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The Gas Target Model for the Vysehrad 4 Region
Conceptual Analysis

Sergio Ascari

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Abstract

The Gas Target Model is a challenge, notably for the less than large European markets that are fostered to merge in order to boost liquidity. Th challenge is even tougher for the Vysehrad countries (Czech Republic, Hungary, Poland and Slovakia), which have long been dependent on Russian supplies and are therefore characterised by less open markets than their Western neighbours. This paper analyses the reality of the V4 countries vis -à-vis the European Gas Target Model, starting from their current and expected infrastructural endowment, and suggests ways to develop and implement it in the most efficient way for them and for the EU as a whole.

Keywords

Gas Target Model, Vysehrad 4, Security of Supply, Gas Hubs

Executive Summary*

The current situation, challenges and opportunities

The natural gas markets of Vysehrad four countries (hence: V4) are characterised by very similar problems:

- dominance of Russian supplies under long term, oil linked contracts;
- limited interconnection (except between Czech Republic and Slovakia);
- overwhelming East-West flows;
- limited, though growing, internal competition and as a consequence poor market liquidity;
- expected increasing demand due to the gradual loss of competitiveness of more polluting fuels, as well as of more gas penetration in the residential market;
- low security of supply standards.

The similarity of issues and geographical proximity have led the V4 countries to undertake closer collaboration, notably by agreeing on a common security of supply strategy, including regional emergency planning, and a common implementation of the Gas Target Model that European regulators have proposed for the medium-long term design of the EU gas market, and which has been endorsed by the Madrid Regulatory Forum. Yet it is clear that Slovakia and even more the Czech Republic are more integrated into the Western European market thanks to larger interconnection endowed with firm reverse flow capacity; whereas Hungary has several interconnections that require improvement, and the interconnection of Poland with Western Europe and the other V4 countries is very limited. Market competition has been affected by these infrastructural characteristics. Effective interconnection of all V4 countries as part of the North-South Corridor in Central Europe is expected by 2017-18.

V4 collaboration on the gas market starts at a time of important changes, which are sources of challenges as well as of opportunities. In particular:

- cheaper gas is available, mainly as LNG landed in Western Europe, where gas demand is often declining or stagnating. The V4 countries may shortly exploit this opportunity at a lower cost through the new LNG terminal in Świnoujście, Poland;
- the implementation of the European Network Codes and of the recently adopted EU Congestion Management rules may open up pipeline capacity with interconnected LNG terminals in Western Europe, Turkey and Greece, in the same way as it has recently happened for interconnections between V4 countries and their Western neighbours, which have become partly available for (physical or virtual) reverse flow services. More generally, this will require a major review of market regulation, which represents an opportunity to harmonize it within the V4 region, with a view to establish a common market;

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- large pipeline projects from the East may bring into the region (notably in Hungary) new supplies through the Nabucco West , TAP or South Stream pipelines.

Less certain but potentially even larger change potential could obtain from other sources.

- new production opportunities in the region and in the neighbouring countries, notably from unconventional gas plays;
- connection to the North Sea continental shelf through the Baltic;
- new LNG terminals in the Balkans (Croatia and others);
- a more aggressive competitive behaviour by companies that sell Russian gas.

The V4 decision to cooperate for the exploitation of these opportunities is clearly justified. The GTM studies have noticed that investments aimed at a certain market areas are boosted by the availability of a liquid and reasonably competitive market. In turn this requires a market size of tentatively 20 Bcm/year and the availability of at least three different sources, with a reasonably low market concentration (with an HHI index around 2000)*. None of the V4 countries can individually achieve any of these conditions at present: only Poland may have such capacity in coming years, although through LNG supplies that may be rather costly in the short term and a very dramatic fall of the incumbent's market share, which could probably be achieved only by an aggressive gas release programme. Otherwise, the availability of three different sources is currently possible only through "backhaul" supplies from the West, which is not direct, often interruptible and therefore less reliable. On the other hand a common V4 market would allow the achievement of at least two such conditions (market size and concentration) and help achieving the third one by triggering investment in new supplies and connections.

In the framework of the institutional cooperation among the V4 countries, their National Regulatory Authorities have been asked to prepare a joint Report, with detailed National Annexes, on the analysis of market liquidity in the V4 countries. This Report is extremely useful as it provided exhaustive information on the state of infrastructure, market structure, regulation, competition, trading arrangements and tools, as well as the suggestion of measures to boost liquidity. On the other hand the Report mostly focuses on the description of the existing situation, underlining missing links; but it does not consider market opportunities nor does it propose even a high level market design. The present study aims to propose such design and to list the main steps of a roadmap for its implementation.

Principles of an enhanced V4 collaboration

The political proposals for a joint V4 implementation of the GTM calls for the establishment of a virtual trading point in the region, supported by a single balancing zone, and with an energy exchange for gas trading. Harmonised transmission products would ensure gas flows throughout the region and across it.

It is suggested that the implementation of these cornerstones should be consistent with three policy principles.

- Any market design should be implemented consistently with market opportunities, possibly by the consistent adoption of policy instruments (including taxes, subsidies and action by government-owned companies) that are suitable to foster the smoothest convergence of business and political decisions. In other words, the objectives of V4 collaboration should be fully consistent with business interests and companies' strategies;

* Michel Glachant, "A Vision for the EU Target Model: the MECO-S Model", EUI Working Paper RSCAS 2011/38. www.florence-school.eu

- Existing cooperation projects extending beyond the V4 region should be encompassed in the region rather than substituted for, notably as these involve the integration with more advanced and competitive markets;
- A process should be designed rather than an abstract market design. Priority should be given to flexible solutions that may evolve into one of the available theoretical model, or a combination of them, without regrets for any investment that might have been taken towards inadequate solutions.

All V4 countries are Members of the South-South East European market region, one of three into which the Gas Regional Initiative is articulated (GRI SSE). It also comprises Italy, Slovenia, Austria, Romania, Bulgaria, Cyprus and Greece. The V4 countries have important interconnections with other SSE countries, in particular with Austria and Romania, as well as with other EU countries, particularly Germany. Within the GRI SSE, several pilot projects and studies involving V4 countries are currently in preparation. Almost all of them involve relationships on the East-West axis, like the GATRAC project between the Czech, the Slovak and a German TSO (Ontras), allowing for the purchase and management of bundled capacity across the three borders, through the Lanzhot and Hora sv. Kateriny Interconnection Points; a bundled capacity allocation project will soon be started on the Lasow IP between Poland's Gaz-System and Germany's Ontras. A similar one has recently been launched between Hungary and Romania. Further activities regarding implementation of EASEE-Gas Common Business Practices, a cross border balancing platform, and a model for future balancing and trading regions, are also reported but their advancement is not clear.

Applicable high level design models

There are several basic models that may be considered for the integration of V4 countries. Some of them can also be combined, or be modified so that they become different development stages rather than alternative solutions. Their feasibility is related to infrastructure development in various ways that are discussed in the Report.

- *Single cross border market zone.* The establishment of a single entry-exit and balancing zone has the advantage of ensuring the achievement of the GTM objectives in terms of market size and concentration, and could bring the V4 close to the GTM objective of having access to at least three different significant sources once suitable interconnection is developed for interconnection. The objective would be fully met if connections to new sources like Caspian gas or Mediterranean LNG are built; if they are reached by long distance pipelines bringing gas from the Caspian region; or if new unconventional resources are developed inside the V4 countries. On the other hand this is a demanding solution, as it requires full harmonisation of market rules and practices, lack of internal congestion and a single market operator. This solution does not necessarily require the full merger of TSOs, but at least a very close cooperation and probably the establishment of a coordination body for revenue compensation, dispatching and balancing related activities. A single market operator is expected to emerge once the merger is complete.
- *Trading region.* This concept has been suggested as an option for the European GTM. It envisages a single tariff and price zone (and hence a single market operator) but separate balancing areas, which may coincide with individual (National) TSOs, or parts thereof. Like the next one (market coupling), this model is unprecedented in gas, and needs to be clarified on several aspects. It would still require a remarkable coordination effort on tariff and dispatching issues, but less than with the single zone.
- *Multiple coupled market zones.* Several zones with formally working spot markets, though not very liquid, may be connected through market coupling once they are interconnected. The interconnection may be limited and some congestion may occur and it would be treated by an algorithm where different prices may emerge after joint bids are presented daily in the coupled zones. This solution requires less interconnection investment but some market rules harmonisation

effort, as for the single price zone. Yet no single tariff or dispatching are necessary. There may be separate market operators but a common office for market coupling must be designated. The main difficulty is the very limited experience in adopting the market coupling concept in gas markets. Some experience and studies are being developed within the NNW Gas Regional Initiative and may provide advice about the feasibility and condition of market coupling.

- *Independent connection to more liquid zones.* This solution avoids any proposal of active market integration, with the exception of those necessary to ensure the security of supply standards required by Regulation 994/2010/EC. This approach considers that markets can in fact be integrated, with substantial price alignment, by market forces that select one or more favourite trading spots, which act as benchmarks for other market zones. This happens if all connected zones can “shop” in that market, even with limited direct interconnection between them. Likewise, V4 countries may limit their interconnection and harmonisation to what is justified by market decisions or physical security of supply requirements, but decide to elect (e.g.) a German (or a future merged German-Dutch) hub as their natural marketplace. Under this solution, the regulatory strategy would be partly different and focus more on ensuring the viability of connections with the most liquid hubs and the availability of transmission products to move gas from/to it.

Proposals for joint GTM V4 implementation and related difficulties.

Upon consideration of the possible models, the market situation and opportunities and the available theoretical models for market integration, the following strategy is tentatively proposed for discussion among V4 stakeholders. This proposal considers the most likely development of new infrastructure, notably interconnections between the V\$ countries, and is tailored so that deeper integration follows the completion of the connecting pipelines.

- i. *Establishment of working connection among the V4 and with neighbouring countries.* NRAs and TSOs should work to ensure that market rules and procedures ensure the smoothest connection for delivery of gas to and from hubs across the western V4 border. In particular, harmonised capacity products should be developed as part of the implementation of the European Capacity Allocation Network Code, including for delivery by backhaul (virtual reverse flow), between all interconnected V4 and if possible through intermediate countries. The products should also ensure deliveries to and from working Western European hubs. This activity can start immediately as it does not require any new infrastructure.
- ii. *Development of market zones.* Existing entry-exit market zones should be consolidated and remaining wholesale price controls gradually phased out. The market zones may include the Austrian/Czech/Slovak trading region proposed within the GRI-SSE, using the large existing interconnection capacity of the three countries. However the adoption of this solution should be integrated by the connection of the Hungarian and Polish market zones, subject to market coupling due to the limited existing interconnection. It is however beyond the scope of this paper to take positions or provide suggestion about the inclusion of other countries into the V4 market.
- iii. *Connection of the V4 countries.* Physical interconnection between Hungary, Slovakia and Poland as well as enhancement of the link between the Czech Republic and Poland should proceed rapidly for the sake of credibility of any further V4 integration plans. Interconnections between the V4 countries and absence of congestion within gas network is a prerequisite for further actions aimed at regional GTM implementation.
- iv. *Joint implementation of the European Network Codes.* This would pave the way for harmonised market rules that would be the basis of integration as a single market zones or as a trading region. Coordinated work by V4 NRAs and TSOs would also facilitate their hard tasks in the implementation of ENCs, and improve regulatory quality and stability.
- v. In particular *NRAs' and TSOs' cooperation* would be targeted at:

- a) the establishment of a single entry-exit tariff zone;
 - b) Coordinated implementation of the Capacity Allocation Mechanism (CAM);
 - c) A coordinated capacity development mechanism, based on integrated auctions or open seasons, with contributions from public institutions;
 - d) Harmonised balancing rules would be useful, although this would not necessarily mean the merging of the balancing zones, which should be decided at a later stage;
 - e) Common congestion management criteria, in line with the new Annex I of Regulation 715/2009/EC.
- vi. V4 countries should also work towards the adoption of common criteria for customer protection, based on wholesale prices established in the V4 market(s). It is worth recalling that the (even perceived) imposition of price freezes that may not cover costs is a major obstacle of market liberalisation and integration and should be temporary and related to objective criteria.
- vii. Implementation of a single market zone in the V4 region Standardised capacity products linking the zones should be developed building on the examples that are being developed (GATRAC, PRISMA, Hungary-Romania etc.) and be subject to co-ordinated auctions. Other neighbouring countries (Austria, Romania, Slovenia, Croatia, and others) may be invited to join the process.
- viii. Decision on final market design. The effort to carry out the previous steps will probably take about three years. Only at that point and in relation to the resulting outcome a choice could be made about the final market design, choosing about the maintenance of the starting mix, a trading region extended to all V4 (and possibly other) countries, or a large single market and balancing zone. The outcome should be decided by an operational study evaluating the possibility of dispatching and balancing in the whole zone in relation to actual flows and available infrastructure.

Institutional issues

The pursuit of this plan would entail significant institutional developments. In order to enhance the credibility and ensure a steady implementation of the plan, several entities in charge of their achievements must be identified or created. The establishment of joint bodies for an enhanced co-operation at the V4 level would stress the credibility of the market rules as internationally coordinated regulations are much more stable than national ones:

However, the creation of new bodies should be minimised to avoid bureaucratisation. The GRI SSE may offer a suitable institutional framework for the regulatory harmonisation, provided it becomes more operational (following the electricity RI example) and is practically articulated into smaller sub-zones, among which one should be the V4. ENTSOG, ACER and other organisations also offer platforms for international co-ordination. On the other hand, it should be clear that V4 integration is expected to be a stronger and tighter link than the general EU integration process.

Within such framework, committees for the streamlining of market rules and the implementation of network codes could be set up, with leading roles divided among the participating NRAs and TSOs, in charge of

- capacity product organisation, allocation and congestion management;
- interoperability and business practices;
- tariffs;
- balancing.

Such committees might be based on similar experiences within ENTSOG, ACER and GRIP experience.

A common gas exchange need not be established by international agreement but may emerge from market developments. A body in charge of infrastructure development procedure, which may be located at regulatory level, would probably be useful.

TSO coordination of transmission management activities, tariff revenue calculation and redistribution would be necessary and would represent a major development, as it would probably need the competences of an Independent System Operator. This is however an open issue: some TSOs even in the region are trying to envisage cooperation in the establishment of common market zones without a formal coordination body. On the other hand, the evolution of the European gas transmission industry is probably towards broader collaboration and alliances, even though this does not necessarily require full mergers.

1. Introduction

The similarity of issues and geographical proximity have led the Vysehrad 4 countries (henceforth: V4) to undertake closer collaboration in natural gas policy, notably by agreeing on a common security of supply strategy, including regional emergency planning, and a common implementation of the Gas Target Model (GTM) that European regulators have proposed for the medium-long term design of the EU gas market, and which has been endorsed by the Madrid Regulatory Forum¹.

As a contribution to this collaboration, the present paper will analyse how the GTM may be implemented in the V4 region, with a view to maximise the benefits that arise from joint implementation. A most relevant conclusion of the GTM is that markets should be large enough to attract market players, investments, so that sufficient diversity of sources may be reached and market power indicators are kept below dangerous levels. In most cases, this requires physical and/or virtual interconnection of present markets, which is also useful to achieve the required security of supply standards, as envisaged in the Regulation 994/2010/EC.

The political proposals for a joint V4 implementation of the GTM call for the establishment of a virtual trading point in the region, supported by a single balancing zone, and with an energy exchange for gas trading. Harmonised transmission products would ensure gas flows throughout the region and across it. In turn this requires:

- the elimination of regulatory and trade barriers between V4 countries;
- the construction or reinforcement of infrastructure foreseen for the North-South Corridor (NSC) in Central Europe as a key diversification project for the region;
- the definition and implementation of a roadmap leading to an integrated market.

This paper assume that the implementation of these cornerstones should be consistent with two policy principles.

- i. Any proposed design should be consistent with market opportunities, and be based on the consistent adoption of policy instruments (including taxes, subsidies regulations and action by government-owned companies) that are suitable to foster the smoothest convergence of business and political decisions. In other words, the objectives of V4 collaboration should be made consistent with business interests and companies' strategies;
- ii. Existing cooperation projects extending beyond the V4 region should be encompassed in the region rather than substituted for, notably as these involve the integration with more advanced and competitive markets.

¹ See the Conclusions of the XXI Madrid Gas Regulatory Forum, 22-23 March 2012, http://ec.europa.eu/energy/gas_electricity/gas/forum_gas_madrid_en.htm

The paper does not analyse in detail the costs and benefits of infrastructure development for interconnection of national V4 markets. This has been already analysed in several studies². In general, Cost-Benefit Analysis of options should be performed. This is beyond the scope of the present Report.

