

# The Gas Supply Outlook for Europe

## The Roles of Pipeline Gas and LNG

Clingendael International Energy Programme



Nederlands Instituut voor Internationale Betrekkingen  
Netherlands Institute of International Relations  
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ABSTRACT

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THE GLOBAL ENERGY OUTLOOK

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The global energy scene is changing rapidly. Producing countries are tightening their grip on the development of their resources. Emerging (and other) economies are taking direct political interest in securing supplies. There is growing integration between politics and business in international energy deals and energy is now on the political agenda of every government.

Prices of energy have sky-rocketed over the last two years. The impact on national economies, on energy demand and on the relative position of gas in the energy market may be considerable, but it is too early to form a considered view of the way in which and the extent to which these will change.

World gas reserves are plentiful to satisfy gas demand for the foreseeable future, including the expected increase in demand for LNG. The bigger issue however is not the availability of reserves, but the pace of development, as well as the potential for development. The global development effort, both in pipeline gas and LNG, does not currently appear to be keeping pace with the demand prospects. While Europe is geographically well positioned for new supplies, surrounded as it is by the majority of global gas reserves, there are not many major supply developments ongoing in producing countries specifically earmarked for its markets other than those from Russia.

Logistically and geographically, Russia is the most obvious supplier to contribute to Europe's growing gas demand. But realising more supplies than those already committed is not a foregone conclusion. In this light, and in view of the commercial and political objective of the markets to diversify its supply sources, European stakeholders have given much attention to LNG and the role that it could play in supplying European markets. Against this background, this paper offers a detailed assessment of the outlook for LNG supplies to Europe.

The pace and potential of LNG development is slowed down by limited (human and material) resources for project construction, the increasing complexity of LNG projects, and (geo-)political factors. Producer governments are reconsidering their LNG export strategies and begin to focus on "supply management" as a means of ensuring value protection for their resources. They also prioritize the use of gas for growth in their domestic economies. They control most world reserves of oil and gas through their National Oil Corporations (NOC's). As a consequence NOC's often have different agenda's than International Oil Corporations (IOC's). As a result, a sellers' market for LNG is expected to persist in the foreseeable future (but history has shown that the energy market is not very predictable...).

The outlook for gas demand and supply in Europe and, for that matter, in the world is surrounded by more uncertainty than ever. Producing forecasts or single scenarios would be risky business today, could even create a false impression of insights in future developments. There are very few certainties left for Europe:

- it is broadly assumed that there will be growth in gas demand. Although the amount of growth is highly uncertain (even static demand is not entirely unthinkable);
- Europe will need to import more gas than it does today, but we do not know where it will be coming from and at what prices;

- business models of gas suppliers are changing, and will affect security of supply.

It would therefore seem prudent to address the future challenges by the use of more than one scenario, particularly focusing on those which stem from tight supply conditions.

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### CHANGING BUSINESS MODELS

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LNG and, to a lesser extent, pipeline business models are changing. The traditional model is based on long-term contracts between producers and buyers. Driven (mainly) by arbitrage opportunities, high prices and the opening of the US market for LNG, the LNG industry today is moving away from this model in various manners. These include:

- producers reserving part of their liquefaction capacity for short-term deals;
- producers contracting their own production;
- the emergence of aggregators buying LNG long term and selling it in a mixed portfolio.

These developments may well lead to chronic surpluses in shipping and regasification capacity accommodating this business model. Growing volumes of this “flexible” LNG are no longer committed to any market. This LNG responds mainly to price signals, although politics and customer relations could also play a role in deciding the final destination of these volumes. Therefore, even if the European Union (EU) were able to match prices in Asia or the US, this would not guarantee that it would be able to secure the required volumes of flexible LNG in the global marketplace at all times.

Relative to the East Coast of North America, Europe is geographically well positioned to receive LNG, notably from the Mediterranean and West Africa. As regards LNG from the Middle East, Europe also has a cost-advantage over the US, but there is no geographical advantage for Europe relative to the Asian market. In fact, the Asian market is currently buying short- and long-term LNG from the Middle East and has the potential to lay a significant competitive claim on future LNG from this region. For the foreseeable future Europe will be in competition for LNG supplies with the rest of the world.

Pipeline suppliers to the European market, notably those from Russia, Norway and Algeria, also appear to add “flexible supplies”, not committed to their markets by means of long-term contracts, in their supply portfolio for Europe, for purposes of direct marketing and sales in the wholesale spot market. For Gazprom another driver may be the need to maintain more optionality in its supply position, given the potentially growing demand of its domestic market.

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### ATTRACTIVENESS OF LNG FOR THE EU

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The attractiveness of LNG for the EU lies mainly in its potential to add diversity of supplies and thus contribute to security of gas supply. Flexible LNG could improve security of supply by helping to accommodate (seasonal) shortages. Thus, LNG could make a positive, but for flexible LNG uncertain, contribution to security of supply, both for the long and short term. Conversely, there is a risk that the EU market players will rely on flexible LNG to make up for seasonal and other shortages, at the expense of further investments in underground storage. This could lead to a reduction in the EU’s short-term supply security. Therefore, while Europe cannot count on flexible LNG to be available to provide secure flexibility in the EU market, it is recommended that the EU make sure that there are no avoidable barriers to the development of underground

storage, a more secure and probably cost-effective way of creating the necessary flexibility in the market. Further analysis is needed out to establish the relationship between the costs and opportunities for LNG to contribute in a secure manner to flexibility and the use of underground storage.

Flexible LNG may help reduce the effect of a disruption of pipeline gas supply. It is important however to realize that LNG can also suffer supply disruptions and is in certain aspects more vulnerable to geopolitical risk than pipeline gas. Provided that regasification and shipping capacity are available, flexible LNG can help to alleviate the effect of disruptions or higher winter demand in Europe, but at a price (topping other markets) and provided there are no other (political) obstacles. Given increasing global competition for LNG there will be no certainty that the short-term LNG will be there when needed.

In today's market there is no clear-cut optimal balance between LNG and pipeline gas. Instead, given the current dynamics of the market, Europe should be aiming at being the attractive outlet for both pipeline gas and LNG. Pipeline supplies should continue to form the solid basis of gas supply for the EU. LNG offers a welcome prospect of new supplies and of supply diversification. Flexible LNG can also make a contribution to short-term supply security, but not one that the market can count on.

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### THE EU'S ATTRACTIVENESS FOR LNG

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In a sellers' market producers will be looking closely at the EU's attractiveness as a consumer market compared to options in Asia and North America.

Continued regulatory uncertainties in the EU market may undermine efforts to attract long-term LNG supplies. Furthermore, relatively tight regulation in the EU hinders EU buyers in their negotiations with suppliers as it takes away flexibility necessary to develop win-win opportunities.

Price uncertainty is another issue. For buyers in the continental market a major long-term LNG contract with other than oil-indexations creates significant price exposure in a market, dominated by oil-indexed prices. The producers have a choice of markets and of prices. Given the current price setting of pipeline gas, it is not certain that Europe will be able to out compete Asia-Pacific buyers on price.

The uncertainty of future EU demand for LNG further compromises the EU's attractiveness. The level of growth will be determined by many factors of which their eventual effect is very hard to establish today. These uncertainties are felt not just with regards to the EU, but exist universally, albeit to different extents. For Europe, demand uncertainty is compounded by the strong position of Russia as a supplier of gas and questions regarding future incremental pipeline supplies to the EU. Producers of LNG will be looking for security of demand and will not draw much comfort from the EU outlook, unless they are protected by long-term contracts with strong buyers.

The EU is politically not a transaction partner. Instead, member-states have turned to bilateral/country-by-country deals to secure long-term LNG supplies (so called government-to-government relations to underpin the business-to-business relations).

EU market players have traditionally been actively scouting for new supplies and creating the conditions for new supplies to their markets. These initiatives should be useful in a sellers'





market. However, the EU is facing similar competition from the Asian markets, which have also shown their ability to secure supplies in this manner.

LNG regas terminal capacity is currently expanding, confirming the appetite of the European market for LNG. However, if new LNG flows would fail to come to the EU market, the regas expansion would imply a cost burden to the market players. A slowdown in regas capacity additions should then be expected as an investor's response to market circumstances.

The EU is fortunate given its substantial supplies through pipelines from Norway, Algeria and Russia. Given its geographical position Europe remains essentially a market for pipeline gas. In the future new possibilities should be explored and encouraged to expand these existing supplies and complement them with supplies from Central Asia and the Middle East.

To address the implications of changing business models and other Security of Supply issues, a crisis management mechanism could become the (political) minimal requirement for all member-states to support strategic external energy relations and the accompanying investment strategies of companies. This is particularly important for gas with a value chain extending beyond the jurisdiction of the EU. For member-states to cooperate and, perhaps in time, relinquish some of their sovereignty in the foreign (energy) domain, the absence of a crisis mechanism which fairly distributes costs and benefits over the member-states in the event of market failure (perhaps also along the IEA method of cost distribution), and which helps to reduce the cost of risk management at the member state level, is a (political) stumbling block for any EU initiative towards external energy policy. Such a mechanism would necessarily be best implemented within a EU minimum framework setting for reasons of cost and benefit distribution (and the avoidance of free-riding on other member-states' national energy security policies) but sufficient to create a level of political comfort for the external energy policy initiatives.

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### SCENARIOS FOR 2015

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Uncertainties of the magnitude now being faced by the industry do not lend themselves easily for forecasting. Scenarios have been made to explore the dimensions of the demand and supplies around 2015 and the different roles that LNG could play in the European market.

The scenarios suggest a wide range of potential demand as well as of future pipeline supplies to Europe. With the additional premise that LNG will balance European supply and demand after pipeline gas has found its way to the market, the required contribution of LNG to the European market could vary considerably, from around the current supplies to levels well above the capacity of the LNG regasification terminals, and possibly also well above the LNG production capacity, in combination with demand for LNG from other regions. In the latter situation, high demand for LNG in Europe could lead to higher than current price levels for gas in Europe, for LNG and pipeline gas.

The scenarios do suggest, however, that in a number of cases higher LNG supplies at or over 100 bcm can be realized under potentially manageable pricing and supply conditions. This would benefit the European market, offering a reasonable balance between pipeline gas and LNG, from diversified supply sources.

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### THE EU'S POLICY FOCUS

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Based on the "net-back" pricing mechanisms in its long-term pipeline supplies, EU gas prices have been lower than those of Asia, which relies nearly completely on LNG. While this benefits

the EU consumer, it does not help EU's position as a potential outlet for LNG under long-term contracts in a competitive global market.

The gas and LNG markets are characterised as tight for the foreseeable future. There will be global competition for gas between the EU and other regions. This implies the need to refocus from the "internal market" to the "external market". The current internal market design is of value in a buyers' market with an abundance of supplies. In a future sellers' market a successful energy policy depend on obtaining competitive supplies from outside the EU. Price competition in the gas market takes place for a large part in the international market. The EU gas market designers should take this into account, and may, while focussing on (re-)designing internal market dynamics, in the process inadvertently drive up prices for consumers due to supply shortages. Rather, competition policy, and particularly the ability to punish companies for abuse of market power, should be a strong instrument to manage competitive forces in the EU.

Regulation in its widest sense is regarded by producers as one of the biggest risks they are facing. Addressing the 'external market', reducing the regulatory risks and designing regulation that gives EU buyers maximal opportunity to attract new supplies and that increases producers' interest to take their gas to the EU market, should become the prime policy objective.

Understanding the extent of concerns of producers would help the EU to consider whether and how it can accommodate producers of LNG (and gas) and turn the EU into a more, if not most attractive market for gas. A structured dialogue on gas between producing countries and the EU could make a significant contribution to lowering, where possible, the barriers to entry, by means of sustainable, long term policies and establishing a reliable framework for the industry to develop the business.

As regards the 'internal market', EU policies should be aimed at:

- promoting energy savings, so as to avoid significant growth in gas demand which may become very difficult to manage;
- reducing the significant economic and policy-based uncertainties in the power generation sector regarding the future fuel mix, thus also increasing 'security of demand' for suppliers;
- promoting fiscal terms in order to increase indigenous productions<sup>1</sup> and develop further insights in the prospects of 'unconventionals'.

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<sup>1</sup> See also: CIEP, *The Dutch Upstream Fiscal Regime in Northwest European Context*, CIEP Briefing Paper, The Hague, 2008.

