eu/documents/official-statements

Annex 8: Best practice in gas market design[37]

Regulators consider that all wholesale gas markets should ensure the following characteristics are met as a matter of best practice: adequate level of liquidity (spot and forward), wide accessibility and connection to a gas exchange.

Measures that can help to improve liquidity (spot and forward) in a wholesale market are:

a) Regulators should guarantee that the hub[38] is operated (by the TSO or by an ad hoc Hub Operator) in a fair and non-discriminatory manner. To allow this, a Code of Conduct or Guidelines for Good Practices for Hub Operator could be developed.

b) Regulators and/or Governments could impose ad hoc regulatory measures on incumbents. For example, regulators can ask the incumbent to become market maker[39] or to follow gas release programs. This measure can be beneficial especially where the gas offer is highly concentrated and where a new wholesale market is still under development.

c) Another way to increase liquidity is to have only one natural gas hub on the same balancing zone/entry-exit system. This solution is preferable to prevent fragmentation of liquidity in the market and to enhance competition, wherever the physical conditions allow.

[37] Best practices/recommendations presented in annex 6 have been identified taking into account the results of the "*EFET Guide on the Features of a Successful Virtual Trading Point*" (http://www.efet.org/Cms_Data/Contents/EFET/Folders/Documents/EnergyMarkets/GasPosPprs/2005Today/~contents/HJ92XT8KN44RVWXA/EFET-Guide_Hub-Features_Final.pdf), and the ERGEG "*Monitoring Report 2010 on the regulatory oversight of natural gas hubs*" (http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Gas/2010/E10-GMM-11-03%20Gas%20Hub%20Monitoring%20Report%202010_final.pdf).

[38] As specified in footnote 19, for the purpose of this document a hub shall be defined as the virtual point of an entry/exit system where the TSO (or a separate independent entity dedicated at national level) handles all nominations for the transfer of title to gas between network users (or balancing portfolios).

[39] A market maker is a market participant that agrees to make bid/offer spreads, on the basis of agreed parameters with the aim of increasing the liquidity available for all other market participants.

The second characteristic is to make the wholesale market accessible. For this purpose, regulatory oversight is important to guarantee fair and continuous functioning of the hub and the delivery of information. Furthermore, it is essential to set up non-discriminatory access conditions to all market places. This means that the requirements applied to shippers and traders should be aimed at facilitating national and cross-border trading and they should take advantage of the experience gained by the more efficient and liquid markets in Europe. Therefore special attention should be given to the following requirements:

a. Licensing (including the access to the transmission network), the process of licensing companies should be made as easy and low-cost as possible. The possibility of acknowledging licenses issued by other EU countries could be even investigated in the future if deemed helpful and workable by governments/regulators and market participants.
b. Admitting physical and non-physical traders. In particular, non-physical traders/financial parties can have a different appetite for risk and profile compared to physical players. Their participation increases competition, liquidity and supports the development of forward markets. National network codes should foresee a different set of obligations in relation to the different market participants in order to facilitate the participation of non-physical traders.
c. Fees, by setting up a transparent and cost-reflective fees regime which does not discourage market entry and trading, and which are tailored to local market conditions.
d. Transparency, by reducing barriers and information asymmetries and publishing all the information relevant to market participants to enable them to take commercial decisions in a standardised format across Europe.

A final characteristic is the establishment of a central counterpart and, consequently, a gas exchange. This can be seen as the final step in the evolution of the wholesale market. The main advantage is that the gas exchange is operated by a body acting as central counterparty to the transactions concluded by all market participants. This will facilitate transactions which are more transparent, the provision of more reliable price signals and alternative ways of managing credit risks. In order to fully exploit these benefits, a clear set of rules shall be defined. In particular, a fair financial collateral system is crucial to protect TSOs/shippers from the risks of actions carried out by less creditworthy users. At the same time, market participants should be asked to present a collateral proportional to their exposure, otherwise collaterals which are too high will probably result in barriers to entry for new participants. Therefore, the dual aim to pursue should be minimising the credit risk to participants resulting from a payment default and reducing barriers to entry for new participants. A possible way to achieve these aims is the presence of a clearing house (CH) acting as a central counterpart and providing clearing services for several gas and power exchanges. In order to efficiently manage the risk, this CH could record the assets and positions held by each market participants and ask for collateral proportional to the real position (so called “netting”) covered by the market participant in the system.

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