The study starts from an analysis of the main difficulties and barriers faced by gas market development in each V4 country, and assesses how the GTM could be developed in them. This analysis has been based on interviews with stakeholders in all V4 countries, which have also been used to obtain feedbacks about a possible joint GTM implementation. Stakeholders included Ministries, National Regulatory Authorities (NRAs), Transmission System Operators (TSO), gas suppliers and traders, Distribution System Operators (DSOs), Market Operators (MOs), independent think tanks and experts. A list is provided in Annex I, however no opinions are directly reported and any responsibility for judgements and proposal lies entirely with the author.

In the framework of the V4 cooperation, each NRA has drafted a detailed Report on Gas Market Liquidity, outlining the current conditions of gas markets, their regulatory regimes and the problems of further V4 integration. The reader is referred to such Reports for a more precise description. In section 2, starting from such Reports and the interviews, the situation of each country is assessed with a view to assess benefits, difficulties and ways of further integration.

In section 3, the main opportunities facing V4 gas markets and justifying their integration are reviewed.

In section 4, the main abstract models that are available for the implementation of the GTM are briefly illustrated and their feasibility is discussed with respect to the actual V4 situation.

In section 5, a proposal for the implementation of the GTM in the V4 region is presented, outlining the main necessary steps. The proposal does not consist of a fully detailed and predetermined market design, but is a process where it is shown how the actual design could be decided by the relevant institutions on the ground of actual market and regulatory developments.

In section 6, the main institutional consequences and conditions for the development of the GTM process are discussed.

2. The current situation of the Vysehrad gas markets

2.1 Overview

The natural gas markets of V4 countries have a very similar history, which still affects their current problems. They were developed when the V4 and other Central and Eastern European Republics were centrally planned economies tightly connected with the Soviet Union. Gas markets were developed by state bodies, originally exploiting domestic resources that existed but were limited in all current V4 countries. Consumption development was boosted since the 1970s, when the Soviet Union started to export natural gas towards Western Europe and built long distance pipelines that crossed the V4 countries leaving some gas on the way to integrate their limited domestic production. In particular, two major pipelines were developed: a Northern one, known as *Yamal* (largely parallel to the older *Northern Lights* system), crossing Belarus and Polish territory into Eastern Germany; and a larger Southern route (known as *Brotherhood*) through the Ukraine and Czechoslovakia, which was split between a branch heading for Southern Germany and France and another reaching Austria, Italy, Slovenia and Croatia. Two large spurs sprang off this route in Western Ukraine and in Eastern Austria,

² Péter Kaderják, The Danube Region Gas Market Model and its application to identifying natural gas infrastructure priorities for the Danube Region, Conference on EU Strategy for the Danube Region, 20 June 2012, Brussels

feeding Hungary and (through it) Serbia and Bosnia & Herzegovina. These pipelines are mapped in Figure 1 below and stylised in Figure 2, where technical capacities are also shown.

The political situation and in particular the lack of open access to these pipelines led to dominance of Russian supplies, which came under long term contracts with prices linked to those of oil crudes and derivatives. After markets started to open following the entry of V4 countries into the EU in 2004, attempts were made to diversify supplies, with Norway as the main candidate. Later, as more liquid hubs started to develop beyond the V4 western borders, supplies could be activated from traders who were active on such hubs, out of their portfolios: in such case the final origin of the gas can hardly be ascertained. Yet, considering the physical flows, it is clear that all gas that is consumed in V4 and is not locally produced comes from Russia, with very few exceptions. Western supplies are in fact obtained by swaps or through virtual reverse flow capacity.

In particular in the last few years, delayed implementation of the EU principles requiring Third Party Access, the advent of the Third Package and the Security of Supply Regulation (No. 994/2010) have led to the opening of some virtual reserve flow (or *back-haul*) capacity on the large two interconnections of Poland and Czech Republic with Germany. Although rather large, this capacity is mostly interruptible, and is therefore not regarded by most actual prospective suppliers as a suitable basis for a consistent competitive challenge of suppliers who can rely on firm capacity. Not surprisingly, the market shares of newcomers to these markets have not exceeded the shares of firm entry capacity connected to Western Europe (see Table 1). However, some firm reverse capacity has also been developed in a few Interconnection Points (see Figure 2).

Table 1 – Supplies to Vysehrad countries

	Czech Rep.	Hungary	Poland	Slovakia	V4
(Bcm, 2011)					
Domestic	0.1	2.4	4.3	0.1	6.9
Russia	6.88	5.66	9.28	5.33	27.15
Norway	3.85				3.85
Other West	1.3	1.06	1.55		3.91
Total	12.13	9.12	15.13	5.43	41.81
NG share of primary energy, 2011 (%)	17.2	40.4	13.4	32.9	24.9
Per capita consumption (cubic meters / year, 2011)	1189.2	912.0	394.0	987.3	652.3

Source: BP, Eurostat

Besides limited available capacity and supplies from sources other than Russia, a common and critical feature of the V4 is the very limited interconnection among them, with the exception of the Czech Republic – Slovakia link that is part of the Brotherhood system. In fact only a very small local interconnection is active between Czech Republic and Poland.

At present, only indirect interconnections are theoretically feasible through neighbouring countries. However, in practice connection opportunities though the Ukrainian territory can hardly be used yet. Geographically, the interconnections of Ukraine with Poland at Drozdowicze, with Slovakia at Velké Kapušany and with Hungary at Beregdaroc are relatively close to each other. However, being non-EU entry points, they are not subject to the same TPA obligation of intra EU IPs. Therefore, it is hard to establish any interruptible or firm, physical or virtual reverse capacity rights on such points, with the partial exception of Drozdowicze. Difficulties in flowing gas through this link into Ukraine have been reported and in fact it has only been used for small amounts; even though it is already on the ground, this link does not appear as a reliable option for permanent interconnection between Poland, Slovakia

and Hungary, although some stakeholders are more optimistic and occasional swaps cannot be ruled out.

As for Western connections, the Austrian hub³ could be an option for connection of Slovakia (and indirectly the other V4 countries) with Hungary. This could be an available opportunity in the short term and using existing infrastructure, however the small capacity and frequent congestion of the AT-HU interconnector (known as HAG) reduces the scope of this route. In turn, Poland has limited firm connection capacity from Germany, which could be also used for connection with the Czech Republic. Some larger capacity is interruptible, as back-haul on the Yamal pipeline in Mallnow, which is expected to be turned into firm (physical reverse flow, see section 2.4 for more).

To sum up, V4 countries have seen overwhelming East-West flows, with limited quantities left in the region, and as a consequence poor liquidity. Very limited, though growing, internal competition from companies that have used the same infrastructure (or limited other infrastructure) to attain virtual or physical reverse flows. This has happened particularly in the last 2-3 years thanks to the growing availability of cheaper gas in Western Europe, priced with no or lower reference to oil derivatives and mostly coming from the North Sea or as LNG regasified in Western European terminals and as a consequence poor liquidity. This development has not been the same in the various V4 countries.

2.2 The Czech Republic

The Czech market is a mature one, in spite of the relatively small gas share of the country's primary energy. The Czech Republic has a remarkable nuclear industry and is one of the few European countries that are still investing in nuclear power; moreover it is home to substantial coal production. Yet its per capita gas consumption is still the highest among the V4, driven notably to its large industrial component, but total consumption has been declining since 2001. However, the spreading of individual heating in the residential sector, and a possible replacement of coal in power and heat generation due to stricter environmental rules in the EU may entail a certain mid-term recovery.

Among the V4, the Czech market is also the most open and advanced in terms of competitiveness and organisation. It is also the most advanced in terms of supply diversity. Its resources are based on the Northern branch of the Brotherhood pipeline that enters the country from Slovakia and quickly splits into two further lines, both aimed at the German border- A major spur supplies Moravia and connects to the Polish network at Český Těšín / Cieszyn. Domestic production is now quite small but several fields as well as other geological structures have been turned into a flourishing storage industry that provides reserve and flexibility services not only to the Czech Republic but also to neighbouring countries, notably Germany.

Market openness mostly depends on the availability of firm capacity from Germany, which has allowed several companies to compete with supplies based on relatively cheaper gas available in Western European hubs. It is interesting to notice that this has also seen the participation of Russian based companies, which have not been shy of entering price competition, based on its own resources. Decision to develop firm capacity in the reverse direction to the main Brotherhood flow has been crucial to allow reduced dependence on Eastern supplies. This has been further reinforced recently by the opening of the Gazelle link between the two Czech Republic-Germany border point (Hora Sv. Kateriny and Waidhaus), which is not normally aimed at the Czech market but helps improving security of supply, as it provides a different route for Russian gas.

³ The Austrian hub used to be a physical one, based in the major pipeline node of Baumgarten, near the Slovakian border. From 1 January 2013 this hub has been turned into a virtual one to bring it into line with the EU regulations and target model, encompassing the whole Eastern region of Austria, managed by the Austrian Gas Connect TSO and including over 90% of the Austrian end user market.

Another pilot initiative that has helped the connection of the Czech Republic to the German market is the *one stop shop* capacity product connecting the Czech and the bordering German TSO (Ontras) across the HSK IP. This product has been recently extended to Slovak Eustream's network, thereby putting the Czech Republic at the centre of one of the most advanced developments of the EU capacity market, as it is an example of capacity allocation along a route encompassing several TSOs..

As a consequence of these developments the Czech Republic has the lowest wholesale market concentration among the V4 (see Table 3 below). Lately retail competition has been also developing quickly and the switching rate of smaller customers has dramatically increased in the last two years to over 11%.

Whereas the Czech market has the lowest dependence from Russian supplies among the V4, it is still not connected to any other sources than the “Western mix” as it can be found in the German NCG and Gaspool hubs. Connection to other sources, e.g. on the Mediterranean coast is very remote due to the limited surplus of gas in Italy and some reported difficulties in the reverse flow usage of the Slovak-Austrian connection.

Further reasons for the relative success of liberalisation are probably to be found in the early choice of privatising the industry, which reduces the risk of collusion between industry on one side and government and regulators on the other, but also the possibility by government to influence pricing the private choices of the industry. The reduced concentration of the distribution sector also helped, as each local retail suppliers has an interest in actively seeking cheaper supplies to cater to its relatively loyal customers, and possibly also in competing in distribution zones other than its original home base. Finally, any end user price regulation has been abolished for over seven years, which certainly encourages the entry of new competitors.

End user prices are among the lowest in the region and below those of Western neighbours for industrial customers, but they are relatively high for the residential market (see Figures 3-6). The Czech case may represent an example of the effects of full end user price liberalisation, which is to some extent feared in the other V4 countries.

Despite the positive developments of competition some improvements have been suggested for the Czech market. First, even if availability of resources is currently abundant in neighbouring German hubs, they cannot be used for balancing purposes. In fact the Czech Republic - like the other V4 countries - does not have a proper balancing market yet and unbalances are subject to administrative penalties that are linked to prices recorded at the German EEX exchange. The Czech market operator (OTE) has developed a platform for intra-day trade that is used by market players to achieve balancing requirements, including through a monthly ex-post trading of tolerances. Such platform for short term trading is unique in the region. However this market is very small (dealing between 10-20 Mcm/year) and is regarded as too small and shallow. On the other hand, physically remote markets like the NCG are hardly useful for balancing purposes.

Regarding infrastructure, some difficulties are reported only in Northern Moravia, where the reinforcement of the existing pipeline capacity is expected. This is actually the line that connects the Czech Republic with Poland and its reinforcement could also lead to that of the Czech-Polish IP: according to TSO Net4Gas' Ten Years Development Plan this interconnection should be upgraded from the current 0.5 to 2.5-3 Bcm/year. More recent plans, embodied in the latest ENTSOG Ten Years Network Development Plan (published in February 2013) foresee a further expansions. Net4Gas and Gaz-System plan to build a second IP with a capacity of 6,5 Bcm/y from the Czech Republic to Poland and 5 in the opposite direction. In a later stage further upgrade of capacity up to 10 Bcm/y in the direction from CZ to PL is planned. Further plans have been envisaged for connection with Austria, aimed at bypassing both the limitations of the Austrian-Slovakian IP and those of the Baumgarten - Oberkappel pipeline (WAG). The current AT-SK link is regarded as not fully adequate to bring into the Czech Republic new supplies that may come from the Southern Corridor or the Mediterranean.

2.3 Hungary

Hungary has a very mature gas market, based on a century old oil and gas industry. Domestic fields are still being exploited and provide about 20% of current domestic requirements. Imports from the former Soviet Union have been started in the 1970s from a branch of the Brotherhood pipeline that springs off in Western Ukraine, not far from the Slovak border. This branch is also used to supply Serbia and through it Bosnia and Herzegovina, however this transit activity amount to nearly 2 Bcm/year only and is therefore far smaller than in the other V4 countries.

On the other hand Hungary has the highest reliance on natural gas for its primary energy requirement (over 40%), due to its limited coal resources. Consumption is evenly distributed between industry, power generation and the residential sector. Therefore, it is also very sensible to security of supply as well as gas price issues. After peaking at over 13 Bcm in 2005, consumption has recently declined to just over 10, falling notably in the power sector, where it has been suffering from the competition of imports based on coal or nuclear generation. The fall has also been related to the poor macroeconomic performance of the country in the global crisis, which has been the worst in CEE.

Hungary has been very active in the development of infrastructure, starting with the Austrian link (HAG), which normally supplies gas of Eastern origin but connects the country directly to the West. As such, it turned out to be extremely useful during the January 2009 crisis, when the country barely avoided cutting residential customers. After that event Hungary enhanced its infrastructure activity, building connections to Romania and Croatia and promoting that with Slovakia. It also built a special strategic storage site for emergencies.

Hungary was an early case of ownership unbundling as MOL, the national oil and gas company, sold its gas supply interests and the related Russian supply contracts to Germany's E.ON in 2005. European competition authorities required that about 15% of the supplies should be auctioned annually, thereby providing the basis for other suppliers. The largest Russian supply contract expires in 2015 and Hungary is currently debating about its renewal.

After privatisation MOL itself re-entered the market as storage operator as well as producer and minority trader. The distribution sector also became a source of competition after unbundling, as the four main companies (covering about 98% of the market) were totally or partially sold and became the market bridgehead for a few Western European gas giants (ENI, GdF-Suez, RWE). Lately competition has extended to smaller customers and switching rates exceeding 10% / year have been reported, in line with Western European cases. Nearly 50 traders are now active, with some of them using a "pure trading" license that does not allow direct sale to end users.

However, market liquidity remains inadequate due to insufficient diversity of supplies, as in the rest of CEE. A related problem is that of *take or pay* contracts, which have suffered due to consumption decline, and whose costs are ultimately paid by all end customers.

Limited liquidity also affects the balancing market that has been started but is jeopardised by lack of adequate information provided on shippers' positions and by the relatively low penalties, which are often much lower than the bid/ask spreads on the market. Liquidity is also low due to scant supply diversity and far lower transit flows, which have triggered a flourishing balancing market in neighbouring Austria

After the 2009 crisis the construction of an interconnection with Slovakia has become a major issue, as those with Romania and Croatia are currently supporting the export mode only. On the other hand, the HAG is very often congested after Western European hub prices started to diverge from those of oil based long term contracts, but cannot be reinforced due to difficulties on the Austrian side. Moreover, capacity on this connection is partly reserved for the incumbent, in relation to its universal service obligations towards protected customers. The Romanian export ban may be lifted soon as it is

subject to European infringement procedure, and the two countries' TSOs are actively working, in collaboration with NRAs, to offer a pilot bundled capacity product.

The much expected supply diversification through the Nabucco pipeline has long been postponed and the same has happened to the proposed Croatian LNG terminal. FGSZ, the MOL-controlled TSO, has launched an open season procedure in cooperation with its Slovakian counterpart, but this has failed to reach the required booking level. A second attempt failed later despite more favourable conditions, possibly due to the perception that the Hungarian government was committed to the investment anyway.

Meanwhile, the government has signed a MoU that will allow the transit of the Russian supported South Stream pipeline across the Hungarian territory. This is regarded as a diversification of routes, but not of suppliers.

Lately following E.On's decision to leave the Hungarian market and the introduction of tight price controls on residential and small industry's prices as well as on network margins, the government has promoted a partial re-nationalisation of the industry. The Slovakian link will be built by a new TSO controlled by MVM, the state owned power utility, which will also shortly take over E.On's trading and storage businesses. The regulatory status of the new TSO is yet to be defined. In any case with its 5 Bcm/year capacity this link is expected to allow for much tighter integration of Hungary with its Northern and Western neighbours and possibly to help increasing supply diversity.