## 1. INTRODUCTION

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The European Union (EU) will become increasingly more import dependent, and for natural gas<sup>2</sup> as well. New gas flows have to be developed to replace declining domestic flows and to satisfy expected new gas demand. With the increasing import dependency, the need for more diversified gas flows grows in order to manage both the economic and the political consequences of dependency. LNG will play an increasingly important role in satisfying the EU gas demand, in addition to traditional and new pipeline flows. Pipeline supplies from the three traditional suppliers cover all European markets: Norwegian gas supplies the UK and Northwest Continental Europe, Algerian gas looks after the Iberian Peninsula and Italy, and Russia is a main supplier of both the continental northern, central and southern European markets. By contrast, the penetration of LNG in the EU market is regionally unevenly distributed, while the number of suppliers per regional market may also vary. The question of more and more diversified imported gas flows not only has geo-economic dimensions, but also geopolitical ones because the role of government in the gas sector is significant. Business-to-business contracts in the various parts of the gas value chain, including LNG, require a substantial contribution from government-to-government relations. The quest to attract more and more diversified gas flows cannot be seen separately from the framework that the dominating political and economic order offers as the context in which these gas flows must be realised.<sup>3</sup>

### 1.1. NEW MARKET STRUCTURES

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The recent changes in the geopolitical and geo-economic balance of power compel us to contemplate the conditions under which gas (and oil) will be produced and traded in the foreseeable future, generally and on the European/Asian continent. Will we see a world in which gas can flow freely between producers and consumers in a completely liberalised market, and in which companies operating on a level playing field have access to all parts of the gas value chain? Or will we see a world in which, even more so than today, the strategic interests of sovereign states and the geopolitical balance of power will determine the gas investment climate and trade flows. In the latter case such conditions could imply that international oil companies, as the main vehicle for achieving security of supply in an international market setting, would have to materially realign their company's strategies with those of producing countries in order to continue to gain access to upstream assets. Already, most new gas projects are developed in joint venture with a national company holding a majority, and this applies to LNG as well.

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<sup>2</sup> Commission of the European Communities, *EU Energy Policy Data*, SEC (2007) 12.

<sup>3</sup> CIEP, *Study on Energy Supply and Geopolitics*, final report, January 2004, TREN/C1-06-2002, The Hague; Van der Linde, C., *Energy in a Changing World*, inaugural address 22 November 2005, Clingendael Energy papers 11; Hoogeveen, F. and Perlot, W., *Tomorrow's Mores, The International System, Geopolitical Changes and Energy*, CIEP, December 2005: all available at [www.clingendael.nl/ciep/publications](http://www.clingendael.nl/ciep/publications).

The thinking in the 1990s that international oil and gas markets would be increasingly freed from heavy-handed government involvement and management, and that the government would limit its role as market regulator and tax collector, has evaporated in recent years. Instead, governments in producing countries are asserting their control and management over their energy resources and economic rents through (majority) ownership. This trend is prevalent in many of the oil- and gas-producing countries. To be sure, consumer governments are also increasing their control over the energy sector again, despite the liberalisation and privatisation processes of the 1990s. They are regulating markets within the constraints of their public interests (environment and security of supply), they are breaking up the value chain by ownership unbundling, they are subsidising new energy sources and taxing the energy sector to capture the economic rents, thus constructing a limited space for competitive forces to work. At the heart of all government intervention in the energy sector is the distribution of risks and benefits through the energy resource value chain in the short and the long term, often branded as Security of Supply and Security of Demand policies.

To be sure, consumer governments are also increasing their control over the energy sector again, despite the liberalisation and privatisation processes of the 1990s. They are regulating markets within the constraints of their public interests (environment and security of supply), they are breaking up the value chain by ownership unbundling, they are subsidising new energy sources and taxing the energy sector to capture the economic rents, thus constructing a limited space for competitive forces to work.

The explanation for the more interventionist energy policies around the world can be found in a paradigm shift in international oil and gas markets, from a long period of ample supplies, where production capacities around the world had grown faster than demand, to world oil and gas markets that have recently become much tighter. In the past years, demand has grown much faster than supply, and overcapacities in the oil and gas industries have disappeared, reducing flexibility in the value chain. Maintenance work, political and social protests in the oil industry, acts of nature, and accidents in any of the producing countries would create immediate shortages of supply. In gas, the excitement over the increasing availability of Liquefied Natural Gas (LNG), with the unlocking of the substantial, previously stranded reserves of the Middle East, quickly dampened when it became clear that, also in this market, demand would outpace supply and that the much heralded flexibility to supply markets would remain limited for some time to come.<sup>4</sup>

### 1.2. THE STATE AND THE GAS MARKET

Import dependency in a perfect world economy or world market for gas is different from import dependency in an imperfect world economy or gas market. The level of imperfection of energy markets is an important determinant of the need for and level of government policies to compensate for certain imperfections. Public interests, such as the environment and security of supply, are typical matters that need to be secured by government policies. In a market-based economic system, imperfections can also motivate the government to apply its competition policies to prevent abuse of market power. Moreover, governments may decide to overcome some of the perceived imperfections by implementing a certain market design with the express notion of overcoming those market imperfections and, in such a trade-off, must accept that new

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<sup>4</sup> Dutch Energy Council, *Gas for Tomorrow*, The Hague, 2005, p. 54, available at: [www.energieraad.nl](http://www.energieraad.nl).

imperfections are the result. The difficulty is that both competition and imperfections manifest themselves in many forms, with their own set of peculiarities and outcomes. In addition to market imperfections, government can also intervene in the market for political or social reasons when the market outcomes run counter to or thwart desired outcomes in other spheres of government responsibility.

In energy, the role of government is crucial both in a market-based system and a mixed or state-oriented economic system, going beyond their role as regulator, market model designer or even prime owner of energy assets. Governments play a vital role in shaping the investment climate in a country or region, which is important, in certain segments, for the very capital-intensive energy industry. They are responsible for macro economic and monetary stability; but, in energy, also as owners of the subsurface, they are responsible for issuing permits to explore, produce, transport, transit and distribute energy. In energy, they also have a role as tax collector, laying claim to both profits and the large economic rents.

In energy, including the gas industry, it is therefore unthinkable that government would not be involved in or would allow the industry to be governed by some simple or basic rules of market behaviour, or by self-regulation. The potential benefits from capturing economic rents, the impact on the balance of trade (and payments), and the social and political stakes are simply too high for any government, whether they are producing, transiting or consuming, to leave to the industry. At the same time, the value chains in energy are often not limited to a single jurisdiction, which not only complicates the choice of regulatory regime, but also may thwart capturing the full benefits from the energy sector, or even make the achievement of public interests, such as security of supply and the environment, harder to obtain. It is in this sphere that security of supply, transit and demand may clash and introduce strategic political interests into the decision making.

In a free-world energy market, energy, including gas, is assumed to be available to those who are willing to pay the market price, which is determined by demand and supply. The assumption is that there are no serious bottlenecks in the value chain that would prevent supply from matching demand. But in energy, the long lead times between discovery and production, the capital intensity of certain parts of the value chain, the inflexibility of transportation (particularly in gas and coal), the dedicated investment requirements, and the large economic rents create severe imperfections along the value chain and in the various sub-markets. These imperfections could not always be dealt with in the market, in the sense that the management of risks and benefits was difficult outside the company. Over time, companies have tended to deal with these imperfections by vertical integration, which internalises the management of risks and benefits. Both backward and forward integration are models along which energy companies have developed. Asymmetric information about the risks and benefits in the various parts of the value chain and government intervention were further incentives to develop along this business model. For governments the internationally integrated company poses difficulties with regard to their wish to stimulate competition but also security of supply or demand, because the company stretches beyond the jurisdiction of one government into that of another. Companies can easily find themselves in the middle, between the diverging interests of two or more governments covering the gas value chain.

### 1.3. AN EU EXTERNAL ENERGY POLICY

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The changes that took place in the international energy markets around the turn of the century did, however, impact the ability of the European market to deal with these changes. The confidence that market principles would be the guiding principles to balance supply and

demand was challenged when it became clear that producer governments began to actively manage the energy value chain. Furthermore, the pre-occupation with internal market discussions and the environment overlooked both legitimate producer country concerns about security of demand as a result of the EU market design, and the impact of climate change policies on their main source of income. The changes in the international energy markets and the renewed importance of the modus operandi of politics as opposed to economics in energy diplomacy have in a sense prompted the more prominent role of national states in the EU. Government-to-government relations have become important to facilitate the business-to-business. As it were, the EU Commission cannot make the 'handshake' on gas contracts, because the EU is not a state. This also complicates the development of an EU external energy policy.

In the new make-up of the world economic and political systems, energy is an economic good, a strategic good, and a geopolitical power tool. Producing countries are aware of their position and are, more than ever before, aware their position to generate maximum political and economic benefits for their own states and economies from energy. This awareness of the properties of oil and gas as an economic and strategic good and geopolitical power tool implies that investment levels and production levels will be maximised to serve the interests of the producer state(s) and their state companies in the first place, and not automatically for the good of the world economy.

The EU member-states have always been comfortable with the arrangements in the International Energy Agency (IEA) on oil security and the crisis mechanism, due to the continued limited political and strategic role of the EU in securing oil flows, but also due to the intergovernmental character of this cooperation. The coalition on oil crisis management has been a great benefit to the EU countries and, against a relatively low cost, could tap into the US foreign policy to guarantee oil flows. Although the benefits of the IEA go undisputed, the US policy in Iraq about guaranteeing oil flows in the future did create unease among European and Asian countries and led to increased efforts to shore up their national and/or regional efforts. The call for 'one voice' in external energy affairs exemplifies this position.

### 1.4. ENERGY SECURITY

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Energy security means different things to different countries. The US and China are mainly pre-occupied with oil security, while the energy security debate in the EU has focussed mainly on the flow of natural gas, the limits to diversification (due to the regional context of the market and the inflexibility of pipeline routes), and the monopolies over supply and transportation by state gas companies (e.g., in Russia, Algeria). The IEA does not have competency in the field of gas, nor is there a crisis mechanism at this level. Moreover, the EU does not have a gas security policy or a crisis mechanism either, which leaves the gas sector more vulnerable to disruptions. In addition, gas security of supply is mainly a member-state issue, perhaps explaining the bilateral nature of many of the new long-term (LT) supply contracts involving both government and company handshakes.

Increasingly, Russia has become an important energy supplier for the EU member-states. The East European countries had been traditional importers of Russian energy, but EU member-states have also been increasing their imports of oil, gas, coal and electricity from Russia. Most of these imports have had to flow through infrastructural corridors that were constructed to serve the Comecon countries' energy needs and the gas export contracts. This has led to immediate worries about security of transit. From an overall EU perspective, diversification of routes, even if it involves one supplier, will reduce the risk of supply disruption due to transit risks. The commitment of a supplier to supply a market also increases when large dedicated investments



have been made to reach that market. This interdependency has not always been valued in the European public discussion, leading to a discussion focussed on conflicting interests and not on the obvious shared interests that can balance the relationship between the EU and Russia.

Emphasis on the economic issues in Europe, exemplified by the deepening of integration and enlargement, has sidetracked the discussion at the EU level from geopolitical issues and strategies regarding security interests to internal energy market issues. European leaders have failed to properly communicate the implications of the changing international geopolitical and geo-economic context and the role they want to claim for Europe, while public support is a crucial underpinning for any stepped-up international engagement, other than trade and investment. The instruments of the EU foreign and security policy have fallen short in the context of the EU's ambitions and the changing international context it must operate in. The question is, then, whether the new geopolitical circumstances warrant a revision of the European design from a predominantly economic organization to a new EU design that includes political and strategic issues. The question for the development of an EU external energy policy is whether energy diplomacy can be developed without such a new design or whether that energy diplomacy should be used to develop such a design without the other elements of a full foreign and security mandate in place.

Despite the foreign policy initiatives in the new treaty, which still have to be tried and tested, the Commission, so far, falls short of the competencies in the foreign policy domain to compete with the member-states for supremacy in this domain. That said, developing a common foreign policy is going to take a lot of time, particularly in highly controversial areas, and in areas where national interests are deemed at stake. It is unlikely that a common foreign policy will develop quickly enough to deal with the current strategic energy policy issues, let alone to have energy policies in place to deal with an energy crunch the IEA has cautioned about in its 2007 World Energy Outlook.<sup>5</sup>

From the above, it is already clear that the EU has not developed a full policy toolbox yet to underpin any full-fledged external energy policy.<sup>6</sup> Yet, even if the member-states have a more complete toolbox, market integration has rendered this box less efficient because policy tools are employed at different levels, i.e. the EU and the member-state level, and can lead to inconsistencies and/or inaction. That is why a smarter use of toolboxes at both levels makes sense. However, before an external energy policy can come about, there are certain preconditions that must be considered. In the absence of these conditions, there is a distinct danger that the calls for 'one voice' are for public consumption only, and not meant to be taken seriously.

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<sup>5</sup> IEA, *World Energy Outlook 2007*, Paris.

<sup>6</sup> Van der Linde, C., *Turning a Weakness into a Strength: A Smart External Energy Policy for Europe*, IFRI, Paris, April 2008 ([www.clingendael.nl/publications/2008/20080400\\_ciep\\_art\\_linde\\_ifri.pdf](http://www.clingendael.nl/publications/2008/20080400_ciep_art_linde_ifri.pdf)).