It is reported that the price controls on residential and SME markets may have been accompanied by partial reduction of available capacity on the Western border, which is in fact normally congested. The need to recover costs and limited competition may have led to a price increase in the larger industrial customers' market, which is apparent in Figures 3 and 4. Such reallocation of costs and margins from the residential to the industrial market could be a problem for gas suppliers in the country after market integration, as newcomers equipped with cheaper supplies and no USP obligations may sweep the industrial and power generation market and deepen the losses of those with USP obligations. For that reason the price controls on end user customers are likely to be at least adjusted after market integration.

Access to diverse supplies remains a major issue in Hungary as well as in other V4 and other neighbouring countries. Hopes are based on access to larger supplies from Western hubs through the new link with Slovakia, overcoming the bottleneck of the HAG; on access to Caspian resources through Nabucco West (or less favourably through TAP and IAP), and to connections with LNG resources to be landed in Croatia or Poland. For these reasons, Hungary remains deeply committed to the deployment of the NSC as well as to V4 integration.

2.4 Poland

In Poland, the role of natural gas has been a relatively minor one and per capita consumption is the lowest in the V4 and among the lowest in Europe (Table 1): this is a consequence of the predominance of cheap local coal in the country's energy industry. In fact this low development is now a major opportunity, as policies aimed at reducing local, regional and global pollution are expected to trigger a major gas for coal substitution process. Moreover, the Polish economy is in a relatively buoyant state and has suffered less than the rest of Europe from the recent global crisis. Thus, Poland is one of the few EU countries where a significant gas demand growth is expected: from the current 1515.4 Bcm in 2011 to 24 by 2020 and up to 32 by 2030. The actual outcome could of course be affected in case the large estimated Polish unconventional gas resources start being produced, which would increase gas competitiveness and foster its takeover of the energy market.

On the other hand, Poland is among the least advanced EU Member States in terms of market liberalisation. In fact diversification of suppliers has only started less than two years ago, and the

incumbent, state owned PGNiG has a market share around 95%. Moreover, over 70% of the gas comes from a single direction. As a consequence of this near monopoly situation gas prices are currently regulated at retail level, and have been regulated even at wholesale level until very recently. Yet their level is relatively low, because the country boasts a relevant domestic production, and prices are set at a weighted average level between them and those of imports.

The market model has been recently innovated. An entry-exit tariff system and a virtual exchange point have been established, with a gas exchange which is operational since January 2013. Although its liquidity is still negligible, there is a plan to boost it by requiring that a substantial part of gas sales be channelled through the exchange.

Other difficulties for the development of the Polish market are its limited access to supplies other than from Russia (through either Belarus or Ukraine). A very limited competition has started thanks to the reinforcement of the Lasów IP from Germany (1.5 Bcm/year), the Cieszyn IP from the Czech republic (0.5) and the virtual reverse interruptible capacity on the Yamal pipeline at Mallnow.

The opening of the Mallnow interconnection for reverse flow is a positive outcome of the agreements that have brought the Polish section of the Yamal pipeline under the Polish TSO's (GAZ-SYSTEM) control and its access rules into compliance with EU legislation. Even though this has allowed the sale of virtual reverse flow capacity, it is not regarded as a sound basis for a competitive challenge, due to its interruptibility, but as a useful integration of other supplies. Polish and German governments and regulators and the concerned TSOs have already agreed on turning some of the reverse flow capacity into firm one, which is also required for the implementation of the EU security of supply regulation (Reg. 994/2010/EC)⁴. In other words part of the current virtual reverse flow capacity would be turned into physical reverse flow by adding compression, notably on the German side.

The Polish wholesale market has not been very attractive so far not only because of its price regulatory status and its nearly monopolistic structure, but also because of the composition of demand⁵. In fact most distribution market, amounting to over 80% of the total, is controlled by the incumbent and direct access to small customers is notoriously very difficult in the early stages of market liberalisation. The role of gas fired power generation is very small in Poland due to abundant and cheap local coal resources, hence the only really contestable market consists of large industry and is not large⁶.

Considering the limited excess capacity and the lack of diversification, as well as the demand increase expectations, it is not surprising that the Polish government and TSO are planning major infrastructure enhancements. In particular these should include:

- the LNG terminal in Świnoujście, underpinned by a long term contract with Qatar and capable of producing up to 5 Bcm/y of natural gas, expected to be operational in 2014 and possibly extended to 7.5 Bcm/y later;

⁴ Moreover, some difficulties currently occur due to the very different capacity allocation regime across the border. Germany uses auctions, whereas Poland allocates *pro-rata*. This is understandable as auctions are risky when the power of market players is heavily unbalanced. This problem will be automatically solved when the new European capacity allocation Network Code will be implemented, but it may generate some difficulties in the transition.

⁵ It is claimed by stakeholders that regulated end user prices may not be cost reflective but cross-subsidize larger customers, worsening the entry difficulties of newcomers. It is beyond the scope of the present study to assess the validity of this statement.

⁶ A further difficulty that has slowed down retail competition has been the lack of a rucksack principle on the allocation of capacity at transmission system exits or city gates. Capacity remained with the incumbent rather than being automatically transferred to the new supplier, as it normally happens in Europe. This issue is expected to be solved soon by transferring city gates capacity to distributors.

- the strengthening of the Cieszyn IP, which may reach 2.5-3 Bcm/y according to plans already included in the Czech TSO's but may increased to 10 pursuant to the EU-wide Ten Years Development Plan;
- the construction of a interconnector with Slovakia from South-Eastern Poland, able to transport 4.7 Bcm/year from Poland to Slovakia and 5.7 Bcm/year (extendable to 9.5) in the opposite direction.. This would be tightly connected with the scheduled Slovakia-Hungary pipeline (see below), thereby ensuring full physical interconnection of the V4 region.

A different role could be played by the proposed interconnection between Poland and Lithuania. This is also a project of major EU interest as it would eliminate the isolation of the Baltic Republics, and potentially also of Finland, with 2017 as a tentative commissioning target. However given the existing proposals of new LNG terminals in Lithuania and Latvia and the limited market size (less than 10 Bcm/year including Finland) over a sparsely populated region it is dubious what the economic rationale for this proposal could be, and the cost allocation between concerned countries and the EU itself could still be a matter of some discussion. It is anyway clear that such interconnection may enlarge the market size of the V4 but not provide any new sources, with the partial exception of those available through a Lithuanian or Latvian LNG terminal.

The agreed policy in Poland calls for the development of new infrastructure, wherever possible with the help of shippers' money. In fact, the opening of the existing interconnection with the Czech Republic has been underpinned by three long term capacity contracts. On the other hand, no market test or open season aimed to ascertain the availability of shippers for the financing of new interconnections or reinforcements has been launched yet. Remarkable interest certainly exists for a stronger interconnection with Germany, and the reinforcement of physical reverse flow on the Yamal pipeline. As for Southern connections to Czech Republic and Slovakia, some interest has been detected on the Polish side but the situation has not been regarded as mature for private interest funded developments⁷.

Besides interconnections, the Polish system requires substantial internal investment notably to enhance connection between the country's Northern and Southern regions. This is also a part of the NSC, which would be necessary to connect the Polskie LNG terminal to the other V4 countries.

Storage is also relatively limited. Figure 7 shows storage working gas plotted against 2010 consumption. The interpolation line shows (on a logarithmic scale) the "rule of thumb" by which this should be around 25pc of annual consumption. Poland is clearly short of storage, whereas other V4 countries are "long". In fact, the complementary storage situation, with relatively abundant resources in all countries but lack of them in the largest national market (Poland) is another important driver of V4 integration. If the regional gas market model proposed in BEMIP for the Baltic States is implemented and a link between Poland and Lithuania is built, storage opportunities in Latvia shall also be taken into account.

2.5 Slovakia

Slovakia is the smallest V4 country in terms of population and gas market size. It has a very mature market with a high gasification level (2nd in Europe after the Netherlands). Only limited consumption increase is expected from economic growth and partial replacement of other fuels in power and heat generation.

⁷ It is worth noting that this situation is by no means peculiar to V4 countries, but it is rather a by-product of current market and (especially) general environmental and energy policy uncertainties that do not allow for reliable forecasts of gas demand development, notably in the power sector.

The peculiar characteristic of the Slovakian gas industry is its transit role. In fact it is home to the largest gas transmission system in Europe, with a capacity of over 90 Bcm/year, nearly 15 times as large as the domestic consumption, transporting Russian gas towards Western destinations. This system splits not far from Slovakia's western borders, with a Northern branch crossing into the Czech Republic at Lanžhot and a southern branch heading for the Austrian Baumgarten hub. As a consequence of which interconnection capacity with Western neighbouring countries is very large.

Domestic production is now negligible, but some fields have been turned into storage sites that are large compared to the country's requirements and sell their services to neighbouring countries as well, mostly Austria and the Czech Republic.

The high relevance of transit has been a major source of benefits as well as woes for the Slovak gas industry. For many years it has brought remarkable transit fees, which have been a major source of hard currency for the country. On the other hand the dominance of Russian gas flows has discouraged any supply diversity perspective, hence Slovakia's reliance on Russian imports is the highest among the V4. This has become a major problem in January 2009, when the interruption of all flows through the Ukraine has led to serious service disruption. In spite of storage and limited inflows from the West all industrial customers had to be cut and the resulting damage has been estimated at around 1 billion Euros. After this event security of gas supply has become a high level priority for Slovakia, and the construction of the direct connections to Poland and Hungary has been decided. Despite some difficulties in the process (see section 2.3 above) the construction of the Hungarian interconnector is now advanced, with procurement completed, and it is expected to be operational by 2015, with a capacity of nearly 5 Bcm/year. The Polish link is expected to complete its feasibility study later in 2013, but the routing has not yet been agreed between the two countries. In any case both project – and the whole NSC – are expected to obtain a high rating among the European Projects of Common Interest (PCI) envisaged by the Infrastructure package currently under discussion in Brussels.

The 2009 interruption has also led to the enhancement of reverse flow capacity in the pipelines connecting the Czech Republic and Austria. This has increased the possibility of swaps and the activation of commercial flows from the West, which has boosted competitive supplies: in the last two years the incumbent has seen its market share shrinking, notably in favour of large Germany-based companies. Some 16 suppliers have been recorded. The reverse flow capacity increase is also expected to have solved at least the short term SoS problems.

Moreover, strengthened (though not fully satisfactory) capacity is allowing the Slovakian TSO to use the Austrian Baumgarten hub for its balancing purposes. This represents the basis for a common balancing market, even though the Slovak balancing system is not yet market based but it is entirely under the responsibility of the TSO.

On the other hand, the frequent disputes between Russia and Ukraine have led to a different development that is a major threat for the Slovak gas industry. The construction of the Nord Stream pipeline that directly connects Russia and Germany under the Baltic sea, together with the slump in Western European gas consumption, have led to a slow but steady decline of transit flows. The possible construction of South Stream may further exacerbate the fall of Slovak transit and Eustream, the Slovak TSO, is already planning to reduce its capacity. On this issue little can be done by Eustream, except possibly promoting a more aggressive pricing strategy. On the other hand this development is also probably reinforcing the urgency of promoting different flows, with the North-South axis partly replacing East-West.

The Slovak industry has recently gone through a major ownership change. The government had been early sold 49% of the formerly integrated incumbent (SPP) to E.On and GdF-Suez, with a clause that the management would be controlled by the buyers. Lately the two western companies have sold their shares to Czech international group EPH. It is too early to say how this change will affect the

strategies of SPP or of its affiliated transmission subsidiary Eustream. In any case, strong support for the development of the NSC appears unchallenged in Slovakia.

2.6 Concluding remarks: the V4 countries and the development of market integration

Infrastructure, and in particular interconnection between all V4 countries, is the necessary foundation of any integrated market development. At present only the Czech Republic and Slovakia have adequate interconnection capacity and are sufficiently independent from supplies from (or through) Former Soviet Union (see Table 2). However, plans for new infrastructure would lead to remarkably higher interconnection, which would be probably sufficient to implement a common market and possibly also a single balancing zone, although more detailed studies are needed on this respect.

The V4 decision to cooperate for the exploitation of these opportunities is clearly justified. The GTM studies have noticed that investments aimed at certain market areas are boosted by the availability of a liquid and reasonably competitive market⁸. In turn this requires a market size of at least 20 Bcm/year and the availability of at least three different sources, with a reasonably low market concentration (i.e. an HHI index around 2000). No one of the V4 countries can achieve these conditions at present. Without the NSC and V4 integration, the availability of three different sources is possible only indirectly through “backhaul” supplies from the West, which are often interruptible and therefore less reliable.

Theoretically, only Poland may the capacity of achieving the required GTM standards in coming years, although through LNG supplies that may be rather costly in the short term: in fact the LNG supplies have been contracted at a time when their prices was not particularly favourable, due to competition from East Asian demand. Achieving an acceptably competitive level of the HHI would also require and a very dramatic fall of the incumbent’s market share, probably to below 30%, which could probably be achieved only by an aggressive (an unlikely) gas release programme.

The difficulties of achieving a secure and competitive gas market in a single country (including the largest V4 country) show the benefit of integrating all V4 countries into a single relevant market: a common V4 market would allow the achievement of at least two such conditions (market size and concentration) without major efforts, with a slower pashing in of competition between the current national market leaders – as has mostly happened in Western Europe in the last decade, possibly fostered by limited gas release programmes. It would also help achieving the expansion of new supplies by triggering investment in new connections.

In order to see how V4 integration could help achieving the GTM objectives, Figure 8 and Table 2 can be considered. Figure 8 depicts the state of infrastructure as it it could appear around 2018, including infrastructure that is is expected to commissioned by that time, including Nabucco and LNG terminals in Poland and (possibly) Croatia. Table 2 shows how connection of the V4 markets would modify market concentration indices, assuming that current market players kept their sales. An integrated market would probably lead to market players entering the respective home markets, and new players also intervening, as it has happened new capacity would be assigned in line with present shares of current capacity holders in each country. hence concentration would further fall. Such calculation is purely hypothetical as connection is scant, but it shows how market power would fall if interconnection was provided.

⁸ Jean-Michel Glachant, “A Vision for the EU Target Model: the MECO-S Model”, EUI Working Paper RSCAS 2011/38. www.florence-school.eu

	Czech Rep.	Hungary	Poland	Slovakia	V4
C3	59%	82%	97%	95%	78%
HHI	3905	5121	9029	6199	2537

Source: NRA Liquidity Reports; own estimations for Hungary and V4.

On the other hand, it is clear that, whereas all stakeholders in the V4 have confirmed their interest and commitment towards integration, it is also clear that such interest is not the same across the region. In fact, Poland has the lower supply capacity independent from FSU supplies (Western imports and domestic production), followed by Hungary (Table 3). Both countries fall short of the N-1 criteria for security of supply, even though they respect the narrower official N-1 definition that is included in Regulation 994/2010/EC, which is based on daily rather than annual capacity⁹. Yet this definition is clearly unsatisfactory for the countries' energy policy, which looks at diversity of supply with a view to ensure competition between supplies and lower prices as a consequence.

	2011	2018 (exp.)
Czech Republic	197.3%	190.9%
Hungary	62.0%	121.3%
Poland	37.9%	110.5%
Slovakia	242.3%	365.8%
V4	107.6%	166.9%

Source: own calculations based on ENTSOG data.

For these reasons, it is clear that the greatest infrastructure development effort would fall on countries with lower alternative supply capacity. In particular, Poland is called to the greatest effort to substantially reduce its near isolation, and even more so as its consumption is expected to substantially grow. As for Hungary, it has already developed remarkable interconnection, but needs to complete its job by connecting with Slovakia and ensuring flow reversal on its Croatian and Romanian borders¹⁰.

The Czech Republic has a limited interest into the development of infrastructure as a way of satisfying its security of supply requirements. On the other hand, the limited infrastructure that the Czech Republic is expected to develop (i.e. the enhancement of its Polish link) is largely necessary anyway for domestic reasons. As for Slovakia, its opportunities depend largely on its peculiar position as the home of the largest transit flows in Europe: experience has shown that in spite of large connections its security of supply may not be fully granted, as bottlenecks further west may limit the amount of gas that can actually reach the country. For these reasons, the country appears firmly committed to boost its connections with Hungary and Poland, as a crucial part of the NSC.

A REKK study¹¹ shows that the construction of such interconnections could in principle drive wholesale prices of the V4 countries close to each other and close to those prevailing in Western

⁹ By such definition storage can be used to satisfy emergency needs.

¹⁰ This analysis does not consider the contribution of new major transit projects like Nabucco West and South Stream, which by their nature are beyond control of the V4 policy makers.

¹¹ P. Kaderjak, see fn. 2.