For member-states to cooperate and, perhaps in time, relinquish some of their sovereignty in the foreign (energy) domain, the absence of a crisis mechanism which fairly distributes costs and benefits over the member-states in the event of market failure (perhaps also along the IEA method of cost distribution), and which helps to reduce the cost of risk management at the member state level, is a major (political) stumbling block for any EU initiative in external energy policy becoming successful. While transition to a low carbon economy is a long-term containment policy (in the sense that it reduces gas and oil import dependency and exposure to disruption risk), the short- and medium-term risks are not covered. A crisis management mechanism could become the (political) minimal requirement for all member-states to support strategic external energy relations and the accompanying investment strategies of companies. This is particularly important for gas with a value chain extending beyond the jurisdiction of the EU. Such a mechanism would necessarily be best implemented within an EU minimum framework setting for reasons of cost and benefit distribution (and the avoidance of free-riding on other member-states' national energy security policies) and to create a level of political comfort for the external energy policy initiatives. Also, a fuel-by-fuel approach should be avoided; instead, an integrated approach should be realized that fully benefits from the strengths of energy diversity among and within the member-states and compensates for the weaknesses.<sup>7</sup>

What can the EU do now to prepare the ground for a more European-based energy policy? The things the Commission can do are rather mundane and could and should have been done at the beginning of the liberalisation process in the first place, because they are part and parcel of a properly functioning market: 1. provide the market with transparency on flows, 2. prepare the groundwork for creating some sort of benchmark for security of supply, and 3. set up a peer-review system for member-states to look at each other's arrangements. With the groundwork prepared properly, the EU

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can begin to build, based on its coming shared responsibility, an external energy policy, not the other way around. The Commission has not yet made a convincing case for the member-states to relinquish their nationally-oriented gas policies, while their oil policies are secured by the IEA. The absence of a crisis management policy is particularly important for smaller or follower member-states, while large member-states are better positioned to secure their own energy interests, despite the decline in effectiveness of national instruments due to the internal market.

The EU should thus recognise that the current incomplete competencies in the field of energy and strategic foreign policy dimensions will take a long time to develop into what can be constituted as 'one voice'. The Commission can start by enhancing transparency and begin to

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<sup>7</sup> CIEP, *Study on Energy Supply and Geopolitics*, final report, January 2004, TREN/C1-06-2002, The Hague; and Jacques de Jong, Hans Maters, Martin Scheepers en Ad Seebregts, *EU Standards for Energy Security of Supply (update)*, CIEP, The Hague, Clingendael Institute/ Petten, Energy Research Centre of the Netherlands, CIEP/ECN, April 2007. All available at: [www.clingendael.nl/ciep/publications](http://www.clingendael.nl/ciep/publications).



prepare the groundwork for a crisis mechanism. They should focus on stimulating the member-states and the companies in developing best practises, bottom up rather than top down. It is also important that the development towards a low carbon economy, as the EU's long-term containment policy, is made an integral part of the security of supply approaches. A smart crisis mechanism is the basis for an external energy policy to be developed upon, not the other way around.

### 1.5. BALANCING INTERNAL AND EXTERNAL MARKET DEVELOPMENTS

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In conclusion, the natural gas industry in the EU and Europe<sup>8</sup> is a fairly young industry and its international dimensions date back to the first imports of natural gas from Norway, Algeria and the (former) Soviet Union. The various enlargements of the EU and the introduction of the internal market have brought a large part, but not all, of the member-states' gas industries within EU jurisdiction. With the internal gas market incomplete and competency over important aspects of energy policy still in the hands of the member-states, it is hard to even refer to the EU as a single policy space. The recent Third Energy Package<sup>9</sup> contains some disputed elements on market design; in external energy policy-making the member-states are also far removed from a consistent and single approach.<sup>10</sup> For the purpose of this study, it is clear that the EU gas industry and the gas value chain are not limited to one jurisdiction. This is an important issue because, unlike the US where most of the value chain has fallen and still falls, within a single jurisdiction, this was never the case in Europe<sup>11</sup>. To take inspiration from the American market design and regulatory model, it is important to understand this vital difference. The EU will also have to take the relationship with other regulatory systems into account in order to match EU demand and international supply without throwing up

Competition between pipeline supplies and LNG in the EU market cannot prevent the market logic of dependence on one supplier in certain parts of the EU market. The answer to diversifying supplies and enhancing security of supply in these markets lies not in accommodating other gas supplies in that part of the market when they are uncompetitive (and would run counter to the EU policy to establish an internal market with a level playing field), but rather in diversifying the energy mix and enhancing regional cooperation.

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<sup>8</sup> EU is defined by the member-states. In this paper, references to Europe and the European market includes the EU member-states, Norway, the non-EU member-states on the Balkan and Turkey and excludes the CIS member-states; see also Figure 6.

<sup>9</sup> Commission of the European Communities, *The EU Electricity & Gas markets: third legislative package*, Brussels, September 2007. Documents available at: [http://ec.europa.eu/energy/electricity/package\\_2007/index\\_en.htm](http://ec.europa.eu/energy/electricity/package_2007/index_en.htm).

<sup>10</sup> Van der Linde, Coby, 'External Energy Policy: Old Fears and New Dilemma's in a Larger Union', in: Andre Sapir (ed.), *Fragmented power: Europe and the global economy*, Bruegel, Brussels, 2007 ([www.bruegel.com](http://www.bruegel.com)); and Van der Linde, C., *Turning a Weakness into a Strength: A Smart External Energy Policy for Europe*, IFRI, Paris, April 2008 ([www.clingendael.nl/publications/2008/20080400\\_ciep\\_art\\_linde\\_ifri.pdf](http://www.clingendael.nl/publications/2008/20080400_ciep_art_linde_ifri.pdf)).

<sup>11</sup> When the US required more gas imports and investment was perceived to be impeded by TPA requirements, they quickly introduced the Hackberry decision (December 18, 2002). See for more on the Hackberry decision: [http://www.eia.doe.gov/oil\\_gas/natural\\_gas/analysis\\_publications/ngmajorleg/ferc.html](http://www.eia.doe.gov/oil_gas/natural_gas/analysis_publications/ngmajorleg/ferc.html)

regulatory barriers through mismatches in systems. This includes the ability of companies to manage their risks and benefits in the value chain through vertical integration spanning more than one jurisdiction.

The EU is fortunate, given its substantial supplies through pipelines from Norway, Algeria and Russia (see Figure 6). In the future, new possibilities should be explored and encouraged in order to increase these existing supplies and complement them with supplies from Central Asia and the Middle East. First in the EU, and perhaps later in Asia when East Siberian reserves are developed, pipeline supplies and LNG both will have a role to play and, ideally, should compete for market share.

Competition between pipeline supplies and LNG in the EU market cannot prevent the market logic of dependence on one supplier in certain parts of the EU market. This is especially true when the line of arbitration between LNG and pipeline gas stretches across the EU and leaves certain local markets in a position where competition from LNG supplies is unlikely, if not impossible, so that they remain essentially dependent on one pipeline supplier. The answer to diversifying supplies and enhancing security of supply in these markets does not lie in accommodating other gas supplies in that part of the market when they are uncompetitive (and would run counter to the EU policy to establish an internal market with a level playing field). Instead, it lies in diversifying the energy mix and enhancing regional cooperation on energy with neighbouring member-states, allowing these countries to tap into their neighbours' fuel mix distribution, or by tying their gas markets to the interests of other parts of the EU gas market (and their governments).

Based on the successful strategy of economic integration, European companies could integrate their activities along the value chain with upstream companies and vice versa. The idea behind this strategy is that with intertwined economic and/or energy interests, or interdependency, both producers and consumers have a vested interest in maintaining good economic relations. At the same time, such ventures work towards securing additional supply and demand between the producers and the consumers. In the case of Russia and the EU, such interdependency exists and could be seen as an important disciplining force in their relationship. For smaller countries or markets that are very dependent on Russian supplies, becoming part of the larger economic interests of the EU-Russia relationship can provide them with additional security that a bilateral relationship perhaps cannot muster. When alternative gas flows are not a commercial option to reduce gas dependency on the one dominant supplier, mixing economic interests within the infrastructure and in markets with other important upstream and downstream players could be an opportunity to reduce the exposure to disruption risk or abuse of market power when a relatively small regional market thus becomes tied in to larger supply and market interests. The EU competition policy, and particularly the abuse of market power, can help discipline the market behaviour of the players in that part of the internal market, while a crisis mechanism could further increase those countries' levels of comfort.

The global gas and LNG markets will probably be characterised as 'tight' in the medium and longer term.<sup>12</sup> In such a business environment there will be global competition for gas between the EU and other regions. This implies the need to change the focus from the internal market to the external market. The current internal market design is of value in a buyers' market with an

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<sup>12</sup> In Chapter 8 in this paper, various scenarios for the European gas market have been prepared for the year 2015.

abundance of supplies. In today's sellers' market a successful energy policy and low consumer prices depend on obtaining competitive supplies from outside the EU. Price competition in the gas market, to a great extent, takes place in the international market. The EU gas market design should take this into account and not focus too much on organising company structures and pushing through changes in market dynamics, thereby inadvertently driving up prices for consumers due to supply shortages. Also, gas is gas, and no supplies should be singled out for special treatment in the sense of hampering its access to the EU market. Competition policy, and particularly the ability to punish companies for their abuse of market power, should be a strong instrument to manage competitive forces in the EU.

The EU will always be a market where international gas will arrive by both pipeline and LNG. The recent expansion of the LNG sector and the subsequent prospect of more LNG penetrating the traditional pipeline EU market could change the prospect of diversifying gas flows, but the initial impact should not be overstated. The LNG flows have their own rigidities, and competition for attracting LNG trains in the current tight market could reduce its impact on the (perceived as concentrated) pipeline flows in the EU. Also, Russia and other traditional suppliers to the EU market do not sit still and prepare new strategies to defend their market share.

## 2. THE GEOPOLITICS OF SECURITY OF GAS SUPPLY

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World-proven oil and gas reserves are amply sufficient to meet demand over the next decades, and, technically, these reserves could be developed, but a combination of political, institutional and economic factors have prevented these investments from taking place at the desired pace and level. Investment levels, both in the upstream and downstream parts of the gas value chain<sup>13</sup>, which would allow supply to catch up with growing energy demand, have in the eyes of the IEA been disappointing, despite the recent higher price levels. This has amplified anxieties in the EU over the security of supply for several reasons: the maturity of existing large gas fields might not be replaced in time with new fields in, for instance, Russia, to both facilitate traditional and new pipeline flows; demand from new markets, such as China, could reduce the diversification options when they begin to draw on Central Asian gas supplies; the investment capacity is mainly going to develop LNG supplies and these do not only bring gas in smaller increments but also service more diversified markets. The problem is that the EU needs to attract lots of new gas flows to replace the substantial but declining domestic production and at the same time satisfy new demand. The sheer size of the volumes the EU is looking for in the coming decade cannot be satisfied by LNG alone, nor by the three traditional suppliers, but must necessarily be a combination of both. The search for new gas will require the EU to expand its gas diplomacy efforts from the traditional regional suppliers to also embrace new producing countries. At the same time, that will increase the competition among consuming countries that are also looking at the same gas flows. The EU is moving from a regional market with mainly captive supplies to a market with partly captive demand (Northwest and East) and demand for supplies in the world market.

Security of supply concerns are now matched by security of demand concerns on the part of the producing countries. These latter concerns are focussed on the return on investment for the national companies and the governments, control over export routes and access to markets.

In the 1990s, gas import dependency mainly had economic dimensions but, increasingly, this dependency achieved geopolitical and strategic dimensions when energy also became a priority of foreign policy among the main geopolitical players in the world. In particular, the way in which China has secured oil and gas flows in recent years through predominantly bilateral political deals with countries such as Iran, Venezuela and Sudan has troubled foreign and energy policy-makers in the OECD's capitals. The gas crisis between Gazprom of Russia, a 50% +1 share state-owned company, and the Ukraine has particularly alarmed EU policy-makers. Although the conflict was predominantly a commercial one, and must be seen as part of the painful transition of energy trade relations among the states of the former Soviet Union to a more market-based energy trade, many judged the refusal to deliver gas on January 1, 2006, as an act of Russian regional energy power politics. The conflict has greatly impacted EU-Russian relations. Moreover, the concerns over gas supplies from Russia are responsible for the narrow focus in the EU on gas security instead of on the wider security of energy supply issues.

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<sup>13</sup> The upstream part of the oil and gas sectors involves exploration and production, while the downstream side consists of the transportation, processing and distribution segments of the industry.