Europe. Section 5 will further analyse how the market organisation may better exploit the availability of such new interconnections.

Three of the V4 countries have started to operate their national central gas markets. Even though it may seem early for an assessment, at least the Czech case shows that they are probably too small and endowed with too limited liquidity resources, despite good interconnection with Western hubs. It is probably necessary for the V4 to either merge their short term markets or to arrange some permanent cooperation (like e.g. market coupling) in order to mobilise and pool their resources. In turn, Slovakia has so far preferred to refer to the neighbouring Austrian hub.

Emerging spot markets are also associated with balancing, though in a different ways in the three countries. Since balancing is at the same time a possible trigger of spot markets and a major reason to establish them, it is clear that some harmonisation of the relationship between balancing and market organisation is absolutely necessary. Most stakeholders agree with this view. The substantial changes that will be necessary due to the implementation of the European balancing network code are a major chance to promote such harmonisation.

3. Challenges and opportunities

The V4 countries share common problems, notably their lingering high dependence on Russian supplies, entailing limited security of supply standards and relatively higher prices if compared to those of Western Europe. Yet their collaboration in the gas sector occurs at a time the gas market faces important changes, which are sources of challenges as well as of opportunities for the V4 countries. These are now briefly described and discussed, with a view to underline the main reasons that highlight the benefits of developing the North-South Gas Corridor in Central and Eastern Europe and of integrating the V4 gas markets.

3.1 The Polish LNG terminal

The main source of the current decoupling between spot market prices and those of oil-indexed long term contracts that still dominate V4 supplies lies in the LNG that has been rather abundantly available as a consequence of the largely unexpected shale gas revolution in North America. Declining or stagnating gas demand in Western Europe has added to this opportunity and some part of the bonanza has reached the V4 through the limited available West-East capacity.

However, the V4 countries may shortly exploit this opportunity through the new LNG terminal in Świnoujście, Poland (*Polskie LNG*). It may be claimed that gas from LNG terminals can also be shipped to V4 through existing facilities in France, Belgium, Netherlands, however it can be shown that this would be a more expensive option. For example the total cost of shipping gas from an African or Middle Eastern source to end customers in Prague or Warsaw would be 0.20-0.40 \$/Mbtu higher than through the Świnoujście terminal, if the LNG had to be landed and regasified in the Netherlands. Costs could be even larger in case of congestion or tougher competition on any ring of the supply chain. Direct re-gasification in CEE rather than through Western facilities and networks certainly represents an asset for V4 customers.

3.2 The Southern Gas (Fourth) Corridor

More could be done with new transmission infrastructure, opening supplies from gas-rich regions on the South-Eastern neighbourhoods of Europe. Large pipeline projects from the East may bring into the V4 region (notably in Hungary) new supplies through the South Stream, Nabucco West or Trans Albanian Pipeline (TA) projects. Among them South Stream - which is expected to cross Hungary - would be only a route rather than source diversification for V4, much in the same way as the Nord

Stream, Opal and Gazelle pipelines allow supplies of Russian gas to reach the Czech Republic through the Baltic and Germany rather than through the Ukraine and Slovakia. Nabucco West and TAP are currently seen as alternative ways of bringing part of the gas produced at Azerbaijan's Shah Deniz field to Europe. A choice between them is expected by mid 2013.

This would be the first implementation of the long pursued EU's policy of promoting a Fourth (or "Southern") Corridor of gas imports, with supplies from the gas rich Caspian and Middle Eastern regions. Whatever the chosen route, the mid term development that is expected is rather limited: only 10 Bcm/year of Shah Deniz production are allocated to Europe, hence their contribution will be limited. Although the V4 are in an excellent position as front-line purchasers of such gas, their shares will be presumably even lower. Yet, there are hopes that Southern gas corridors supplies may increase at a later stage through other possible sources that are in the ground but not currently available for various reasons (e.g. Turkmenistan, Iran, Northern Iraq, East Mediterranean offshore).

Nabucco West is clearly the best option for V4 as it directly crosses the Hungarian territory and is expected to terminate at the Austrian Slovakian IP in Baumgarten. It is the more direct and cheaper way of bringing Caspian gas to V4, but not necessarily to Western Europe: this could be the reason for its postponement. In case TAP is preferred as the first Fourth Corridor option, some gas could still indirectly reach the V4 through the Ionian Adriatic Pipeline (IAP), a spur off the TAP linking Albania with Montenegro, Bosnia-Herzegovina and Croatia, with the latter already connected to Hungary. The construction of the IAP is a political goal of the Energy Community of South-Eastern Europe and a part of the project of better gasifying the Western Balkans. It is likely that any available quantities for the V4 would be rather small.

3.3 New market players

Expiration of long term contracts with the traditional suppliers and / or their renegotiation will naturally occur, and the trend towards shorter term, less oil related contracts could substantially alter the competitive conditions in the V4 as well as in other EU markets. A possible development is that traditional upstream suppliers could decide to enter the wholesale markets: a chance that is easier for Russian companies in V4 rather than in other European regions, due to historical links. The last few years have indeed seen a remarkable increase of the number and relevance of new suppliers in the V4, with the maximum impact in the CR and minimum in Poland. It is worth noting that this behaviour does not exclude companies that use (commercial) Russian gas, and that are ready to compete for customers even at prices that are below those of the traditional long term contracts. Furthermore there are several indicators showing that the Russian may be considering changing its attitude towards markets rather than further losing market shares. This is therefore an important opportunity for V4 markets, notably if interconnections between them and along the new NSC will eliminate the possibility of segmenting and addressing the V4 markets separately.

3.4 The European Network Codes

More generally, the implementation of European Network Codes starting in 2014 represents an opportunity for a major review of market regulation, which could be the chance to harmonize it within the V4 region, with a view to establish a common market. The implementation of the ENCs, which are now being developed after the Framework Guidelines issued by the ACER and approved by the European Commission, is expected to occur mostly between 2014 and 2016. In the gas sector, four ENCs are being issued (Capacity Allocation, Balancing, Interoperability and Data Exchange Rules, Harmonization of Tariff Structures), and rules on Congestion Management have already been approved by a fast-track procedure and included in an Annex to Regulation 715/2009/EC. Yet, all these rules normally require few changes in primary legislation, but a significant production and

harmonization of secondary legislation, involving mostly NRAs and TSOs. Section 5 below will provide further details and examples of the rules to be issued in relation to the chosen market model.

The implementation of new ENC's is an opportunity for V4 harmonisation, and also for work of NRAs and TSOs. ENC's will leave several options to choose from, and detailed rules will have to be tailored to each market. This is likely to require a strong effort and heavily stress the limited resources of TSOs and – even more – NRAs. A way to relieve the efforts and achieve better quality results is a regional division of labour. For example, each TSO and NRA could be assigned to a task force led by a V4 country NRA and TSO: the task force leader would bear the greatest effort on implementation of the ENC, though with the consent of its partners. In this way, a harmonised implementation of ENC's would also lead to a better quality of the market rules.

3.5 Further opportunities

Less certain but potentially even larger potential for the V4 market could obtain from other sources. These are regrouped here due to their relatively more uncertain outlook and / or their location outside (but close to) the V4. Exploitation of these opportunities could be related to success of the V4 integration, but is by no means a pre-condition for it:

- ***Mediterranean LNG.*** The implementation of the ENC, of the SoS Regulation No. 994/2010 and of the recently adopted EU Congestion Management rules may help opening up pipeline capacity with interconnected LNG terminals. The rather recent story of V4 connection with Western European hubs could teach several lessons on the relevance of this opportunity. For several years after gas market liberalisation had started, the large East-West transit pipelines that transported Russian gas across the V4 countries could not be used in any other way, as capacity was fully booked and no physical or virtual reverse service was available. However, notably after the January 2009 supply crisis that stopped transport through the Ukraine for two weeks, things have changed. In spite of the difficulties of arranging capacity across several different TSOs some gas has been made available and is now the source of any substantial market liberalisation as well as diversity of supply in the V4 region, with the Czech Republic as the best beneficiary. Likewise, similar opportunities exist in the Southern part of the V4 region: LNG terminals in Turkey and Greece have spare capacity and pipelines across Bulgaria and Romania could accommodate some virtual reverse flow gas that could reach Hungary. Planned investment may also turn part of such capacity into physical one. Although several difficulties currently hamper these initiatives, it is possible that the entry into force of new Network Codes on Congestion Management and Capacity Allocation, as well as enhanced capacity aimed at meeting the security of supply standards required by Regulation 994/2010/EC may open up new opportunities, based on existing infrastructure, as they already did in the case of connections between Poland and the Czech Republic Western Europe.
- ***Other North-African gas.*** Some more gas could also come through the Italian LNG terminals and the Austrian TAG pipeline into the Baumgarten IP with Slovakia or the HAG into Hungary. This opportunity has been a minor one so far as the Italian market has suffered from inadequate or costly LNG logistics and generally poor competitive conditions, which have led to premium prices with respect to those prevalent at Baumgarten, and even more at North-Western hubs. However this situation is now changing, with more alignment of Italian prices with those of NW Europe. The next opening of another (though small) Italian LNG terminal and new pipeline and projects on the Mediterranean coast could increase the Italian market surplus, also in the wake of its persistently weak demand, yet the weight of this opportunity should not be large. The Italian TSO has also announced plans to reinforce South-North capacity towards Switzerland-Germany and Austria.

- ***New production opportunities in the region and in the neighbouring countries, notably from unconventional gas plays.*** Poland is widely regarded as a major potential source of shale gas, even though recent estimates have been re-estimated at 350-750 Bcm, much lower levels than earlier expectations¹². However these estimates may not adequately consider more recent activities. The Polish shale potential is a very important topic that lies beyond the scope of the present Report. And is still subject to significant forecasting instability. Further resources in the Czech Republic are currently frozen by a moratorium. Remarkable unconventional resources are also expected in the Ukraine.
- ***Connection to the North Sea continental shelf through the Baltic.*** Fairly detailed projects had been defined for a connection between Norway and Poland via Denmark, known as the *Skanded* and *Baltic Pipe* projects. However Skanded has been suspended in 2009 due to the general economic crisis and the aggressive Danish policy, targeting the phasing out of fossil fuel usage by 2050, whereas the Baltic Pipe' commissioning is now scheduled for 2020 only.
- ***New LNG terminals in the Balkans.*** An important component of the original NSC was its Southern end, which was supposed to be represented by its connection with Western Balkans infrastructure. In particular, plans have long been put forward for the Adria LNG project, a 10 Bcm/year LNG terminal to be based on the Croatian Northern Adriatic Krk island. However the Adria Consortium has postponed the FID until 2013. Meanwhile the new Hungary-Croatia link has become operational, though it is not yet bi-directional. Further pledges have come from Croatian and Hungarian authorities, and the Hungarian and Croatian gas industries have consolidated¹³. Plans have also been considered for an LNG terminal in Albania, but these have never reached any operational step. On the other hand, South Eastern Europe is interested by other major projects, notably Nabucco West, South Stream, TAP, IAP, as well as by the Energy Community Gas Ring concept. It is widely agreed that not all these project could be borne by the available resources and market demand, even considering the remarkable growth potential of Western Balkans besides that of the V4. It is likely that a clearer picture of the feasibility of these opportunities will appear after a final decision on the route for Shah Deniz gas will be taken around mid 2013.

3.6 Regional cooperation and extension of V4 market integration

All V4 countries are Members of the South-South East European market region, one of the three into which the Gas Regional Initiative is articulated (GRI SSE). It also comprises Italy, Slovenia, Austria, Romania, Bulgaria, Cyprus, Greece and Croatia as an observer. The V4 countries have important interconnections with other SSE countries, in particular with Austria and Romania, as well as with other EU countries, particularly Germany.

This study is fully aware of the opportunity of extending the process beyond the V4 countries, with the inclusions of neighbouring countries, notably of those that share the V4 conditions, like V4 Southern neighbours: Austria, Slovenia, Croatia, Romania. These countries are already included not only in the GRI SSE but also in bilateral cooperation projects with V4 countries and their inclusion (or some form of connection) have been mentioned as useful by several V4 stakeholders. Other neighbouring countries (the Baltic Republics, Finland, Bulgaria, Serbia, Bosnia and Herzegovina) partly share the same situation, but have not been mentioned in the same way, probably due to their

¹² http://www.upi.com/Business_News/Energy-Resources/2012/03/23/Lower-Poland-shale-gas-reserves-estimated/UPI-90051332498600/; F. Geny, "Can Unconventional Gas be a Game Changer in European Gas Markets?", OIES Working Paper, 2011, www.oxfordenergy.org. Kosciuszko Institute, "Unconventional Gas – a Chance for Poland and Europe? Analysis and Recommendations", The Kosciuszko Institute, Kraków, 2011, www.ik.org.pl.

¹³ <http://www.naturalgaseurope.com/hungary-croatia-lng-terminal-adria>

different geographical and institutional position or their less advanced market status, so that it is likely that integration with such countries appears less close.

The present study is focused on V4 market integration and does not aim at providing advice on the opportunity of extending it to other countries. The following points that have been raised by stakeholders are brought to the readers' attention.

Within the GRI SSE, several pilot projects and studies involving V4 countries are currently in preparation. Most of them involve relationships on the East-West axis:

- the GATRAC project between the Czech, the Slovak and a German TSO (Ontras) allows for the purchase and management of bundled capacity across the three borders, through the Lanžhot and Hora Sv. Kateriny IPs;
- a bundled capacity allocation project will soon be started on the Lasow IP between Poland's Gaz System and Germany's Ontras;
- a pilot bundled capacity product is about to be launched on the Romania-Hungary interconnection.

Several stakeholders in the Czech and Slovak Republics underline that the establishment of a common market between their countries and Austria is immediately feasible thanks to existing interconnections and can be the core of a CEE gas hub, starting from the Baumgarten Central European Gas Hub (CEGH), to be extended later to Hungary, Poland and others. They underline the fact that the CEGH has a remarkable experience and market operation capability and that it is necessary to start developing and expanding hubs as soon as possible in the wake of growing competition among European hubs. Two studies have been recently published, respectively about the macroeconomic benefits and about the features of a joint implementation of the GTM between Austria, the Czech Republic and Slovakia.

A first study proposes¹⁴ that the joint implementation should use the “Trading Region” model where a single virtual trading point would be established but three separate balancing zones would be maintained (see section 4 for more details on this model).

A second study¹⁵ estimates the macroeconomic benefits of the trading region by means of the estimation of efficiency improvements arising from alignment in the region. Net benefits of the Austria-Czech Republic-Slovakia pooling are compared and found positive, though lower than those of a single market merging Austria and Italy. However these results seem to be crucially dependent on the price differences of Austrian, Italian and other hubs, which have been rather volatile, but with a tendency to convergence (Figure 9).

Other stakeholders notice that the inclusion of Austria (and possibly also of Slovenia, which is in a similar status) would have positive but limited benefits for the V4. It would help due to CEGH advanced market management skills and it would also further increase the integrated market size (by about 20%). On the other hand, the Austrian system is complex due to the presence of several TSOs, which are now trying to be jointly operated through a new coordination body (Gas Connect Austria). A new market model has just been introduced, hence the experience with the entry-exit model is shorter than in other V4 countries except Poland. Furthermore, Austria suffers from similar problems as the V4: the main supply source is Russia, through long term contracts; the Slovenia market is small and buys limited amounts of Algerian gas that is supplied through Italy. The independence and neutrality of the CEGH from and towards suppliers should also be ensured, as it is currently 50% by

¹⁴ Wagner, Elbling and Co., Design Principles of the CEE Trading Region, Part I, 5 November 2012; http://www.acer.europa.eu/Gas/Regional_%20Initiatives/South_South-East_GRI/Pages/GRI-SSE-studies.aspx.

¹⁵ J. Büchner, O. Floercken, N. Täume, Study on cross-border market integration. Macroeconomic analysis of the CEE Region, E-Bridge Consulting GmbH, June 2012; http://www.acer.europa.eu/Gas/Regional_%20Initiatives/South_South-East_GRI/Pages/GRI-SSE-studies.aspx

Gazprom. For all of these reasons, some stakeholders notice that the inclusion of Austria and Slovenia would hardly enhance the V4 situation in terms of access to new sources and supply diversity.

Lately Austria, like the Czech Republic and other V4 countries, has managed to achieve some diversification, with Russia's share of supplies falling below 50%. However its main long distance pipelines are among the most congested in Europe as WAG (see Figure 1) and HAG are busy carrying cheaper gas eastbound from Western hubs, whereas TAG is used to haul Russian gas towards Italy, Slovenia and Croatia. WAG's congestion reduces Austria's appeal and indeed tighter connection with Czech Republic and Slovakia can be seen as an attempt to overcome such bottlenecks.

Connection with Croatia would represent the completion of the NSC. It would not greatly increase market size but could in principle provide access to other resources if a decision on its long debated LNG terminal is finally taken. This is not likely in the current uncertain climate about the European market, but it could happen shortly after that.

Romania is home to significant gas reserves, with new finds recently reported in the Black Sea. Its market opening has been limited so far by a pricing policy aimed to ban exports and contain the average price paid by domestic consumers by rolling the cheap domestic production, which covers about 70% of demand, and the Russian imports that fill the difference. Such policy is clearly not compatible with actual participation in the European integrated market and is the target of an EC infringement procedure. Inclusion of Romania in larger integrated markets could occur as such policies are overcome, but the social situation of the country makes such development likely to occur later rather than sooner.

4. Applicable high level market models

There are several basic models that may be considered for the integration of V4 countries. Some of them can also be combined, or be modified so that they become different development stages rather than alternative solutions. The models will be discussed in this section, illustrating the main requirements for their implementation and the specific issues they may raise in the V4 region.

4.1 Single cross border market zone

The establishment of a single entry-exit and balancing zone in a region represents the ideal situation for the achievement of the GTM objectives in terms of market size, access to sources and supply concentration.

This model requires that several necessary conditions are met:

(1) A single tariff system should be established.

In this model, the region has a single entry exit tariff system: in other words market participants could pay a single entry tariff in any country or TSO in the region and be granted the right to transfer their gas to any other exit point or zone in the region. Compared to the current systems, all payments related to internal IPs of the region would disappear.

For the discussion readers could refer to to hypothetical system of Figure 10, where three countries are part of a region. For simplicity of analysis but without loss of generality let us assume that each country has its own TSO and a national entry-exit system, with a single domestic exit point to local distribution as well as large customers that are directly connected to the transmission grid. Further there are exit points as IPs (d,e,f,h,i,j); pure entry point for import from a producing region or LNG terminal (g), and from domestic production (p); and entry/exit points from storage (q, r). In case of full

merger, no TSO revenue would accrue from internal IPs (e,h,i). The whole tariff system would have to be recalculated and its revenues be redistributed among participating TSOs.

In principle such process is simple. If NRAs (independently) define the allowed revenue of their respective TSOs and agree on a cost allocation methodology, a joint tariff system could be defined. Tariffs could then be raised by a common entity that would pool and redistribute the revenue in line with the allowed revenues of each TSO. Otherwise (and more simply) each TSO would raise the (entry or exit) tariffs in its own jurisdictions and a compensation account would be established for reconciliation with the allowed revenues.

Whereas this is simple in principle, practical difficulties of the harmonization process should not be neglected. First, not all tariff systems are currently based on a revenue cap approach. For example the Czech Republic has a price cap system, where unit tariffs are set at the beginning of the regulatory period in line with the allowed revenue but later they are adjusted by a formula that included the inflation rate and the predetermined productivity improvement, but does not offer a guaranteed revenue. Under such approach, in case capacity booking is reduced the risk falls on the TSO.

In other cases the revenue cap approach is used, where annual adjustment is applied to the total revenue and unit tariffs are also corrected to allow for capacity booking variations. In this way the allowed revenue is basically guaranteed to the TSO, albeit possibly with a delay. Both approaches are acceptable: the price cap is sometimes preferred in cases where a large part of capacity and revenues are related to transit, to avoid that changes in transit capacity bookings may affect tariffs paid by shippers serving domestic destinations.

Regional integration clearly requires harmonization of such approaches. Since risk borne by TSOs is different, rates of return may also differ.

Moreover, a full integration of the tariff systems would probably require further harmonisation. Under a common system, an increase in the allowed revenue for one of the TSOs would eventually be paid by all shippers that use the regional network, both for transit and for consumption in the region. In principle this affects all shippers but the impact could be more significant for neighbouring countries. It is likely that some harmonization would be useful to avoid the insurgence of disputes.

Last but not least, it should also be considered what impact the combined tariffs may have on transit flows. Usually the calculation of an entry-exit tariff over a broader area leads to relatively lower tariffs for longer distances and hence to a better position of transit. However, this is not always the case but depends on the chosen cost allocation criteria, which may be rather controversial as it is apparent in the current European discussion on this topic.

To sum up, harmonization should involve at least:

- criteria for the valuation of the asset base, depreciation, rates of return and operational costs;
- duration and timing of tariff regulatory periods;
- cost allocation methodology to entry and exit points, including storage sites and LNG terminals;
- tariff structure (capacity, commodity and other components);
- criteria for tariff updating, with particular reference to the regulatory account²⁷ for the treatment of cost recovery or under-recovery;
- inflation adjustments of tariffs and capacity prices that are determined at auctions.

In any case, impacts of the regional integration on gas prices should be small, lower than 1% of the wholesale gas price.

(2) There is no internal congestion in the zone.

From a technical perspective, the region must work as a single balancing zone. Any shipper would only be required to be balanced between all its flow allocations at entry and exit points of the region, and not at the individual TSO or country sub-zones. This could mean that, for example, a shipper could be “long” in country A but “short” in interconnected country B, but it would still have no obligation to further balance if the unbalances in the two countries offset each other¹⁶. In such case, TSOs must be able to transport the gas from long to short areas, or to use storage or other balancing tools to maintain the network operational conditions.

A single balancing zone requires a significant effort, notably as it should be combined with changes required by the ENC on Balancing, not only by TSOs but also probably by Distribution System Operators. This ENC is not known in its final version as the present Report is drafted, however the general principles seem to have been agreed. The Code will require balancing to occur on a daily basis by tools that are to be traded in a spot market, which can be a separate platform only for a transitional period. At present, none of the V4 countries use market based balancing but administrative unbalance charges are defined by regulators. Only the Czech Republic and Hungary have limited markets for unbalances that help market players to trade and sometimes reduce penalty payments. In Poland, Gaz System has introduced market-based balancing regime in its national network code. It allows imbalances up to 5%.

For a single market based balancing systems, NRAs need to cooperate very strictly. It requires the common setting of issues like:

- the gas day and all its deadlines (nominations, re-nominations, confirmations, trading sessions);
- settlement methodologies including the attribution of responsibilities and criteria for load profiling of non daily metered end users;
- content and timing of information to market players;
- tolerances and maximum hourly ceilings, if any;
- market price setting method.

More generally, the entry-exit model involves the ability to transfer gas from each entry to each exit of the region. This requires enough capacity that no congestion within the region normally occurs. If this is not the case, other solutions may be appropriate, like the trading region or market coupling, which will be considered later. On this respect, the choice of the best solution would require an analysis of the actual network conditions, including the availability of flexibility resources like storage, flexible production and imports, or interruptible consumers. This is a technical analysis that should be undertaken soon and will be included in the proposed roadmap (see next section).

As in the case of tariffs, it is likely that a very tight cooperation between participating TSOs would be necessary, notably for balancing, as flows should be smoothly managed across the region. In fact it is very likely that the dispatching function in the interconnected networks should be centralised, establishing a coordination body whose responsibilities would be close to those of an ISO (independent system operator).

It is worth wondering how large the interconnection should be to avoid congestion, however this cannot be defined in general but it depends on specific scenario analysis that is beyond the scope of the present paper. Without prejudice to the suggested technical analysis it is likely that interconnections around 30% of the market size would be appropriate. This arises from the comparison of other European cases. For example Italy adopts a single balancing zone which is larger in terms of consumption than the combined V4 and spans over longer pipeline distances. The REKK

¹⁶ Or, it would have to pay only for the smaller “balance of the unbalances”

study is (provisionally) forecasting substantial price alignment as a consequence of the proposed interconnections, but does not analyse the balancing requirements.

If these two conditions are met, a single virtual point can be identified in the region. Trading can be based on such virtual point, where title transfer and other hub services would be provided. This leads to the next feature of this market model:

(3) A single market operator is defined or emerges for trading on the regional VTP.

It is clear that trading at a single VTP cannot occur at more than one trading platform or exchange. On the other hand, many issues remain open on this respect. For example Market Operators may simply providing a platform or offering an anonymous counterpart as well. They could offer products of different duration as well as more advanced services like gas parking, wheeling, loaning, topping up/down and others. They may have responsibilities for settlement procedures, as it happens already in the Czech Republic. At present three market operators have been set up in the region - all of them as an offspring of the electricity market operator - in the Czech Republic, Hungary and Poland. Slovakian players including the TSO have been using the Austrian CEGH, which has been until recently organised for deliveries at the physical hub of Baumgarten at the Slovak-Austrian border.

The Czech MO (OTE) has been operational for almost two years, offering a platform for intra-day trading as well as a monthly session for trading of imbalances. The Hungarian and Polish MO have only started their activity at the beginning of 2013, and have seen few transactions so far. The very limited liquidity, also in the Czech case after nearly two years' operations, seems to confirm that each national V4 market is too small for an effective and liquid market to be operational. In fact, some stakeholders have noticed that even the neighbouring German Net Connect virtual hub, which is based on a physical market of over 40 Bcm/year, is sometimes too small to offer enough liquidity for balancing purposes. On the other hand the Czech intra-day market has been normally converging with German hub prices and marginally departing from Austrian ones.

The characteristics and location of the market operator are often a source of discussion and potential disputes at national or regional level, and the same could be said of the responsibilities that should be associated with this entity. Some proposals about it should be part of a general proposal about high level market design and are therefore postponed to the next session. At this stage it can only be noticed that a political agreement about the location of a market operator is not likely in early stages of V4 market integration, but it could emerge later. This choice could be partly the consequence of a broader distribution of central responsibilities of a coordinated regional market, and is likely to be based on the evolution of infrastructure and liquidity at the national platforms that are currently being used.

4.2 Trading Region

This concept has been suggested as an option of the recommended GTM. It envisages a single tariff and price zone but separate balancing areas, which may coincide with individual (National) TSOs, or parts thereof. This model is unprecedented in gas, and needs to be clarified on several aspects. A study within the GRI SSE¹⁷ offers some theoretical answers.

In the TR model, several TSOs identify and establish a single market zone, which represents a virtual trading point that works as a virtual hub, just like in the previous model. The TR need not include the entire transmission systems but it could be limited to a part thereof, for example the main

¹⁷ See CEER Vision for a European Gas Target Model, Conclusions Paper, Ref: C11-GWG-82-03, 1 December 2011, www.energy-regulators.eu; Wagner, Elbling & Co.; http://www.acer.europa.eu/Gas/Regional_%20Initiatives/South_South-East_GRI/Pages/GRI-SSE-studies.aspx.

high pressure, long distance lines. Shippers nominate entries into and exits from the TR and are allocated what they are nominated in the region, so that they are always balanced in the region. Imbalances are transferred to the balancing zones, which are connected to the TR typically through one or more exit point. For example the territory of a participating country, with its lower rank transmission and distribution systems may be assumed to be part of the balancing zone. In this way each balancing zone may follow different rules.

For tariff purposes, the TR works like the single market zone: entry and exit tariffs may be pooled and their revenue allocated to participating TSOs in relation to their costs. All comments of the previous section under (1) are applicable.

On the other hand, balancing may differ among the participating zones, and each participating country or TSO can follow its own rules. Each balancing zone is also connected to the TR, which will be also used as a balancing market. Shippers will be able to buy or sell gas in the spot market of the TR to be balanced in each zone, however they may also use flexibility resources that are internal to each balancing zone, like interruptible customers, production or storage.

The main advantage of this solution is that it requires less harmonization effort than the single market zone, as balancing rules can differ. In fact, balancing reforms always involve remarkable efforts by all stakeholders (NRAs, TSO, DSO, SSOs and shippers). Very detailed criteria and rules must be defined, including on settlement, profiling, information provision, tolerances, guarantees. If the international harmonization can be avoided at least in the first years of market integration, this could facilitate a faster integration.

Still there are some doubts about how the TR should be organised and about the minimum harmonization requirements that are required anyway. Experiences of more advanced markets have shown that balancing rules and markets can easily generate loopholes that can be exploited by smart shippers, with costs falling on all users. For example, different timing can create arbitration opportunities between the different balancing zones. Shippers that are active in several zones could speculate by using the different tolerances, position information, or settlement rules of them. NRAs should probably jointly and closely monitor the market.

A related issue to be ascertained is how much harmonisation could be required in new mechanisms that are expected to be introduced in the implementation of the Third Package. An interesting example is the “oversubscription and buy back” mechanism that is envisaged as the main short term congestion management tool¹⁸. Such mechanism has potential costs that are normally raised through TSO tariffs. In the case of a single market zone or a TR encompassing several TSOs such costs would be presumably shared among participating TSOs. In the V4 region, the most congested entries that may create problems are probably the Mosonmagyaróvár entry on the HAG from Austria into Hungary and the Lasow entry from Germany into Poland. Inclusion of Austria into the TR would possibly move the congestion further west towards the Oberkappel and Burghausen IPs between Austria and Germany. Such risks are higher as far as western hubs have lower prices than Russian gas, triggering eastbound commercial flows. On the other hand opening or enhancement of connection between the Brotherhood East west system and Poland and Hungary may reduce the problem as the larger connections between Germany and the Czech Republic could be exploited.

The market organisation of the TR would be similar to the single market zone case. A single market operator is likely to emerge, and would be probably chosen by market forces if a political decision is not taken early.

¹⁸ It is included in the revised Annex I of Regulation 715/2009/EC, as modified by the Commission Decision of 24 August 2012.

4.3 Multiple coupled market zones

In this solution each TSO or country retains its own market zone. Each has its own entry-exit tariff system, virtual trading point and balancing rules. Even this solution requires substantial harmonisation of short term market rules, and some interconnection between the zones. However, unlike in the previous cases, congestion may occur and it would be treated by a Market Coupling algorithm where different prices may emerge after joint offers are presented in the coupled zones.

This solution requires less interconnection investment and a reduced harmonisation effort with respect to the single price zone or the TR, yet coupled markets also need some common market rule; for example the deadlines of the gas day must be the same. There may be separate market operators but a common office for market coupling must be designated.

The main difficulty is the very limited experience in adopting the market coupling concept in gas markets. Some experience and studies are being developed within the NW Gas Regional Initiative and may provide advice about the feasibility and condition of MC. Pilot projects have been launched in France (between the PEG-Nord and PEG-Sud zones, both managed by the same TSO, GRT-gaz), and between GTS and its sister company, Gasunie Deutschland. First experiences have been satisfactory in the French case, where a real physical congestion occurs between Northern and Southern France.

This market linking tool has actually been devised for electricity interconnections, which by their nature are very often congested. MC then provides an optimal way of allocating congested IPs. However in gas markets contractual congestion has been common in Europe, but physical congestion is rare.

In the V4 region, MC could be an interesting solution for the immediate inclusion of countries that are currently poorly interconnected: as illustrated in Figure 2, this is the case of Poland and also of Hungary. For MC to be operated with these countries some capacity products, though limited, should be devised. In the latter case the product would either include Austria or use some capacity on the Austrian system, unless a link through Ukraine could be established.

On the other hand, MC is seen as an inadequate solution for countries where ample capacity allows for more ambitious market integration, as is currently the case of Czech Republic and Slovakia and of Hungary after 2015; or of the whole V4 region after all interconnections envisaged in Figure 8 are commissioned. With abundant capacity MC would almost always yield no congestion rents so that it would turn out as a useless tool.

In the short term MC may be accepted as a way to connect Hungary with Czech Republic through Austria and Poland with the Czech Republic through the existing interconnector as soon as possible: in this case the first step would be the creation of the necessary cross border capacity products. Such preparatory work is however necessary for any proposed solution and should therefore be started anyway.

4.4 Independent connections to liquid hubs

This solution avoids any proposal of active market integration, with the exception of those necessary to ensure the security of supply standards required by Regulation 994/2010/EC. It can be therefore deemed as a “business as usual” alternative where no special policy initiative on market design is adopted.

This approach considers that markets can in fact be integrated, with substantial price alignment, by market forces that select one or more favourite trading spots, which act as benchmarks for other market zones. This happens if all connected zones can “shop” in that/those market(s), even with limited direct interconnection between them (Figure 11). For example, Ireland is formally organised as an entry-exit tariff, balancing and market zone, but in fact it is not actively developing its own market

but rather acting to ensure that it can access the larger, more competitive and liquid adjacent British market. Likewise, V4 countries may limit their interconnection and harmonisation to what is justified by market decision or security of supply requirements, but decide to elect (e.g.) a German (or a future merged German-Dutch) hub as their natural marketplace. If no market integration is promoted this solution could indeed emerge.