## 2.1 OLD GAS FLOWS, NEW RELATIONS

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Traditionally, the European gas market has been supplied by three large exporters: Russia, Norway and Algeria. The relative concentration of these external supplies was balanced with substantial domestic production capacities, although regional dependencies on one supplier could be rather extensive. Diversification was limited to mixing and matching domestic production in the EU and importing from one or two of the external suppliers. Algeria mainly supplied southern European gas markets, Norway supplied mainly the northwest European market and the UK, and only Russia supplied both the continental northern, central and southern European markets. The limited level of diversification was due to the inflexible nature of pipeline supplies and bilateral delivery contracts. When, in the 1980s with the Cold War far from over, West Germany, France and Italy decided to contract more Soviet gas and participate in extending the Unified Gas System (UGS) into Europe, the American's Reagan administration protested strongly against becoming import dependent on a geopolitical adversary. European countries were about to embark on a long-term relationship with the Soviet Union through the pipeline, embodied in the long-term take-or-pay gas contracts. The US was afraid that the West European gas contracts and the accompanying infrastructural technology to transport gas over large distances allowed the Soviet Union to free-up oil deliveries traditionally destined for Eastern Europe, which could then be exported to world oil markets for hard currency, and at the same time gasify the economies of the Comecon, thereby shoring up that alliance. The new European-Soviet gas relationship could thus strengthen the Soviet economy and buttress their capability to strategically challenge the US around the world, including in Europe, with gas as a tool of foreign and strategic policy. The gas imports from the Soviet Union were at the time a serious bone of contention in the Transatlantic relationship, not unlike today, and illustrated the fundamentally different policy of the leading countries of continental Western Europe in the regional balance of power.

The collapse of the Berlin Wall in the late 1980s and the break-up of the Soviet Union in the early 1990s heralded profound changes in the institutional make-up of economic and political relations on the European/Asian continent and purported a major shift in the balance of power in the world. These changes also impacted energy trade and diplomacy across the region.

The dependency of the Soviet Union, and later Russia, on hard currency income, and perhaps also the inflexibility of gas transportation to other markets, reduced the potential threat to disrupt supplies, particularly when the limits to growth and flexibility of the centrally-planned economy were reached. As a matter of fact, the dissolution of the Soviet Union and the subsequent severe economic breakdown never affected the flows of gas to European markets.

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<sup>14</sup> New EU member-states in 2004: Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Hungary, Slovenia; and since 2007: Romania and Bulgaria.

<sup>15</sup> New NATO member-states: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

of Mutual Economical Aid (CMEA; Comecon)<sup>16</sup> and the Baltic states, which were part of the Soviet Union.<sup>17</sup> The Commonwealth of Independent States<sup>18</sup> (CIS) is far removed from being a successor to the old power structure of the Soviet Union. Since 1991, the EU, NATO, Russia and other former Soviet Union states have been in the process of digesting these profound changes. Particularly because some of the new institutional arrangements partly overlap and allow for some degree of pick-and-choose orientations in the foreign and security policy options, development of the EU foreign and security policies has been both stimulated and hampered by the parallel process of redefining NATO's focus.<sup>19</sup> This has also affected the energy policy discussion in the EU.

The process of digesting these profound political, institutional and economic changes, and the subsequent process of redefining the new nation and the accompanying national interests, has been uneven and is becoming increasingly more conflicting, both within institutions/groups of countries and among them when national political and economic interests clash. The West European EU member-states are struggling with the integration of the new member-states into the EU's mores and with the fact that integrating a large group such as the 2004/2006 enlargement has fundamentally changed the EU itself, particularly in the political sphere. The Treaty of Maastricht could not prevent the centrifugal forces on the European continent to run free after the dramatic change in the balance of power on the continent.

Both Belarus and Ukraine, with their disappointing transition records, have been left in the middle between the EU and Russia, in a crush zone between diverging national interests.

Ten years on, in a new geopolitical and regional environment and with a weaker transatlantic alliance<sup>20</sup>, discussions about the EU constitution and a new Strategic Partnership Agreement with Russia epitomise the centripetal forces that shape today's inter-European relations. NATO's struggle to find a new purpose and the divergent views among the old NATO member-states on the intervention in Iraq and how best to tackle Islamic terrorism have also left this organisation less coherent than before. The difficulty NATO has in committing their member-states to

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<sup>16</sup> Members of Comecon were the Soviet Union, Poland, East Germany, Czechoslovakia, Hungary, Romania, Bulgaria, Cuba, and Mongolia.

<sup>17</sup> The new NATO memberships were realised before the EU East European enlargements in 2004 and 2006.

<sup>18</sup> The Commonwealth of Independent States (CIS) is a confederation, or alliance, consisting of 11 former Soviet Republics: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Ukraine, and Uzbekistan. Turkmenistan discontinued permanent membership as of August 26, 2005, and is now an associate member. The creation of CIS signaled the dissolution of the Soviet Union and, according to leaders of Russia, its purpose was to "allow a civilized divorce" between the Soviet Republics. However, many observers have seen the CIS as a tool that would allow Russia to keep its influence over the post-Soviet states. Since its formation, the member-states of CIS have signed a large number of documents concerning integration and cooperation on matters of economics, defense and foreign policy.

<sup>19</sup> Schmidt, John R., 'Last Alliance Standing? NATO after 9/11', in: *The Washington Quarterly*, Winter 2006-07, pp. 93-94; CSIS, *Security Threats and Responses in Central Europe*, www.csis.org, p. 6; Algieri, Franco, 'A Weakened EU's Prospects for Global Leadership', in: *The Washington Quarterly*, Winter 2006-07, pp. 110-111.

<sup>20</sup> Halper, Stefan and Jonathan Clarke, *America Alone, the Neo-conservatives and the global order*, Cambridge University Press, Cambridge 2004, pp. 235-237.



contribute to the Afghanistan mission is an indication of the hesitant support of the members to NATO's new mission. The new EU and NATO member-states in Eastern Europe and the Baltic (and aspiring members in the Caucasus) tend to rely less on the soft powers of the EU and the old member-states and more often than not side with the US on security issues in the region. Particularly with regard to relations with Russia, this has led to divergent foreign policy approaches and a different approach to future energy relations within the EU.<sup>21</sup> Both Belarus and Ukraine, with their disappointing transition records, have been left in the middle between the EU and Russia, in a crush zone between diverging national interests. Yet, they are crucial to both Russia and the EU for security of transit. Support for further eastward enlargement of the EU has lessened, while the US would not want these countries, nor the countries in the Caucasus, to fall in with Russia again because it would reduce the ability to develop and the likelihood of developing new energy corridors outside the realm of Russia and Iran, the world's two largest gas reserves holders. The development of an energy community as part of the EU's neighbourhood policy must, in a way, bridge this gap in extending regulatory control over export pipelines. Obviously, these attempts have stimulated Russia to promote its own approach for controlling supplies and export routes and securing their market access.

### 2.2 COMPETING JURISDICTION

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As stated in the case of the EU, the gas value chain not only stretches beyond the jurisdiction of the member-states but, importantly, also beyond that of the EU. The consequence is that the EU's choices with regard to managing the gas value chain risks and benefits are partly limited or determined by choices made in another jurisdiction and cover a different part of the value chain. With the Energy Community Initiative, the EU attempted to at least include some of the neighbouring transit countries in its regulatory orbit in order to manage the Russian gas flows earlier on in the value chain than is now possible. Unfortunately, Turkey, also a potential main transit country for Central Asian gas flows, did not want to adopt this model for various reasons and, except for some smaller countries, the proposal has not really led to extending the regulatory reach of the EU beyond its borders. Also, the transit protocol of the Energy Charter has not been accepted by Russia; instead, Russia has imposed a transportation and export monopoly for gas, fortifying its perspective of managing the risks and benefits of the gas value chain.<sup>22</sup> In addition, Russia is actively diversifying its transportation routes to the European market with both the Nord and South Stream projects. Dependence on Ukraine, where 80% of the Russian gas destined for the European market must transit, is great and creates a security of transportation problem. Recent difficulties in renegotiating gas contracts with both Ukraine and Belarus, as part of the long-awaited normalisation of economic relations after the demise of the Soviet Union, evidenced the nuisance power of both countries. Reducing the nuisance power of both Ukraine and Belarus, and at the same time creating some spare transportation capacity in the transportation system, allows Gazprom to better manage its risks and benefits and creates more security of demand for Russia. It is likely that they will also do that by increasingly mixing long-term supply contracts and spot gas deliveries. With their expanded multi-entry points in the European market (Germany, Italy, Poland, Slovakia, Austria, Hungary, Bulgaria), they enable themselves to optimise this mix, and at the same time build a better economic case for

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<sup>21</sup> Tymoshenko, Yuliya, 'Containing Russia', in: *Foreign Affairs*, May/June 2007, p. 75.

<sup>22</sup> PM Zubkov intends to send an amendment to the Gas Export Act to the State Duma by June 2008, after taking advice from the Federal Antimonopoly Service, to make Gazprom share its gas export profits with independent producers of gas. *Kommersant*, 18 March, 2008.

developing the Yamal Peninsula's gas potential. A vital element in this strategy is the availability of their transportation capacity.

What is remarkable is that Gazprom and the Russian government have been very effective in up-scaling intentions to diversify into real projects, with joint-venture partner companies and governments stretching into the EU. Compared to competing initiatives, such as Nabucco, the time span between plan and investment seems very short, giving the Russian initiatives important first-mover advantages, if realised. The difference between the Russian initiatives and the other initiatives to bring Central Asian gas to the European market through pipelines is the fact that the Russian initiatives bring gas in the pipeline, while the other initiatives so far have failed to find sufficient gas for the pipeline to be fully developed. Only Azeri gas seems to be available at the moment. Competition from both Russia and China for Turkmen gas, for instance, has so far prevented getting a commitment for Turkmen gas to flow through Nabucco to the EU market. Turkmen gas has been sold 100% over the current production capacity to Russia, while the Chinese seem second in line to buy Turkmen gas once the capacity has more than doubled. The extension of the East-West pipeline into Central Asia, as a pipeline still to be filled by gas contracts, will thus directly compete with the proposed European Nabucco pipeline. A possible alternative source for Nabucco, Iran, is politically blocked. Moreover, Iran might prefer to develop LNG projects first.

The EU will also have to take the relationship with other regulatory systems into account in order to match EU demand and international supply without throwing up regulatory barriers through mismatches.

For the European initiatives to bring Central European gas through the Nabucco pipeline, the potential Russian supplies into the Turkish, Bulgarian, the Balkan, and possibly the Hungarian markets, which would effectively complicate additional en route market development in the short and medium terms for other gas projects, could possibly make the Nabucco project more difficult to realise. Moreover, the Georgian crisis has increased the Security of Transit risk. This is particularly true because this project needs to be developed on commercial grounds and because the consortium has not yet contracted any gas supplies. The EU, but also the US, attaches strategic value to the development of this pipeline route because it can bring gas from an alternative source via an alternative route, which helps to diversify supply. Pipeline projects are sometimes initially developed for strategic reasons, i.e. without their capacity fully utilised. Once they are in place it is possible for them to benefit from first-mover advantages and delay additional pipeline capacity from being developed along that route until the pipeline is filled. This may even go so far that the economic case for the pipeline is only conceivable to come after the pipeline is in place, and not before (consider the Chinese initiatives, and also the Bluestream I project). However, for such a development to materialise in the EU context, substantial public funding would be required to overcome the huge commercial risks attached to a project that has perhaps little upfront gas and a very unclear timeline on the return on investment. The EU has so far helped the Nabucco consortium with its good offices. But, the speed with which the companies and governments have recently responded to the Russians' southern pipeline initiatives indicates that they are not yet fully convinced of the success of Nabucco and wish to retain the option of playing a part in the prospect of another, perhaps firmer, gas flow in addition to the sharing in the pipeline itself. Given the size of the gas markets along the routes of both pipeline projects (South Stream and Nabucco), it is questionable whether they can be developed commercially side by side rather than sequenced in time.

For the EU to develop a healthy gas market, developments in producing countries, transit and competing consumer countries should be taken into account. The EU cannot change the politics and economics of potential EU-bound gas flows because other governments are involved in every step of the value chain too, and their national interests and those of their national



companies also matter. For large gas projects to come about, very often government-to-government relationships are important for business-to-business relationships to materialise. This is also the case for LNG. The international companies, perhaps, can develop a market for their equity share, but most of the gas is sold by the state company, and perhaps gas trains are more efficiently developed when a consortium can develop a market for the entire train. The EU has to develop sensitivity to the national interests and the regulatory choices other (competing and partner) governments make, while also pursuing its own strategic choices. At the same time, the dynamics of the gas value chain, the regional markets for gas, and the nascent international gas market should also be firmly on the EU's radar screen. The EU is not an island.