In this case, the regulatory strategy would be partly different and focus more on ensuring the viability of connections with the most liquid hub(s) and the availability of transmission products to move gas from/to it. Yet much of the required work – notably the establishment of bundled cross border capacity products – would be necessary anyway. NRAs and TSOs should therefore work on them irrespectively of the market model that will be implemented.

Connection to more liquid hubs in Western Europe is certainly the immediate objective of shippers, be they retailers or large end customers, and in particular of the newcomers who can hardly rely on the customary (and currently more expensive) Russian supplies. On the other hand implementation of this model in the short term would simply amount to postponing the harmonization of regulatory and business practices beyond what is strictly required by ENCs. In fact price alignment would only be triggered by common alignment to a more advanced hub. The current situation in the Czech Republic, which is already substantially integrated with the German market, would be the example to be progressively followed by other V4 countries as interconnection gets built.

This solution may appear very realistic and involving lower costs than the most ambitious integration model that have been outlined above. It is not surprising that it enjoys some support not only in the Czech Republic but also in other V4 countries that are not yet in the condition to fully implement it. It also has some appeal on governments and regulators, as they would retain more leverage on the industry, which would have to be progressively reduced under a more coordinated approach and a tighter market integration in favour of an agreed and longer lasting regulatory framework.

On the other hand, this solution amounts to giving up in advance any attempt to create an independent hub in Central Europe. Its appeal is entirely based on the idea that Western hubs always feature lower prices than those that may prevail in CEE. This need not be the case: the historical experience shows that even with oil related long term contracts prices may well be lower than those of markets where prices are determined by gas supply and demand. Further, it does not consider the opportunities offered by the Central-Eastern part of Europe and listed in section 3, which would be fostered by the creation of an independent V4 hub: from a more dynamic demand to perspective of conventional or unconventional production in the region as well as in its Black Sea shore neighbours; from direct and therefore cheaper access to the world LNG market to the perspective of a more dynamic and concentrated Russian gas industry.

5. Proposals for joint GTM V4 implementation

Upon consideration of the possible models, the market situation and opportunities and the available theoretical models for market integration, and after detailed discussion with over stakeholders and independent observers in the V4 countries (see Annex 1), the following strategy is proposed for a joint implementation of the European Gas Target Model in the V4 countries.

As already noticed in the introduction, the strategy is outlined in such a way to:

- be as consistent as possible with incentives that drive the behaviour of markets forces, as well as political objectives of governments;
- prefer actions that may be open to different developments, so that they can be considered as “no regrets” options that may be consistent with several models and developments.

The proposed strategy is a flexible process rather than a fixed roadmap. It must learn from each step how to better devise the following one. Not all data are now available to devise the best strategy, as the choice depends notably on the development of the market opportunities outlined in section 3 above.

Each step would presumably require the development of operational studies for their implementation. It is however suggested that such studies should be developed by concerned parties (TSOs, NRAs, MOs). Whereas contributions by external consultants may help, the operational nature should be outlined. Practical proposals for the necessary amendments of current market rules and procedures should be outlined.

With this caveats in mind, the following steps are suggested:

(a) *Establishment of working connection between market zones of the V4 and of neighbouring countries.* Regulators and TSOs should work to ensure that all market rules ensure the smoothest connection for delivery of gas between the V4 countries as well as at V4 borders with EU Member States (Germany, Austria, Croatia¹⁹, Romania). Such connections should be based on the establishment of bundled and (if possible) bi-directional capacity products, starting from and extending the pilot experiences already under way.

The coordination of necessary implementation steps could be devised within the framework of the GRI-SSE (see also section 6), including interoperability issues and border allocation criteria. Each TSO's or National network codes and market rules should be checked for consistency and joint proposal for updating should be prepared. The GRI SSE may thrive to achieve similar links with neighbouring countries that are not EU members but freely agree to be included, notably if they have accepted the basic common rules of the European gas market by signing the Energy Community Treaty (Serbia, Ukraine). In particular, harmonised capacity products should be developed as part of the implementation of the Capacity Allocation Network ENC, notably for delivery by physical or virtual reverse flow of gas from operational western hubs that already meet the GTM requirements (Gaspool, NCG, TTF, NBP, PEG, PSV). In relation to this, a Roadmap for the early implementation of the Capacity Allocation Mechanisms Network Code is being developed by ACER and ENTSOG, detailing, among other aspects, the working arrangements, time schedule, roles and responsibilities and geographical scope²⁰.

(b) *Development of market zones.* Independent existing market zones should be consolidated. Whereas entry-exit systems and market operators have been established everywhere, some regulatory steps should be undertaken for their effectiveness, notably the phasing out of any remaining wholesale price controls.

Common cross border trading zones could also be developed, for instance the proposed Austrian/Czech/Slovak Trading Region, which could use the large existing interconnection capacity of the three countries.

(c) *Connection of the V4 countries.* The connection of the Hungarian and Polish market zones with the Czech-Slovak core, possibly already linked through the suggested TR, should be based on simplified Market Coupling procedures, due to the limited existing interconnection of these countries. Connections would be based on the standardised capacity products developed under step (1).

¹⁹ Croatia will be a Member State of the European Union as of 1 July 2013, and is therefore treated as a Member State in this forward-looking project.

²⁰ In 2012 the South Gas Regional Initiative already made progress in the common definition and application of CAM in the cross-border interconnections in the Region. This can be a simple example also for harmonised CAM implementation in the V4 region. See http://www.acer.europa.eu/Gas/Regional_%20Initiatives/South_GRI/Pages/default.aspx

A preliminary study should consider the feasibility and preliminary requirements for market coupling, considering that in any case such procedures are likely to be relatively short-lived, as the development of larger interconnectors could make them redundant. Yet the time requested for such development (possibly 4-5 years, notably in the case of Poland) would justify such development. The operational study on MC should also consider the feasibility of connecting Poland and Hungary with each other and with Slovakia through the Ukrainian network. Other neighbouring countries (Romania, Slovenia, Croatia, and others) may be invited to join the process.

(d) *Enhanced cooperation of the V4 countries: joint implementation of the European Network Codes.* This step would be necessary for the establishment of a single V4 market zone. Even if the “Trading Region” model with separate national balancing were chosen, a coordinated implementation of Network Codes would be beneficial for the region, as it could represent not only the set-up of larger market area with common rules, but also an efficient use of limited regulatory resources. In many cases a joint implementation, with the establishment of common NRAs' and TSOs' task forces would not only lead to harmonised implementation, but also to better regulatory quality. Each task could be led by one of the participating country, with members from all others.

Synergies are therefore a substantial reason for cooperation of both NRAs and TSOs (and possibly Market Operators as well). Furthermore, in the regulators' case it is worth recalling that international cooperation reinforces independence, as it is harder to interfere in their decisions or to modify rules that have been agreed across national borders. As a consequence of this international cooperation reduces regulatory risk and enhances the attractiveness of the region for external market players and investors.

The content of this cooperation would include:

- i. The establishment of a single entry-exit zone, to be implemented once sufficient interconnection capacity will be available, involving inter-TSO compensation to achieve the balance between actual and required revenues. As long as no sufficient capacity is available the entry exit zones may be split, with interconnection charges, as in the model developed by French TSO GRT-gaz. An operational study on the establishment of a single tariff system should be started soon, outlining a standardised cost allocation methodology for the region and steps necessary to overcome the current discrepancies between the national tariff systems, already outlined in section 4 above under (1). If the trading region involving Austria and possibly other countries is developed, this study should involve the remaining V4 countries at the earliest to ensure consistency for the future extension of the trading region or its evolution into a single balancing zone.
- ii. Coordinated implementation of the Capacity Allocation Mechanism (CAM) The CAM- ENC requires capacity to be allocated by auctions at all IPs. Yet the ENC entails some discretionary development, as not all capacity products are defined at EU but more could be envisaged. In particular, the ENC focuses on individual IPs or on combinations of several IPs connecting any two adjacent market areas (known as Virtual IPs), but it does not address the issue of capacity booking on “routes” encompassing several TSOs along a certain flow direction. This is in fact a limitation, as shippers wishing to reach a destination market that requires the use of several adjacent systems may not be sure about the correspondence of their capacity rights on all required IPs. On the other hand this is an opportunity for further cooperation between regional TSOs, supported by the respective NRAs. For example, TSOs may be requested to develop and offer joint products along the new NS corridor, linking PL-SK-HU or PL-CZ-SK-HU, as well as on the East-West corridor²¹. This would make it easier to obtain supplies from (e.g.) the Polish LNG

²¹ The GATRAC pilot project is already offering a single platform for connection between the Slovak and Czech TSOs and Germany's Ontras and therefore providing access to the German hub Gaspool.

terminal, from Southern routes entering the region through Hungary (Nabucco, South Stream, LNG landed in Croatia), or through the Western interconnections of the V4 countries.

The region's TSOs may also consider a common choice for the development or adaptation of the platform for capacity allocation and trading. Whereas some stakeholders support adoption of PRISMA, a platform that has been already accepted by several western European TSOs, some criticisms have been heard in the region, notably due to its single currency setting, which may require adaptation. V4 TSOs may jointly consider the opportunity of a co-ordinated customisation.

- iii. A coordinated capacity development mechanism. In the gas market, it is also interesting to consider the opportunity of developing integrated auctions, where shippers bid for capacity that may be offered even beyond the current interconnection capacity. If more capacity than it is available is requested, bids are considered for a market test, where the case for capacity reinforcement is considered and ultimately decided for²². In the V4 case this tool may be interesting, for example to decide on the reinforcement of existing and new interconnections, also by looping or adding compression power to existing pipelines, and possibly for the construction or enhancements of LNG terminals. An advantage of this tool lies in the fact that it does not require a specific process (as is the case of open seasons) but it is strictly joined to the CAM, where interested parties are expected to bid anyway.
- iv. Harmonised balancing rules. Balancing is an extremely demanding area where TSOs', DSO's and NRA's efforts are necessary, and may attain the greatest benefit by a coordinated development. Yes, several balancing models are available, but a common choice and adaptation to features of the region looks possible. Since much would have to be reformed in this area anyway, V4 countries have much to gain and very little to lose from harmonisation.

This would not necessarily lead to the decision of merging the national balancing zones, which would be left to the next step. Harmonization would include the main allocation and balancing provisions, tolerances, penalties and their relationship with cash-out prices, which would be related to a single spot market, as required by the Balancing ENC. At first this could be the market zone of the above suggested Trading Region, which could be connected with Poland and Hungary by MC, subject to the existing capacity.

- v. The establishment of common congestion management criteria, in line with EU network codes and regulations, notably regarding the largely new overcapacity and buy-back mechanism to be established as main short term congestion management tool. NRA's could also agree on common criteria for the implementation of long term CM tools like capacity release programmes.
- vi. The pursuit of common customer protection provisions. Whereas this topic may not seem part of an integrated market design, it is nonetheless strictly related and has been frequently mentioned by stakeholders in the region as a major barrier to the development of a functioning integrated market in V4 (and other CEE) countries. The relatively high wholesale prices that prevail in the region and the lack of competition have prompted regulators and governments to impose price controls on wholesale and/or retail prices, at least for the most vulnerable categories like households, small enterprises and selected public services (see section 2). Since private investors are heavily afraid of such controls, which may jeopardise their profitability, a vicious circle may arise where prices are high due to lack of competition but competition is missing due (also to) the existence of price control.

In some case these price controls have been very effective, as they are based on rolling averages of cheap domestic production and imports: this is typically the case of Poland and Hungary as well as

²² Frontier Economics, "Impact assessment of policy options on incremental capacity for EU gas transmission", Report prepared for ACER, February 2013. www.acer.eu

Romania and Croatia (see Figures 3-6). In the case of Hungary, price controls affecting mostly the residential sector seem to be related with relatively high prices affecting other consuming sectors (and through this probably the power prices). On average prices are not higher in the Czech Republic, where any such controls have been removed for over seven years. This problem is indeed common in the EU as several member States still have some sort of end user price controls in place. Such controls have been criticised (among others) by CEER²³, and the European Commission has taken action against some Member States (notably France) asking for a removal or phasing out of such controls. The European Court of Justice has ruled²⁴ that such controls are compatible with European legislation but must be temporary, cost based and the measure should be clearly defined, transparent, non discriminatory and verifiable, to guarantee equal access for EU gas companies to consumers, as well as limited in duration and should not go beyond what is necessary to achieve the objective pursued.

Integration of V4 markets provides a gradual way out of the current price controls. NRAs could envisage common criteria for protected end user prices, which would be based on the common wholesale prices. Pending market coupling, the prices could differ among the national zones, yet the methodology would be similar. At the same time, market integration and the removal of bottlenecks would lead to the emergence of common wholesale prices that could be the basis of domestic customer protection until sufficient competitive pressure has developed. In order to promote market entry NRAs could also announce criteria (e.g. in terms of market concentration or price alignment) that would lead to the removal of remaining price controls.

- vii. Implementation of a single market zone in the V4 region. Once the following steps have been carried out, at least three years will have elapsed and the connection of Hungary and to some extent also of Poland with Slovakia and Czech Republic should be operational. Moreover, several of the opportunities that may justify the independent development of a V4 hub should be clearer: for example, the European carbon emission programme, the choice of a route for Caspian gas, the construction of South Stream, the perspectives of unconventional gas production in Poland, Ukraine and elsewhere, the fate of the Croatian LNG terminal. On the internal side, the cooperation of V4 (and possibly other) NRAs and TSOs will have been more or less smooth and effective, and the ENC will have entered into full force. With the opening of the Hungary-Slovakia link market coupling between them and the Czech Republic will non longer be useful, while it could still be in place with Poland even if the current interconnector with the Czech Republic may have been reinforced in line with the plans. The direct link between Poland and Slovakia should be under construction at that stage.

At that point, if all previous steps and the necessary infrastructure proceed smoothly, NRAs and TSOs may make a sensible decision on the opportunity of either merging their balancing zones or extending the Trading Region arrangement to all V4 countries. Such choice would by no means reduce the appeal of the single market zone, as the V4 would have a single price zone anyway. The choice between a single or multiple balancing zone (TR model) at that point would be a technical issue, mostly based on the ability of TSOs and regulators to agree on a single balancing model and on the ability of the joint system – as assessed by a technical study – to ensure balancing of the transmission grid over the whole region.

²³ CEER, “Status Review of End-User Price Regulation as of 1 January 2010”, Ref: E10-CEM-34-03, 8 September 2010, http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Customers/Tab1

²⁴ Case C-265/08, Federutility, Assogas, Libarna Gas SpA, Collino Commercio SpA, Sadori Gas Srl, Egea Commerciale Srl, E.On Vendita Srl, Sorgenia SpA v Autorità per l’energia elettrica e il gas [2010] 20.04.2010

6. Institutional issues

The pursuit of the V4 market integration plan would entail significant institutional developments. In order to enhance the credibility and ensure a steady implementation of the plan, several intermediate objectives must be defined and a few entities in charge of their achievements must be identified or created. The establishment of joint bodies for an enhanced co-operation at the V4 level would stress the credibility of the market rules as internationally coordinated regulations are much more stable than national ones. On the other hand, the creation of too many new institutional bodies should be avoided to avoid bureaucratisation of the process and conflict about the distribution of responsibilities. Attribution of necessary roles to existing bodies should be preferred.

In the regulatory area, committees for the streamlining of market rules and the implementation of network codes should be established, in charge of

- capacity product organisation, allocation and congestion management;
- interoperability and business practices;
- tariffs;
- balancing.

These Committees may be organised by NRAs, with a fair attribution of responsibilities. For example, each NRA could be given primary responsibility on one of the topics, as task force leader. This would ensure a fair attribution of responsibilities while allowing each NRA to be part of the process.

Among TSOs, a similar division of tasks could be effective, preferably avoiding to give the same country the leading NRA and TSO role on each topic.

The GRI SSE may offer a suitable institutional framework for the regulatory harmonisation. However, the current GRI SSE organisation seems to work more as an information and discussion forum than as an operational body. This depends also on its broad geographical scope, which extends to the South of the V4 to include Austria, Italy, Slovenia, Romania, Bulgaria and Greece and encompassing the Western Balkans. This area is probably too large for an effective operational role. It is suggested that the GRI SSE should be divided into smaller sub-zones (among which one could be V4) and organised as task forces. The Electricity Regional Initiative, which has been organised with smaller zones and follows the logic of overlapping countries, has been more practical in orientation and can be regarded as a positive example.

Work of the GRI could be organised through implementation groups aimed at the main issues, as it already happens in other European GRI regions, aimed at implementing the GTM in the above mentioned areas.