### 2.3 GAS TRADE AND NEW INSTITUTIONAL RELATIONS

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The dissolution of the Soviet Union also had a major impact on the organisation of the gas flow (and gas value chain) to Europe. The number of countries (and regulatory jurisdictions) that governed the value chain increased from only a few governments and companies to many government and company stakeholders. First, the Soviet gas ministry was in charge of organising exploration, production and transportation through the Unified Gas System (UGS), which stretched from the gas fields in West Siberia, Turkmenistan, Kazakhstan, and Uzbekistan to Belarus, Ukraine, and the Comecon countries in Eastern Europe. The fact that the Soviet Union and the East European countries were organised in the Comecon brought them under a unified regulatory regime, in this case state-owned and internationally regulated. After 1990, not only the Soviet Union broke up into 15 independent states, but also the Comecon ceased to exist as a unifying regulatory system (for gas). The Baltic states and five former Comecon countries have become nine new EU member-states, adopting the 'energy acqui', and one country was absorbed into the unified German state. Initially, ownership of the part of the UGS in the newly independent, former Soviet states fell to the new national companies, while the old contracts remained largely in place, perhaps hoping that the CIS would be the vehicle to knit the system together again in a coherent gas production, transportation and distribution system. As a result, throughout the 1990s, both Ukraine and Belarus enjoyed low non-market-based gas prices and managed to re-export gas to East European markets with nice margins. Moreover, during that period their payment record was spotty, at best. The restructuring of economic and political relations, also in gas, is still going on today. Reconstruction of the energy sector in Russia recently and the slow introduction of higher prices, which are planned to reflect the European netback prices in 2011, necessitate a reconstruction of the contracts with both main transit countries.

The EU, while extending their regulatory reach over the gas value chain through enlargement, had at the same time tried to bring the rest of the gas value chain under one umbrella agreement, through the Energy Charter. With Norway in the European Economic Space, and Algeria part of the Mediterranean policy initiatives, Russia was the last major supplier outside the policy space of the EU.

In return for lower than market-based prices, ownership of the Yamal pipeline is being shared with Belarus, while in Ukraine Russian gas supplies were eventually replaced with Central Asian ones when Ukraine refused a joint-ownership deal after both countries attempted to renegotiate the gas contracts on a more market-based footing after the 2004 Orange Revolution. For Russia, the political justification for continuing gas subsidies to Ukraine had disappeared due to both the changes in Ukraine and the new government energy policy leading up to the restructuring of the ownership of Gazprom in 2005. Prices in Russia were increasing and would have become higher than those in Ukraine if they had not been renegotiated. Moreover, Turkmenistan began to push for higher prices and, to underpin its demand, had stopped exports for three months the year

before. It became clear that the old arrangement was severely under pressure and that the old Soviet-based arrangements had to be replaced with new contracts reflecting the new gas market circumstances. The fact that both Belarus and Ukraine were economically not really ready for these new market realities and that in Ukraine the elites were fighting to benefit from the new realities did not help with finding a solution. Ukraine, particularly, used its Orange Revolution and the anti-Russian atmosphere in the EU (due to the Yukos affair and the restructuring of ownership in energy in general) to gain some sympathy. Yet, the EU did not provide Ukraine with much support, but instead used the crisis to rally internal support for security of supply policy-making at the EU level.

The EU, while extending their regulatory reach over the gas value chain through enlargement, had, at the same time, tried to bring the rest of the gas value chain under one umbrella agreement through the Energy Charter. With Norway in the European Economic Space and Algeria part of the Mediterranean policy initiatives, Russia was the last major supplier outside the policy space of the EU. Why, then, did the EU not forge a new strategic energy partnership with Russia ahead of the 2004 enlargement, in which they could have helped the Russians to restructure the CIS energy relations when the discussions on the framework of the Energy Charter ran aground? The explanation is not obvious. Clearly, the influence of the US in the Eastern European sphere cannot be underestimated in its impact on European policy-making. Economically weak and politically disorganised states such as Belarus and Ukraine continue to hold the energy interests of both the EU and Russia hostage. Rather than further deepening the political and economic relations, we have witnessed a growing distrust between the two blocs, epitomised by the dispute about the transit protocol. Only a few years ago, Russia was eager to conclude new and renew old long-term supply agreements in order to solidify their position in the EU market. Now their strategy has changed and they are seeking new types of agreements in which they can not only reach the EU markets through diversified routes, but can also gain direct entry into the EU market as a distributor.

### 2.4 EU AND RUSSIA: ACCESS TO RESERVES AND MARKETS

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An explanation for the growing EU unease lies in the unwillingness of the Russians to open up their huge reserves for direct foreign investments and in the way the Russian government resolved its problems with the oligarchs and their companies. Just when ownership of reserves and production was so near for Western investors, the Russian government closed the door on the sale of foreign majority holdings in Russian energy companies and, instead, ruled that foreign owners could only hold minority shares. The restructuring of Gazprom and the enlargement of the ownership by the government to a 50%+1 share does, however, hold the promise of upstream investments in gas, much like the investments in Qatar and other producing countries allow. Yet, participation in the near-gas monopoly of Russia and its new gas projects did not measure up to the EU's expectation that the Russian government could be persuaded to break up the monopoly. Such a break-up would allow multiple producers of Russian gas to compete for the European market and would assist in realising the internal gas market in the EU. Undoubtedly, the monopolistic grip of transit countries on the pipelines and export storage facilities would have been the EU's next target.

It is likely that the EU's position, insisting that long-term contracts and destination clauses had to be dissolved in a period when Gazprom had not been fully able to restructure its domestic sector and gas relations with the transit countries, fed the growing suspicions of Russia that the EU intended to maximise the redistribution of rents towards the downstream end of the value

chain, while reaping the remainder of the rent through direct foreign investments. The growing dependence of government income on oil and gas exports<sup>23</sup> necessitated the Russian government to prevent such a development. With oil and gas markets tightening and prices increasing, the Russian government acquired the means to seriously pursue its domestic and foreign ambitions and thwart the designs of the EU and others for the Russian energy sector.<sup>24</sup> Energy was already a part of the foreign economic policies of the US and Europe and again became an instrument of the national and foreign policies of Russia. The enlarged EU had prompted Russia to pursue security of demand, which implied that some of the new gas is now being developed for new markets in North America and Asia. Gas that was traditionally seen as destined for only one market is, partly as a result of the 'LNG-revolution', now being diverted to other markets. Initially, the Sakhalin development was seen as separate from the strategy of the national gas industry, including Gazprom, but the growth of demand for LNG and the re-organisation of the Russian gas sector during the second Putin administration has brought both East Siberia and the Far East Russian gas projects within the realm of the Russian gas strategy to diversify demand. The connection of the energy-rich region in East Siberia including Yamal, first with oil and later gas, with the Far East through a new pipeline network, is also strategically important for the development of an economically (and politically) prosperous border region with China. The energy hunger of China creates an economic potential but also represents a strategic challenge. Russia's population is mainly centred in the European part of the country. Russia is concerned that the population pressure in China and the energy hunger could in time jeopardise the integrity of the Russian state. Already, many Chinese are moving north, changing the demographic balance in the region. Energy is seen as a major stepping stone to develop the region into a viable local economy where Russians can work and live and prevent Russians from moving away. This long-term plan for the region is of geo-strategic importance.

It is clear that Russia's gas strategy has evolved in the past decade or so from a regional to a world market strategy in which the national, rather than the regional, economic interests are central. Russia is moving away from a position of being a captive supplier to the EU. The EU at the same time is trying not to become a predominantly captive consumer of Russian gas. Supplies from the traditional suppliers, Algeria, Norway and Russia, will continue to play a crucial role in the EU gas market.

Russia's development concerns and strategies alter the outlook for Europe as the only viable market for Russian energy exports. Already, Europe has to compete with the US and Asia for LNG flows from other gas-rich regions.

The dramatic change in the institutional make-up of the European-Asian continent has also impacted relationships with the traditional main gas suppliers: Russia, Algeria and Norway. Norway entered the European Economic Space (EEC) but failed to make the step to become a full member of the EU. With oil production in the North Sea over its peak, and gas production moving north to more inhospitable regions, Norway is reorienting itself as a major energy supplier to the EU. The merger of Norske Hydro and Statoil is an indication that Norway also wants to maximise its energy wealth for the Norwegian economy. The resultant long-term strategy, stretching the energy period over a large number of years, may run counter to the

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<sup>23</sup> Tabata, Shinichiro, 'Price differences, taxes and the stabilization fund', in: Ellman, Micheal, *Russia's Oil and Natural Gas, Bonanza or Curse?* Anthem Press, London, 2006, pp. 41-46.

<sup>24</sup> Putin, V.V., *Mineral Natural Resources in the Strategy for Development of the Russian Economy*, Zapiski Gornogo Instituta 144, pp. 3-9, as translated and published by Harley Balzer, 'Vladimir Putin's Academic Writings', in: *Problems of Post-Communism*, January/February 2006.

immediate energy and diversification needs of the EU. Also in Norway, the government owns more than 50% of the newly merged company StatoilHydro, a further indication of the importance the government attaches to the management of the energy wealth. The new company allows for an optimal mix of oil and gas production in Norway, creating the option to optimise income from oil and gas and to engage in developments in the Arctic and elsewhere in the world. Security of demand and diversification of markets have also become more important for Norway. Developing a position in LNG, with the development of Snohvit and the participation in Shtokman, will help to achieve this diversification of demand.

What is more, Europe is now effectively competing for new gas developments in Russia with other consuming countries because Gazprom does not have unlimited capacity and capability to develop very many large projects all at once, while Gazprom is the main instrument of the Russian strategy. The merit order of new fields, pipelines, LNG and downstream investments changed under the pressure of the changing strategic market outlook.

### 2.5 RUSSIAN STRATEGISING IN A SELLERS' MARKET

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Nearly two decades after the dramatic political and institutional shake-up of the Eurasian continent, it is clear that energy relations have also changed. The gas sector of Russia is becoming more market oriented, and in the domestic market as well. In March 2008, the independent producers, who could only sell on the domestic market, are now poised to benefit from gas export proceeds when a proposal in the Duma is passed. The importance of the independents for the Russian gas balance is increasing, and the export monopoly of Gazprom has prevented them from benefitting from higher EU prices. Increasing domestic gas prices and allocating their share of export income should help to optimise gas production and stimulate new investments. These investments and those of Gazprom are necessary to make the next step in developing the new generation of gas fields in faraway places like Yamal, East Siberia and Shtokman. The success of the investment strategy and the development of a domestic gas demand will be decisive in determining how much gas will and can find its way to the EU market. Developments in the Russian market, such as the objective to achieve parity in netback values from exports and sales in the domestic market by 2011, will also impact the volumes of Central Asian gas flowing to Russia and the EU. Russia is trying to become an aggregator for Central Asian gas, offering both a spot market and LT arrangements through Russia. Diversification of routes to the market and creating market outlets in the EU play important roles in managing the risks and benefits. At the same time, both Russia and Central Asian suppliers are also developing export routes to Asia, allowing them, in time, to arbitrate between the two important markets for gas.

The volume of 'Russian' gas entering the EU market will, in turn, largely determine the penetration of LNG into the market. For the moment, Russia seems geared towards maintaining its market share and is creating flexibility to benefit from high spot prices, but probably also to maintain room to manoeuvre for an uncertain domestic market demand. Russia's crucial position in balancing world gas markets is confirmed by the IEA: "Russia is also important to the world because future trends in Russian gas exports to Europe are a key factor in determining the degree of tightness in global gas markets and pressures on alternative sources."<sup>25</sup> The challenge

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<sup>25</sup> IEA, *Natural Gas Market Review 2007*, p. 129.

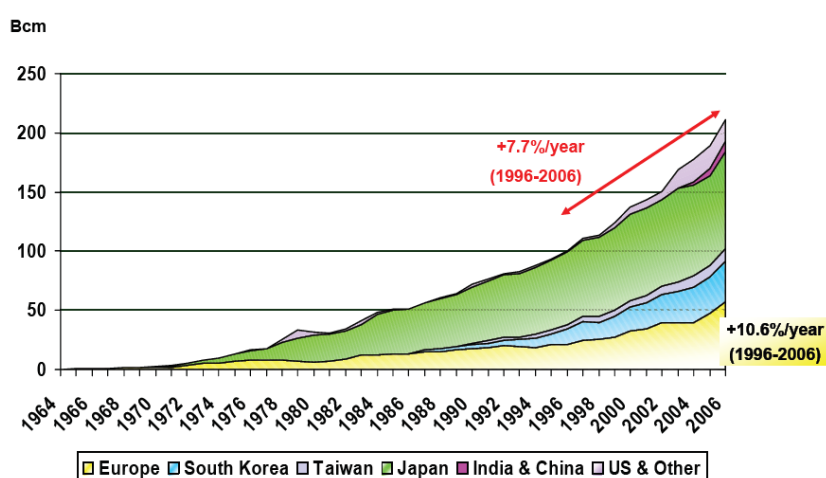
for the EU is then to create a market and regulatory system which attract gas into the market. A decade ago, the buyers' market implied allowing suppliers of gas to compete for the buyers in the EU market. In today's sellers' market it implies allowing buyers to compete for gas with other buyers. This competition for flows does not take place among the various consumer groups in the EU market, but more and more at the international market level with other economies. This competition will also impact the availability or balance between LT and spot supplies and the pricing system preferred. Suppliers have to make long-term investments in both production and transportation to maintain market access and seek a proper balance between long-term income flows and benefitting from short-term spikes. Although the bulk of gas trade is still under LT contracts for both pipeline gas and LNG, the share of spot and short-term contracts is increasing. In the current market conditions, it allows the producers or aggregators to both balance among markets and generate arbitration gains.

It is clear that Russia's gas strategy has evolved in the past decade or so from a regional to a world market strategy, in which the national rather than the regional economic interests are central. Russia is moving away from a position of being a captive supplier to the EU. The EU, at the same time, is trying not to become a predominantly captive consumer of Russian gas. Supplies from the traditional suppliers, namely Algeria, Norway and Russia, will continue to play a crucial role in the EU gas market. The fact that all three have reinforced their governments' interest in the national oil and gas company illustrates the importance of their oil/gas sectors for the national economy. Government is reserving a role for itself in managing the (long-term) risks and benefits.

## 2.6 GOVERNMENT INVOLVEMENT IN LNG

The LNG business developed in the wake of the oil crisis of 1973/74 and began to deliver markets across the globe. In the US and the EU, growth of the LNG business was arrested when both domestic and regional gas production took off (see Figure 1) and pipeline deliveries from Russia began to flow. In the EU, LNG remained a largely southern European affair. Algeria was initially the main supplier to these markets, of both LNG and pipeline gas. The main development of the LNG market was focussed on Asia, with no domestic resources available, and on some gas suppliers in the region (Brunei and Indonesia).

FIGURE 1: HISTORICAL DEVELOPMENT OF LNG MARKET



SOURCE: CEDIGAZ



In the 1990s, LNG underwent a second expansion when cost reductions in liquefaction and transportation unlocked the previously stranded gas in the Middle East and Africa for world markets. The structural upward movement in energy prices, in addition to these new producing countries, has dramatically changed the economics of the gas markets in the space of 10 years. Initially, the large oil companies, as holders of both the capital and technology of LNG trains, were the main market players. They developed the gas field, the liquefaction and the market for LNG.

Early in the Middle East expansion in gas production, the Qatar government realised the potential of LNG and insisted on a majority share for their national company. In this way, they could manage both the resources and the money flows from these large projects in a manner that suited their national economic interests best. LNG projects in Qatar are now mostly developed in a 65-70% ownership role for Qatar Petroleum. Other Middle East and African governments had already introduced this organisational model in which the government has a substantial direct participation. With regard to oil, we have also witnessed a similar development in projects that were first heralded for their large share of direct foreign investors, but later were reorganised to include a larger government company share. The increased government stake in pipeline supplies from Norway and Russia is thus matched by similar government stakes in LNG supplies. Does this impact the potential availability of LNG flows? The answer must be yes. Governments will use other considerations than private industry for the development of their resources.

For example, Qatar has decided to reduce the initial fast pace of development on the North field, officially to manage the logistics of the many trains under development, but the fact that the intense and fast speed of development could create difficulties in its relations with Iran, whose South Pars field shares the geology with the North field, seems a good explanation, too. Also, with a relatively small population, and gas demand growing in the region, Qatar's national interests may lie with a different profile of development and export destinations than the international gas market would prefer. That the demand for energy is becoming an issue in the region is witnessed by the initiative of the UAE to develop a nuclear industry. The growth of domestic and regional energy demand in the region can certainly impact the pace and purpose of gas developments.

Rapid urban developments in the neighbouring United Arab Emirates and the industrial gas demand in, for instance Oman, are offering regional gas export possibilities. Qatar, as a small nation and part of the Gulf Cooperation Council (GCC), cannot ignore these regional developments and may want to reserve some capacity for the regional market.

Moreover, from a government income perspective, the recent increase in oil prices can also reduce the pace of development because government income and monetary reserves have increased due to price rather than volume. As a matter of fact, the sellers' market and accompanying higher prices could reduce the pace of development in certain producing countries because incomes cannot be absorbed in the economy at the same pace. The excess incomes must be invested elsewhere, but in the current economic climate (with declining dollar, uncertain interest rates, higher inflation and reduced access to good performing investments) these could alter the pace of development. At the same time, new suppliers could be drawn to the market to benefit from the expansion of LNG trade and use the space left by traditional suppliers for its gas to find a market.

## 2.7 MANAGED SUPPLY?

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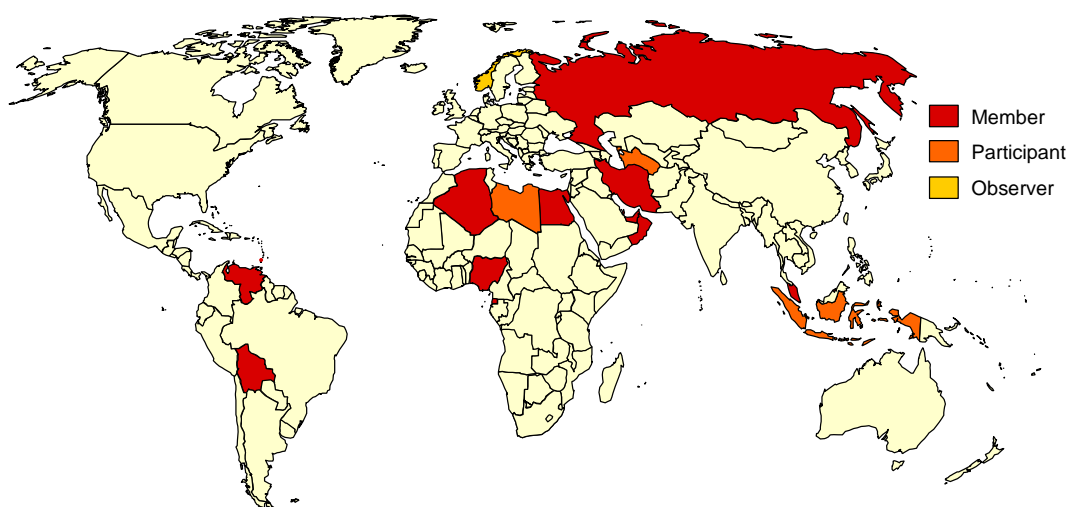
Managed supply capacity and trade flows are dreaded by consumer countries. So far, the discussions in the Gas Exporting Countries Forum (GECF)<sup>26</sup>, established in Teheran in 2001, seem to steer clear of OPEC-like market behaviour (see Figure 2). Invitations have been extended to gas-consuming countries but they have not been taken up yet. Currently, the GECF already represents around 72% of world gas reserves and 41% of supply. Many commentators point out that the likelihood that the GECF could develop into a cartel-like organisation is small because most gas is traded in regional markets through pipelines and they do not possess the type of spare capacity that gave OPEC its command of the oil market from the 1970s.<sup>27</sup> Also, gas is suffering from certain rigidities, not least in transportation and storage, that oil does not suffer from. However, in OPEC's early years the same was true for the oil market, and the gas producers already have a much tighter grip on the gas sector in their countries, in terms of ownership and pace of development than the oil-producing countries had just prior to 1973. The flexibility that is being developed both in EU pipeline supplies (Russia and Norway) and in the LNG market (see section 4.3) could generate the type of marginal supply management that is needed for the producers to influence the market. The importance of the GECF is perhaps in the future when more LNG comes to market and, in the case of Europe, Russia has diversified its routes and captured Central Asian supplies as part of its market development. Also, they may want to be in control over arbitration possibilities in an effort to maximise their share of the economic rent. In case of a slump in gas demand as a result of the current international economic instabilities, the decision of the member-states about how to manage the market might be brought forward. They can either decide to jointly manage supply or revert to security of demand by more bilateral LT gas contracts. And, statements coming out of recent meetings of the GECF certainly do not exclude moving towards a managed gas market. In the 6<sup>th</sup> ministerial meeting on 9 April 2007 in Doha, an expert group was established, chaired by Russia as host of the 2008 meeting, to study how to strengthen the GECF. The group will look at various factors including pricing, infrastructure, and the relationship between producers and consumers.

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<sup>26</sup> The forum doesn't have a fixed membership structure, although Algeria, Bolivia, Brunei, Egypt, Equatorial Guinea, Indonesia, Iran, Malaysia, Nigeria, Qatar, Russia, Trinidad & Tobago, the UAE and Venezuela could be identified as current members. Turkmenistan, Indonesia, Libya and Oman have participated at different ministerial meetings. Norway has the status of observer.

<sup>27</sup> See for instance Hadouche, Hadi, *The Gas Exporting Countries Forum: Is It Really a Gas OPEC in the Making?* OIES, NG 13, June 2006.

FIGURE 2: GAS EXPORTING COUNTRIES FORUM



SOURCE: GECF; CIEP ANALYSIS

Interestingly, the GECF brings together the three largest reserve holders (Russia, Iran and Qatar) and also the countries developing new LNG capacities. The member-states are very different and, at this point, seem to have too many different interests to organize the market. The one issue that they have as a shared interest is the prolongation of the current sellers’ market, which could imply a certain degree of investment management or capacity addition management among the members. With more spot LNG or uncommitted LNG in the system, the flexibility needed for some market management might be ‘under construction’. However, even if the gas countries are successful, to some extent, in organizing supply, they should remember that OPEC also had its strong and weak periods in market management. The long period when OPEC was the world swing producer and had to absorb the cost of overcapacity must be a period the GECF member countries wish to avoid.

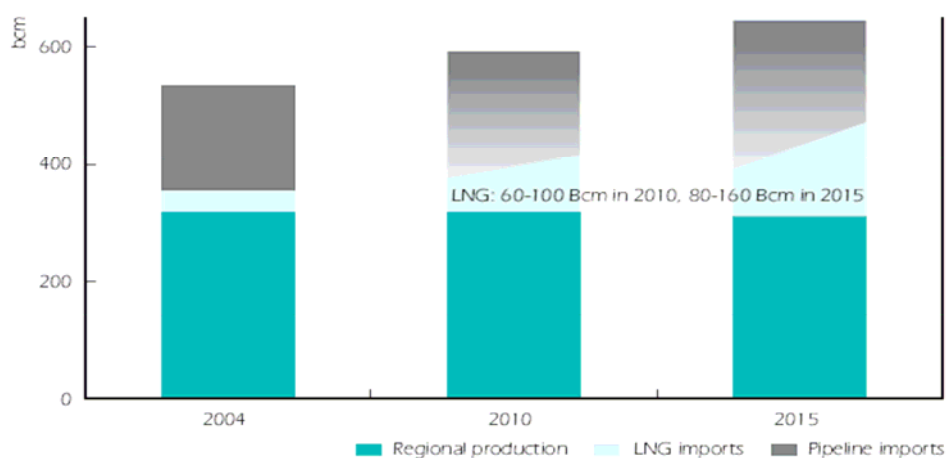


### 3. DEMAND FOR PIPELINE GAS AND LNG IN THE EU MARKET: MARKED BY MANY UNCERTAINTIES

Long-term forecasts of EU demand for natural gas are prone to great uncertainties. As a telling reminder, the IEA has consistently scaled down its estimates for natural gas demand for OECD Europe in its World Energy Outlooks from 2002 through 2006.<sup>28</sup> Looking at some of the current estimates for EU gas demand in the long term by leading institutions, we observe a wide margin between the upper and lower boundaries of forecasted demand.

Today's markets for gas are subject to more uncertainties than ever. Prices for oil have skyrocketed. Gas prices follow, particularly in continental Europe, where gas prices are largely indexed to oil products. The impact of the very significant price changes has yet to sink in and has not been fully assessed under any of the scenarios. This may be difficult anyway, as the energy world has very little experience with the new price levels. Consumption patterns may well change significantly. Economic growth may be slowing down. Security of Supply is back on the agendas of importing countries. And, the impact of climate change on future energy policies and gas demand is still open to wide speculation. Under these circumstances, we do not venture to offer more data on the future demand for gas.

FIGURE 3: NATURAL GAS DEMAND FORECAST FOR OECD EUROPE



SOURCE: IEA, GAS MARKET REVIEW 2007

Within the wide ranges of EU demand for natural gas, could there be a separate demand for LNG? To start, current levels of supply represent a “base load” of LNG and those interested buyers who have invested in LNG regasification capacity are in search of more LNG supplies than current levels. But the macro-projections made by the various analysts of future LNG volumes in the EU portfolio should not be counted as the aggregate of specific LNG demand but rather as their assessment of possible supplies of LNG to the EU markets. In so doing, they have to make many assumptions and all accept that there are wide variances around those assumptions.

<sup>28</sup> Tönjes, C., and De Jong, J.J., *Perspectives on Security of Supply in European Natural Gas Markets*, CIEP, The Hague, August 2007. Publication available at: <http://www.clingendael.nl/ciep/publications/?id=6756&&type=summary>.