As noticed in the previous section, a common gas exchange is not an urgent issue. As far as markets are not adequately interconnected there is no reason to choose one of them, even though they are not likely to enjoy much liquidity. Once market zones are interconnected a single gas exchange would probably emerge. However, regulatory harmonization should define the responsibilities of market operators vis-à-vis those of TSOs, which is not necessarily the same in all countries.

A body in charge of infrastructure development procedure could also be set up. It may be located at regulatory level and should be in charge of organising coordinated open seasons or integrated auctions for the development of infrastructure. In case of further uncertainties about the development of any piece of infrastructure this body would launch the open season or integrated auction, with a preliminary clear commitments by the European Union, National Governments and NRAs for participation to the investment and the setting of clear conditions for the success of the procedure.

The greatest institutional development would probably concern TSOs. For an effective coordination of dispatching and balancing, tariff setting and revenue redistribution, and the

coordinated system of auctions it is likely that inter-TSO bodies for transmission management activities should be organised. Their responsibility would be presumably similar to those of a regional ISO, or to those of the inter-TSO body that coordinates TSOs in Austria. Further insights can be obtained notably from the German experience, where several TSOs are coordinated into only three tariff and balancing zones. Details of this coordination are beyond the scope of the present paper.

Whereas coordination may appear as a further burden on individual TSOs, it should be noticed that this happens in a business environment where the implementation of the Third Package and the demand crisis are triggering an overhaul of the European gas industry, notably regarding TSOs that have been or are being dismissed by large gas companies and are seeking new synergies and development opportunities. This is particularly true for the Czech and Slovak TSOs, which are now threatened by a significant flow reduction due to the opening of alternative routes for Russian gas, and are currently through a process of ownership change. Governments should consider that TSOs in such markets are relatively small, so that some form of consolidation could entail significant economies of scale. TSOs and their owners may consider the opportunities offered by the V4 integration process, which may trigger alliances going beyond the offer of coordinated products, without necessarily leading to the full merger perspective. Similar alliances are being tested in other parts of Europe for example between Italy's SNAM and Belgium's Fluxys for a coordinated North-South Corridor in Western Europe.

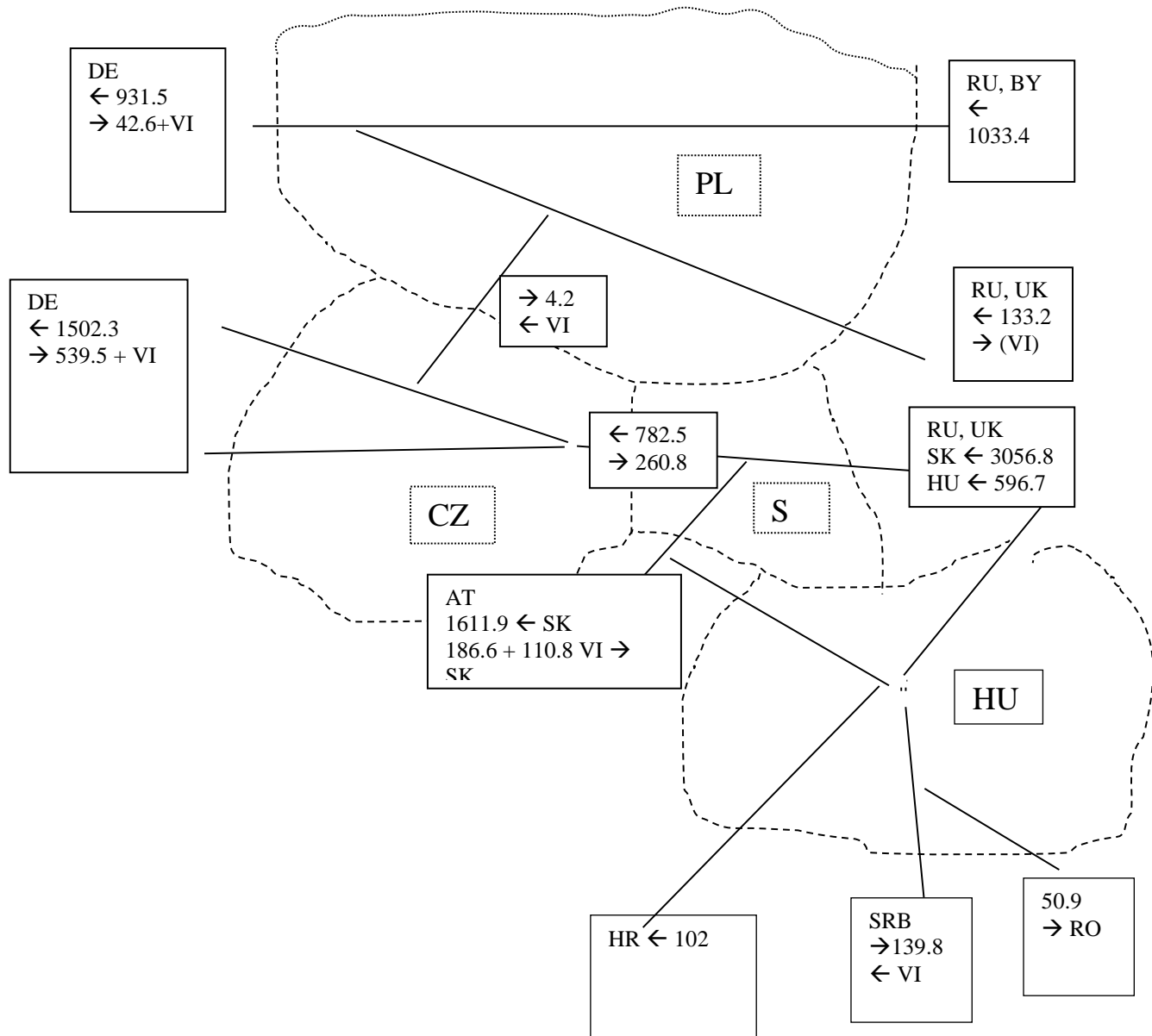
Finally, the remaining state owned supply companies of V4 countries may also consider the perspective of alliances and integration. The development of the European gas markets shows that there is room only for large and efficient companies with markets in several countries and a large supply portfolio. The old national champions in the region may be too large for their original home countries, but they are probably too small for the European market. In the long term their convergence is probably the only alternative to takeover from larger concerns.

Figures

Figure 1. Transmission pipelines in V4 and neighbouring countries (source: ENTSOG/GIE: dotted lines are planned)

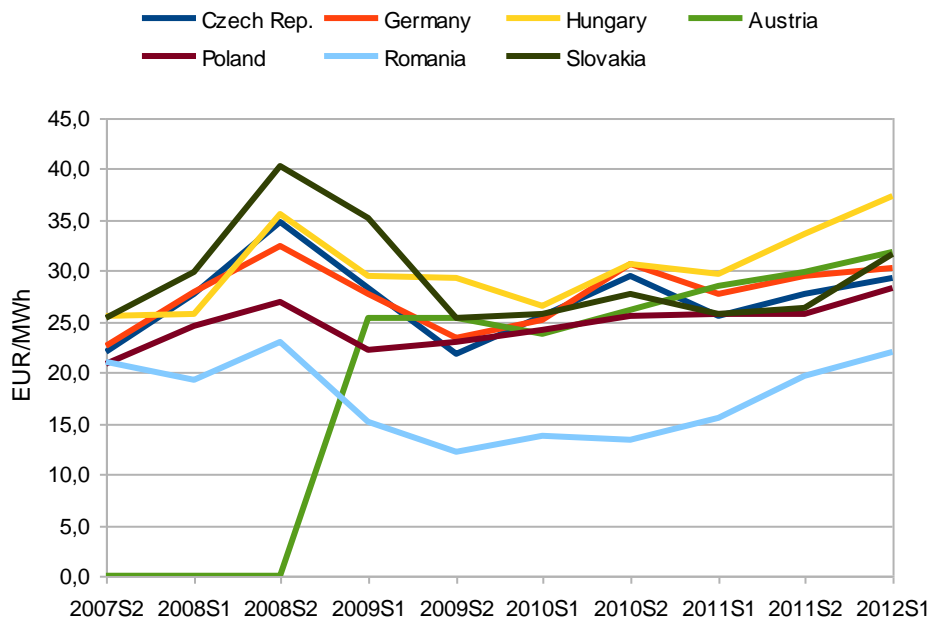


Figure 2. Interconnection capacities of V4 countries (source: GIE)



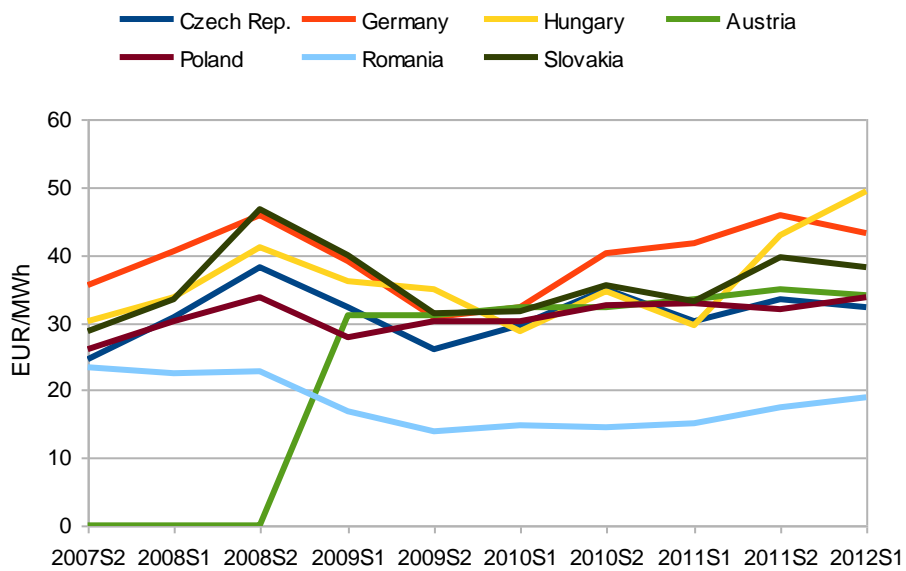
All data in MWh/day; VI = Virtual interruptible capacity

Figure 3. Prices for large industrial consumers



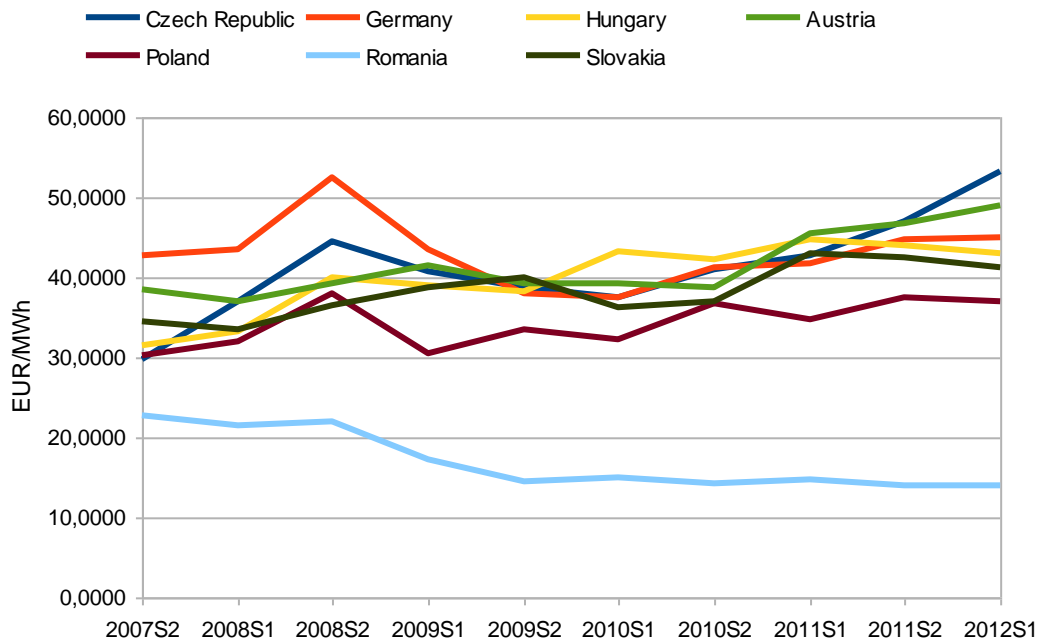
Source: Eurostat

Figure 4. Prices for medium industrial consumers



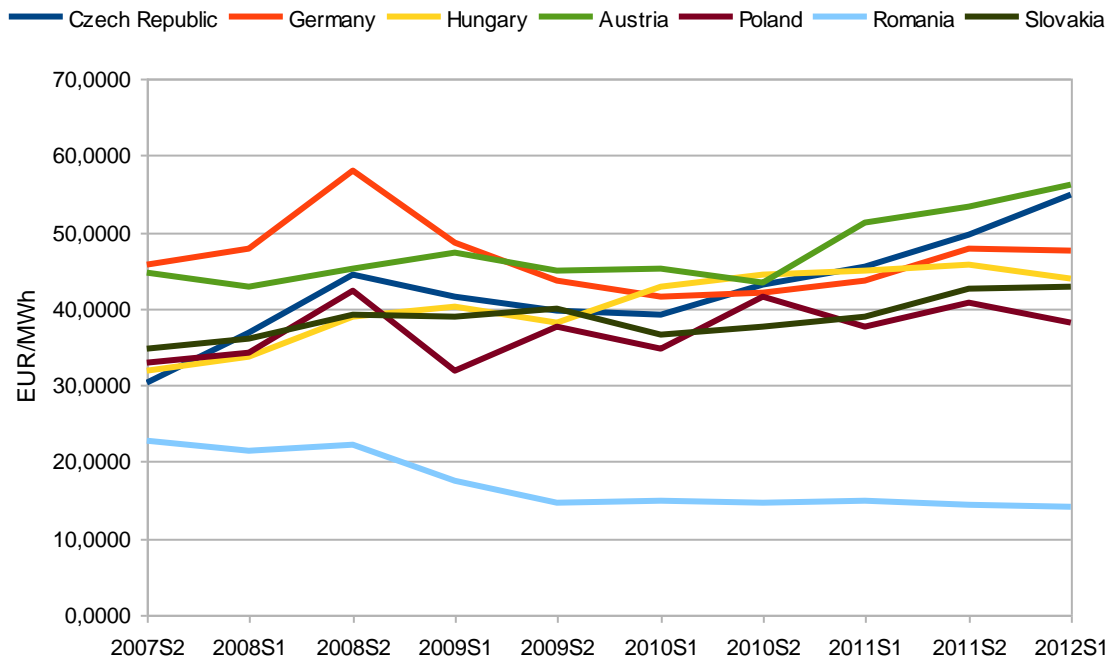
Source: Eurostat

Figure 5. Prices for larger residential customers



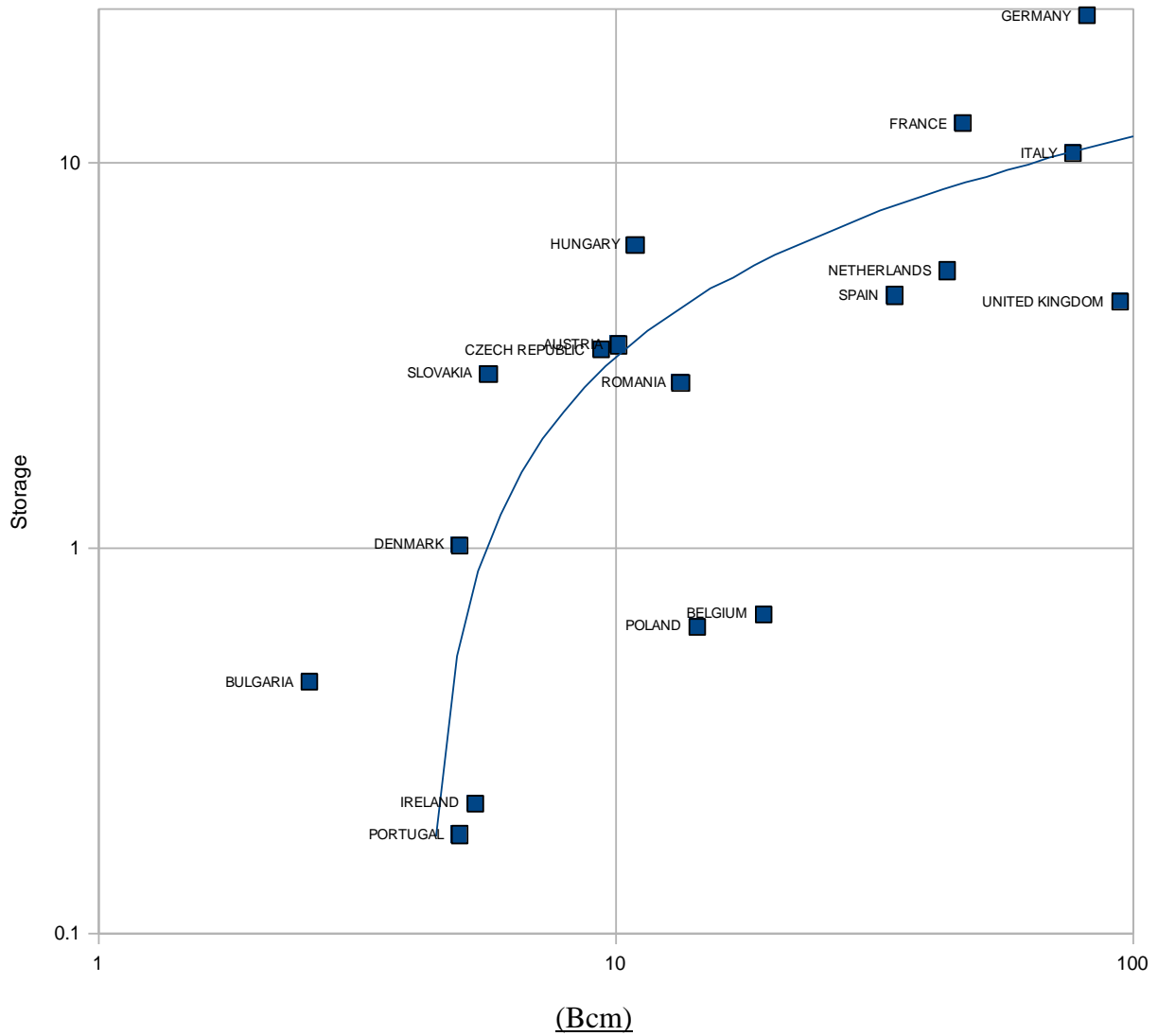
Source: Eurostat

Figure 6. Prices for individual residential customers



Source: Eurostat

Figure 7. Relationship between storage (working gas) and consumption in EU Member States



Source: Eurogas (consumption), GSE (storage)

Figure 8. Interconnection capacities of V4 countries after the implementation of current plans

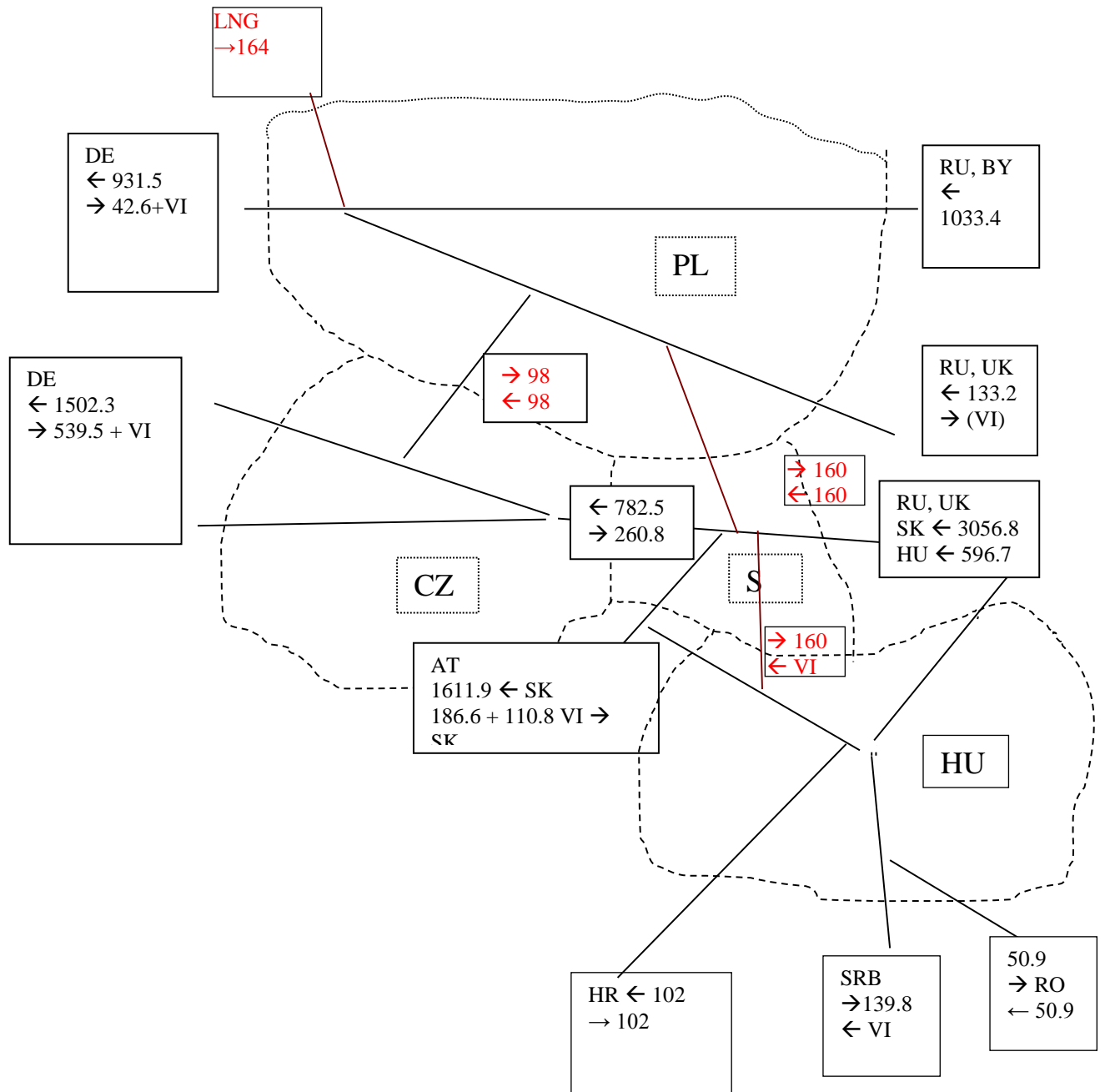
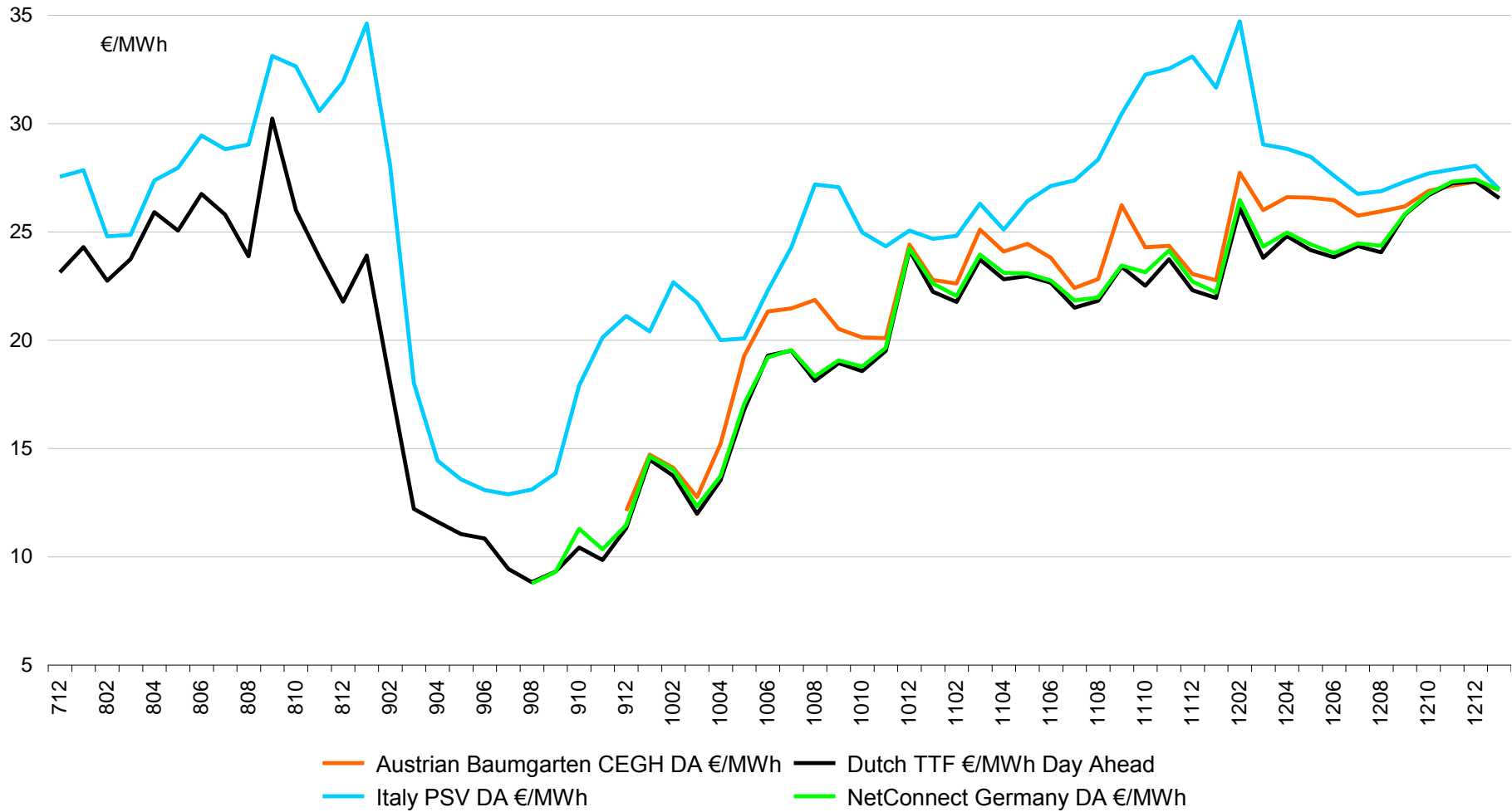


Figure 9 - Gas prices in some European hubs



Source: Elaborations on Platt's data

Figure 10. A stylised integrated market.

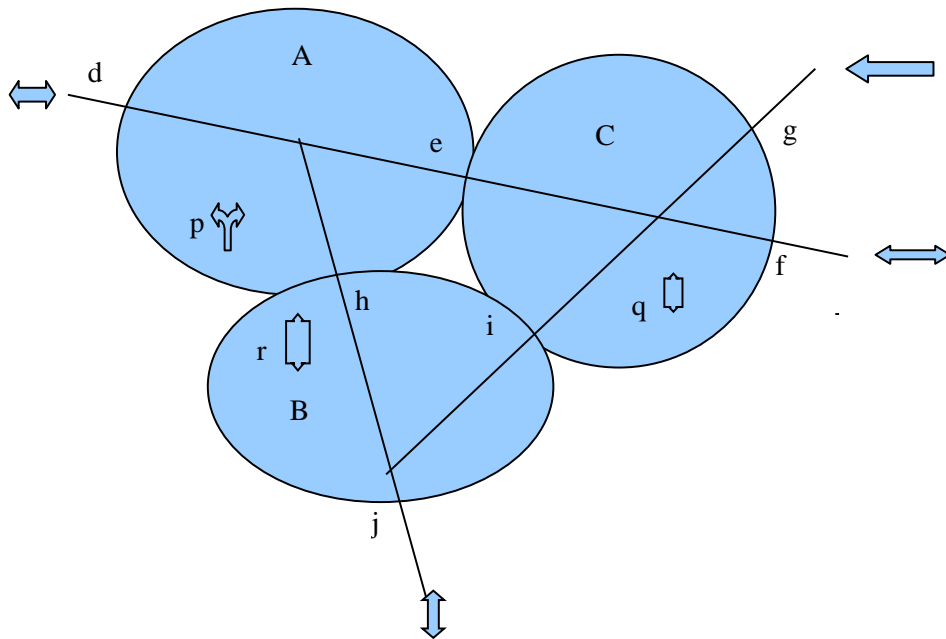
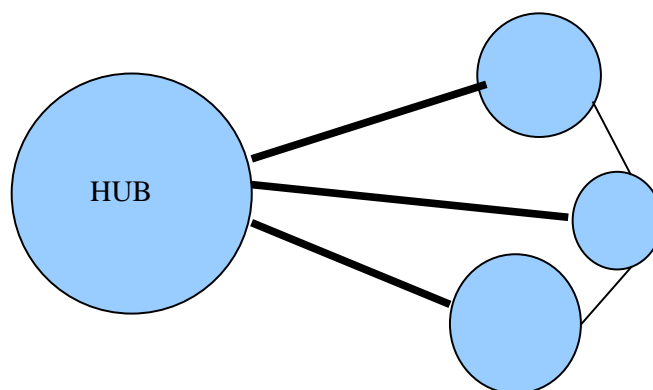


Figure 11. Independent connections to external hub



List of Interviewees

Name	Surname	Position	Institution	City
Lubomir	Cacany	Senior Councillor	Ministry of Economy	Bratislava
Miroslav	Mariaš	Officer, Fuel and Energy Department	Ministry of Economy	Bratislava
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Milan	Dubnicka	Head of fuel and energy department	Ministry of Economy	Bratislava
Alexander	Duleba	Director	Research center of the Slovak Foreign Policy Association	Bratislava
Jan	Klepac	Director	Slovak Gas and Oil Association	Bratislava
Martin	Mikoláš	Head of Business Analyses, S	Nafta	Bratislava
Petra	Bocmanova	Market specialist	Nafta	Bratislava
Jan	Osicka	Research Assistant Energy S	Masaryk University	Brno
Filip	Černoch	Research Assistant Energy Security	Masaryk University	Brno
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Gábor	Szabó	Deputy Head of Antitrust Section	GHV	Budapest
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Pal	Sagvari	head of strategy and energy policy department	Ministry of National Development	Budapest
András	Péntek	Vice-President, Strategy Development	MOL	Budapest
Martin	Šik	Regulation Section	Energy Regulatory Office (ERU)	Prague
Luděk	Piskač	Secretary	Association of Large Energy Consumers	Prague
Karel	Šimecek	Director	Association of Large Energy Consumers	Prague
Thomas	Kleefuss	CEO	NET4Gas	Prague
Igor	Chemisinec	Member of Boards of Directors	OTE	Prague
Jakub	Necasany	Head of Gas Balance Department	OTE	Prague
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Michael	Kehr	Head of Business Development Net4Gas	Prague	Prague
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Piotr	Bujalski	National Gas Dispatching Division	Gaz System	Warsaw
Adam	Marzecki	Head of International Projects	Gaz System	Warsaw
Rafał	Wittmann	Director of Development Strategy Department	Gaz System	Warsaw
Małgorzata	Banasik	law expert for Gaz System	Banasik Woźniak i Wspólnicy	Warsaw

The Gas Target Model for the Vysehrad 4 Region. Conceptual Analysis

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Marek	Woszczyk	President	Energy Regulatory Office	Warsaw
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Artur	Lorkowski	Deputy Director. Department of Economic Policy	Ministry of Foreign Affairs	Warsaw

List of Abbreviations

Bcm/y – Billion cubic meters / year

BEMIP – Baltic Energy Market Interconnection Plan

CEE – Central – Eastern Europe

CAM – Capacity Allocation Mechanism

CM – Congestion Management

DSO – Distribution System Operator

EASEE-gas - European Association for the Streamlining of Energy Exchange – gas

ENC – European Network Codes

ENTSOG – European Network of Transmission System Operators (Gas)

FGSZ – Földgázszállító Zártkörűen (Main Hungarian Natural Gas Transmission Company)

FID – Final Investment Decision,

FSU – Former Soviet Union

GATRAC – Gas Transport Cooperation

GRI – Gas Regional Initiative

GRIP - Gas Regional Investment Plan

GRIP - Gas Regional Investment Plan

GTM – Gas Target Model

GTS – Gasunie Transport Service (Dutch TSO)

LNG – Liquefied Natural Gas

MC – Market Coupling

MO – Market Operator

MOL – Hungarian Oil & Gas Company

NBP – National Balancing Point (British virtual trading point)

NCG – Net Connect Germany (German virtual trading point)

NRA – National Regulatory Authority

NSC – North South Corridor

PEG – Point d'échange de gaz (French virtual trading point)

PGNiG - Polskie Górnictwo Naftowe i Gazownictwo SA (Former Polish gas monopolist)

PRISMA - Platform for European Gas Capacity Booking

PSV – Punto di scambio virtuale (Italian virtual trading point)

REKK - Regional Centre for Energy Policy Research

SSE – South & South-Eastern Europe

TAP – Trans Albanian Pipeline

TPA – Third Party Access

TR – Trading Region

TSO – Transmission System Operator

TTF – Title Transfer Facility (Dutch virtual trading point)

V4 – “Vysehrad 4” countries (Czech Republic, Hungary, Poland and Slovakia)

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