## The Gas Supply Outlook for Europe. The Roles of Pipeline Gas and LNG

On this basis, the IEA estimates (OECD) Europe's imports of LNG will reach a volume of between 60-100 bcm in 2010, increasing to between 80-160 bcm in 2015 (see Figure 3). The IEA notes that these LNG import volumes do not only depend on LNG production developments, but also on upstream and pipeline developments, price developments in the main consuming regions as well as on-demand growth elsewhere (notably China), thus explaining the sizeable range of uncertainty it uses for its LNG outlook for (OECD) Europe.<sup>29</sup>

Estimates about mid- to long-term demand for natural gas and LNG in the EU market appear to show wider margins of uncertainty than was the case in the past. More than ever, we observe that analysts and institutions are offering diverging views on the future demand for gas.

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<sup>29</sup> IEA, *Natural Gas Market Review 2007*, pp. 63-64.

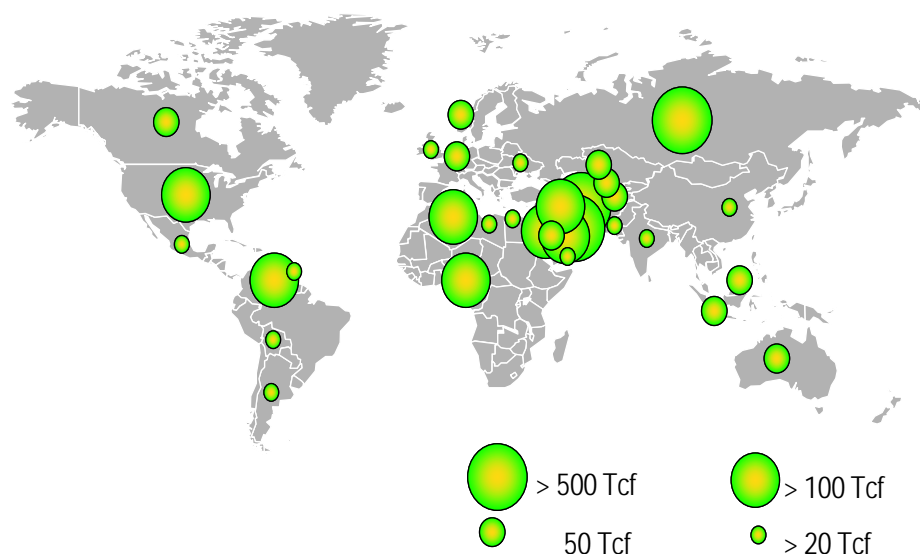


## 4. THE GAS SUPPLY OUTLOOK FOR EUROPE<sup>30</sup>

### 4.1 RESERVES AND SUPPLY SOURCES RELATIVE TO EUROPE

There is general agreement that global proven gas reserves are sufficient to meet global demand for some 60 years. Considering that exploration for gas still offers a significant scope for more finds, it is safe to assume that there is no shortage of gas reserves to meet future demand.

FIGURE 4: PROVEN NATURAL GAS RESERVES



SOURCE: BP, IEA

As regards the EU, the region is surrounded by well over 60% of all proven reserves. Most of these reserves are to be found in Russia, Central Asia, North Africa, Iran and the Middle East. (See Figure 4). Given today's gas price levels, it should be possible to bring all of these deposits to development for supplies to the EU economically.

Most of these developments make sense as pipeline projects, but some suppliers have a choice between exports by pipeline and LNG. Homing in on the most important supply sources to the EU from outside the EU market, we have:

**Russia:** Geographically essentially focussed on pipeline developments, although transit problems and aspirations to become a global player have led to a Russian interest in LNG developments in the Atlantic Basin, conceivably from the Shtokman field in the Barents Sea. But the mainstream supplies will remain pipeline gas. In this respect, the Nord Stream and South Stream pipeline projects are under way.

**Algeria:** Both geographically and economically a pipeline supplier of gas to the EU. Indeed, two new pipelines into Southern Europe are on the drawing boards. These supplies are destined essentially for Italy and the Iberian Peninsula.

<sup>30</sup> In this study – in the case of data – Europe will be defined by all European countries, including Turkey, excluding CIS countries. In Figure 6 these 'European' countries are marked brown.

Algeria is also a major LNG player in the Atlantic Basin and is also supplying LNG to the EU, notably to France and, more recently, to the UK.

Central Asia: Not yet a direct supplier to the EU, but supplies CIS countries such as Ukraine using the transportation capacity of Russia. The Nabucco project is an attempt to open a new supply route to the EU, from Central Asian gas through the Caucasus and Turkey.

Iran: With regards to supplies to the EU, Iran has two options: Pipeline gas (Nabucco) and LNG. LNG currently seems to be favoured by Iran. As an LNG supplier, Iran can be regarded as part of the Middle East. If political hurdles can be overcome, the potential for regional pipeline supplies (India) is considerable and geographically more attractive than the EU.

Middle East: Essentially an LNG supply region. Qatar is the most prominent of all and has become the world's number one LNG supplier. The Asian market is geographically equally attractive as Europe for LNG suppliers in the Middle East.

West Africa: In this region, Nigeria is by far the most prominent gas supplier. Apart from some regional pipeline supplies, West Africa will be an LNG supplier

Caribbean region: Today, only Trinidad & Tobago are active in this region, but they have more potential with Venezuela as a major resource holder. The region is better placed geographically to supply the North American market than the European market.

Altogether, the geographically and economically most attractive countries and regions that hold potential gas supplies to Europe are mainly positioned as pipeline suppliers, with the possible exception of West Africa. The Middle East is equally distanced to Europe and the Asia-Pacific market. Regarding the Caribbean and South American supplies, the US market has a distance advantage over Europe.

While there is adequacy of reserves to meet the EU demand, various factors blur the prospects for such supplies:

- a) None of these supply sources seem to be strongly focussed on Europe as the most important market for their gas. There are a number of possible reasons which will be set out in Chapter 5 (price levels, regulatory concerns, EU energy policies, security of supply concerns/measures).
- b) Developments of new gas supplies are lagging globally. Gas projects are complex and time consuming in the best of circumstances. In the current business environment, this has not become any easier:
  - i. many governments today seek a more substantial involvement and are reviewing their stakes in new developments;
  - ii. identifying and securing markets today is more difficult, if only because there are more marketing options and a number of these carry higher risks for the suppliers. A great number of risk management processes are involved before any investment decision can be taken;
  - iii. as the size of LNG units is increasing, so are the financial and marketing dimensions;

- iv. today, major cost increases and the limited availability of contracting and specialist resources further hamper the development of new supply projects.
- c) Various producing countries are currently reassessing their future domestic gas needs which will take precedence over exports. They will only give the green light for further exports once they have ascertained that their domestic demand can be satisfactorily met.
- d) Most of the global gas reserves are now held by national oil companies (NOCs), which are controlled by national governments. Their agenda and drivers for new developments are dictated by many national (and international) political considerations and the objective to maximise the economic rent for their national resources.

Considering further the efforts required to meet the demand for fossil fuels over the next 25 years (about 50% greater than that of today)<sup>31</sup>, it looks as though the growth in gas production capacity will be trailing the growth in global demand.<sup>32</sup>

Against this background, we expect that the current sellers' market will persist for the foreseeable future.

As a consequence, Europe will be competing with the rest of the world for new supplies, to some extent for pipeline gas, but mainly for LNG. Where possible, the consuming world will have to step up its endeavours to secure new supplies for its markets.

There is no shortage of reserves to meet the future demand for gas in the EU. However, the global development effort, both in pipeline gas and LNG, does not currently appear to be keeping pace with the demand prospects. While Europe is geographically well positioned for new supplies, surrounded as it is by the majority of global gas reserves, there do not appear to be many major supply developments specifically earmarked for its markets other than those from Russia.

For the foreseeable future, Europe will be in competition for LNG supplies with the rest of the world.

## 4.2 PIPELINE SUPPLY SOURCES AND THEIR POSITION RELATIVE TO EUROPE

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### 4.2.1 Existing, committed and proposed pipelines to the European market

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Historically, Europe's imports from outside the EU are realised by pipeline transport, mainly from Russia, Norway and Algeria. In this section the existing and proposed pipeline projects from outside Europe (including Norway) to the European market will be discussed. For a graphical overview of the pipeline export capacities and imports by pipelines, see Figure 6.

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<sup>31</sup> IEA, *World Energy Outlook 2007*, p. 41.

<sup>32</sup> See: IEA, *Natural Gas Market Review 2007*.

#### 4.2.1.1 Existing gas pipelines to the European market

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The first gas pipelines from outside Europe (including Norway) to Europe were built between the Soviet gas fields and the European gas market at the end of the 1960s. These were followed by pipelines from Norway in the 1970s, and from Algeria in the 1980s. Ever since the 1990s, other gas exporting countries have begun to supply gas to Europe by pipeline. This section gives a brief outline of the existing pipelines to Europe.

##### **Russian pipelines to the European gas market<sup>33</sup>**

###### *The Ukraine gas corridor*

The different gas pipelines through Ukraine to Europe were built during the Soviet period and connect Europe to the Russian gas fields in Orenburg and West Siberia, as well as to gas reserves in the former Soviet states in Central Asia. The main pipeline systems are the Brotherhood and the Soyuz.

The transportation capacity from Russia via Ukraine to Western Europe is 155 bcm/yr. The remaining transit capacity via Ukraine is 20 bcm/yr (from South Russia, via Ukraine, Moldavia, Romania, and Bulgaria, to Turkey).<sup>34</sup> Most of the gas from Russia via Ukraine flows through Slovakia along the Transgas corridor (south to Austria and Italy or west to the Czech Republic, Germany, Switzerland and France).<sup>35</sup>

###### *The 'Yamal' to Europe gas system*

During the 1990s Gazprom constructed the Yamal-Europe pipeline from Russia, through Belarus and Poland, to Germany to feed the gas systems of Belarus, Poland, Germany and the Netherlands. This pipeline does not actually connect Europe with the gas reserves in the Yamal region, but instead taps into the West Siberian Basin.<sup>36</sup> The Yamal-Europe was also the first pipeline to diversify away from the Ukrainian transit route. The Belarus section of the gas pipeline was constructed and is operated by Gazprom. The transportation capacity in Belarus is 33 bcm/yr.<sup>37</sup> The Polish section was constructed as a joint venture<sup>38</sup>. The transportation capacity in Poland is 20 bcm/yr.<sup>39</sup>

###### *Blue Stream gas pipeline*

In 1998 Gazprom and the Italian company ENI signed a strategic alliance, which included the construction of the Blue Stream gas pipeline. Blue Stream aims to deliver extra gas volumes to

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<sup>33</sup> Apart from these pipelines, direct gas pipelines were built between Russia and Finland and the Baltic states during the Soviet period. These transport capacities are around 30 bcm/yr in total.

<sup>34</sup> Victor, David G., Jaffe, Amy M., and Hayes, Mark H., *Natural Gas and Geopolitics. From 1970 to 2040*, Cambridge, 2006; Gazprom's data.

<sup>35</sup> Victor, Jaffe, and Hayes, *Natural Gas and Geopolitics*.

<sup>36</sup> As a result of lower gas demand within Russia, development of the Yamal Peninsula was not necessary.

<sup>37</sup> Victor, Jaffe, and Hayes, *Natural Gas and Geopolitics*.

<sup>38</sup> Gazprom and the Polish national gas company, PGNiG, hold a 48% interest in the joint venture (EuRoPol Gaz), and Gas-Trading holds a 4% interest.

<sup>39</sup> Victor, Jaffe, and Hayes, *Natural Gas and Geopolitics*.

what is expected to be a growing Turkish gas market. The first Russian offshore gas pipeline, crossing the Black Sea, avoids the traditional route to Turkey along Ukraine, Moldova, Romania and Bulgaria. Blue Stream began shipping gas in 2003, with a maximal capacity of 16 bcm/yr (2x8 bcm/yr). Besides avoiding third-country transit, the Blue Stream pipeline aims to increase its market share vis-à-vis the competition in Turkey, from competitors like Iran and countries in Central Asia and the Caspian region.<sup>40</sup>

### **Norwegian pipelines to the European market**

In the 1970s the Norwegians constructed the Norpipe gas pipeline to Emden in Germany and the Vesterled to St Fergus in the UK. Since the 1990s, four pipelines have been constructed to continental Europe. The Zeepipe gas pipeline to Zeebrugge in Belgium and one pipeline to Dunkirk in France – Franpipe – have been built. The other two pipelines – Europipe I and II – connect the Norwegian gas fields with the German gas system in Dornum. Recently, the Sage link has been constructed and the Ormen Lange field has started to feed the UK gas market (entry point Easington) through the Langed gas pipeline.

The actual transportation capacity (in 2007) to continental Europe is 86.3 bcm/yr, whereas the transportation capacity to the UK is 41 bcm/yr. This results in a total transportation capacity of 127 bcm/yr.<sup>41</sup>

### **Algerian pipelines to the European market**

In the 1980s, Algeria, Tunisia and Italy constructed the TransMed gas pipeline from Algeria to Sicily in Italy via Tunisia. In the nineties the capacity of this pipeline was increased to 27 bcm/yr. A decade later, Algeria constructed the Maghreb gas pipeline from its gas fields through Morocco to Spain. The actual transportation capacity of Maghreb pipeline is 12 bcm/yr. The total capacity achieved in 2007 was 39 bcm/yr.<sup>42</sup>

### **Libyan pipelines to the European market**

Libya has built one gas pipeline directly to Sicily. This pipeline – the Greenstream – has a transportation capacity of 8 bcm/yr and began shipping gas in 2004. The transportation capacity Greenstream gas pipeline could be extended to 11 bcm/yr.<sup>43</sup>

### **Other pipelines to the European market**

Two other pipelines are connected to the European gas market. The first gas pipeline – the South Caucasus gas pipeline – connects the Shah Deniz field in Azerbaijan with the Turkish market (Erzurum). The initial capacity of the pipeline is 8.8 bcm/yr.<sup>44</sup>

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<sup>40</sup> Gazprom and ENI hold a 50% interest each in the joint venture. Gazprom, 'Major Projects – Blue Stream', <<http://gazprom.com/eng/articles/article8895.shtml>> (July 2008).

<sup>41</sup> NPD 2007.

<sup>42</sup> GasTerra's data.

<sup>43</sup> Ibid. The transmission capacity of the Greenstream could be expanded by the installation of additional compressor(s).

<sup>44</sup> The transmission capacity of the South Caucasus pipeline could be expanded to 16 bcm/yr in 2012 by the installation of additional compressor(s).



The National Iranian Oil Company (NIOC) and the Turkish oil and gas company – Botaş – opened a gas pipeline from Tabriz in Iran to Erzurum (Turkey) in 2001. Its transportation capacity reaches 20 bcm/yr.

#### 4.2.1.2 Committed gas pipelines to the European market

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A number of pipeline projects are under construction and relatively certain to be realized.

##### *Nord Stream gas pipeline*

The Nord Stream gas pipeline is designed to bring additional gas to Western and Northwest Europe from Russia.<sup>45</sup> In the first phase, Nord Stream will be connected by pipeline with the offshore Shtokman field in the Barents Sea. Initially, one pipeline will be operated from 2010 with a transport capacity of 27.5 bcm/yr. A parallel pipeline will be laid to double the annual transport capacity to around 55 bcm/yr – expected to come on stream in 2012.<sup>46</sup>

The gas pipeline runs through the Baltic Sea, avoiding the existing transit countries of Ukraine and Belarus with which Gazprom has had conflicts about gas contracts in the past. Instead, the pipeline must transit the territorial waters of a host of North European nations, some or most of whom have reservations about the planned project.

##### *Flags gas pipeline*

A new pipeline from Norway is the link-up with the Flags gas pipeline to St Fergus in the UK. The pipeline will start operation in 2008 with a transport capacity of 8 bcm/yr.<sup>47</sup>

##### *Medgaz gas pipeline*

The Medgaz gas pipeline is designed to bring additional gas directly to Spain (Almeria) from Algeria. The pipeline will be operated from 2009 with a transport capacity of 8 bcm/yr.<sup>48</sup>

##### *TransMed gas pipeline*

The TransMed gas pipeline from Algeria to Sicily via Tunisia will be extended in 2008 from 27 bcm/yr to 33.5 bcm/yr.<sup>49</sup>

#### 4.2.1.3 Planned or proposed gas pipelines to the European market

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From now until 2015, additional pipeline capacity to Europe has already been planned or proposed for construction.

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<sup>45</sup> Gazprom holds a 51% interest in the joint venture, Dutch Gasunie 9%, and the German companies BASF and E.ON hold 20% each.

<sup>46</sup> Nord Stream, 'Project', <[www.nord-stream.com](http://www.nord-stream.com)>.

<sup>47</sup> GasTerra's data.

<sup>48</sup> Ibid.

<sup>49</sup> Ibid.



### *South Stream gas pipeline*

The last Russian proposal for the construction of a new gas pipeline is the South Stream gas pipeline. This pipeline increases the gas import capacity for Europe, particularly Italy, Austria, Bulgaria, Hungary and the Balkans.<sup>50</sup> South Stream would also bypass Turkey – which is different from the Blue Stream pipeline strategy – and isolates Gazprom's gas supplies to southern Europe from any political risk in transit countries like Ukraine, Moldova and Turkey.

South Stream's projected capacity is 30 bcm/yr. ENI and Gazprom hold a 50% interest each. In the transit countries onshore, Gazprom cooperates with the gas companies in these countries.<sup>51</sup>

### *Europipe III gas pipeline*

A Norwegian proposal for the construction of a new pipeline to continental Europe is the Europipe III gas pipeline. This pipeline would connect new fields from Haltenbanken in Norway with the continental market. The pipeline will not be operational before 2011 and its projected capacity is 23.6 bcm/yr.<sup>52</sup>

### *Skanded gas pipeline*

The last Norwegian proposal is the Skanded gas pipeline to Sweden and Denmark. This pipeline would also be connected to the gas grid of Poland, via the Danish transmission system, and the Baltic pipeline (3 bcm/yr) between Denmark and Poland. The Skanded pipeline is expected to come on stream in 2012 with a capacity of 9 bcm/yr.<sup>53</sup>

### *GALSI gas pipeline*

The proposed gas pipeline *Gasdotto Algeria Sardegna Italia* (GALSI) connects the Algerian supply sources with Sardinia and further east to Livorno in Toscana (Italy). Its design capacity is 10 bcm/yr.

### *Nabucco gas pipeline*

The 'odd one out', this pipeline does not connect new supply sources with the European market, but starts from Austria in the EU en route to Turkey via Bulgaria, Romania, and Hungary, in search of new supplies from either the Caspian region or Iran. It could be connected to the Tabriz-Erzurum pipeline, and to the South Caucasus Pipeline. (Probably, to be connected, the Trans-Caspian Pipeline from Turkmenistan would need to be constructed.) Other options are the connection to the Blue Stream pipeline or new supply pipelines from Iraq or Egypt via the Arab Gas Pipeline. However, this remains pure speculation.

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<sup>50</sup> ENI, 'The South Stream project', <<http://www.eni.it/eni/internal.do?RID=@2slKM%7C0?xoidcmWopk&catId=1073763205&cntTypeId=1008&portalId=0&lang=en>>.

<sup>51</sup> Ibid.

<sup>52</sup> GasTerra's data.

<sup>53</sup> Ibid.

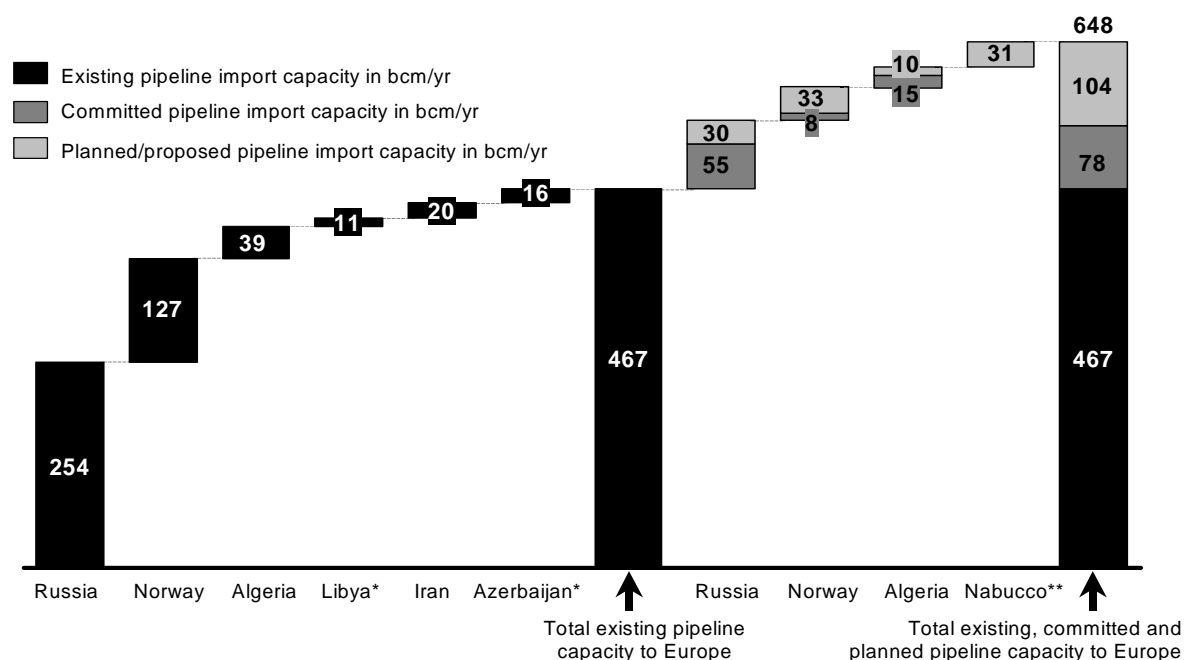
The current plans for Nabucco pipeline suggest that it will start with an estimated capacity of 8 bcm/yr in 2013, which could eventually be increased to 31 bcm/yr.<sup>54</sup>

*NIGAL gas pipeline (Trans-Saharan Gas Pipeline)*

The NIGAL is a planned gas pipeline from the region of Warri in Nigeria to Algeria where it will supply the planned export pipelines to Europe – the Medgaz pipeline and the GALSI pipeline. Its design capacity is 18-25 bcm/yr and is expected to be operational in 2015. However, construction remains purely speculative.<sup>55</sup>

A waterfall (Figure 5) shows the total existing, committed, planned and proposed import capacity to Europe by pipeline.<sup>56</sup> The black bars reflect the existing capacity, the dark grey bars show the committed capacities, and the light grey ones reflect the planned and proposed transportation capacities.

FIGURE 5: TOTAL EXISTING, COMMITTED, PLANNED AND PROPOSED IMPORT CAPACITY TO EUROPE BY PIPELINE (IN BCM/YR)



\* Including proposed capacity extension in the near future  
 \*\* Nabucco could use existing export capacity of Iran/Azerbaijan. When Nabucco uses this capacity, its additional capacity towards Europe would be zero.

Note: Totals may not add up due to rounding.

SOURCE: GAZPROM, GASTERRA, VICTOR, JAFFE, AND HAYES 2006, OME, CIEP ANALYSIS

<sup>54</sup> OMV (Austria), MOL (Hungary), Transgaz (Romania), Bulgargaz (Bulgaria), BOTAŞ (Turkey) and RWE (Germany) each hold a 16.7% interest in the joint venture. Nabucco, 'Project Description/Pipeline Route', <<http://www.nabucco-pipeline.com/project/project-description-pipeline-route/index.html>> (July 2008).

<sup>55</sup> REMEP, 'NIGAL Pipeline', <<http://www.remep.org/energy-projects/projects-currently-being-developed/gas/nigal-pipeline>> (July 2008).

<sup>56</sup> Excluding the NIGAL pipeline project.

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#### 4.2.2 EXISTING AND POSSIBLE PIPELINE SUPPLY SOURCES<sup>57</sup>

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##### Europe (excluding Norway)

During the past decades, gas production within Europe has declined. This will remain true for the coming decades. Only six EU member-states produce more than 5 bcm/yr. Europe has to replace its domestic supplies with new import contracts. In 2007, the total production within Europe (excluding Norway) was 220 bcm.<sup>58</sup>

##### *The Netherlands*

Dutch gas production consists of extraction from the large Groningen field and output from the so-called small (e.g., non-Groningen) fields. The Netherlands has become a mature gas province, even though the Groningen field still holds considerable gas reserves – 1.1 tcm (at the end of 2006).<sup>59</sup> The total remaining gas reserves are estimated at 1.3 tcm (at the end of 2007).<sup>60</sup>

Total Dutch gas production in 2006 amounted to 73.3 bcm, of which 49.2 bcm was exported to other EU member-states. In the coming decade its production will decline to approximately 60 bcm/yr. Dutch upstream activities could be stimulated by adjusting its fiscal regime.<sup>61</sup>

##### *The United Kingdom*

The United Kingdom is in a situation similar to that of the Netherlands as far as its small fields are concerned, in that gas production in the UK is in steep decline.<sup>62</sup> Its remaining gas reserves are estimated at 0.4 tcm (at the end of 2007).<sup>63</sup>

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<sup>57</sup> In Chapter 4 and in the scenario analysis in this paper, the different cubic meters of gas are converted to 'European' cubic meters (excluding data from BP and IEA). A Norwegian cubic meter has to be multiplied by 0.947; and a Russian cubic meter by 0.9. These conversion factors are explained by the following definitions:

- a Russian cubic meter of gas has a pressure of 1 atm. and is defined at a temperature of 20 degrees Celsius. On average, the calorific value of Russian gas is 38.5 mega joule (MJ) per cubic meter;
- a Norwegian cubic meter of gas is a standard cubic meter, defined by a cubic meter at 1 atm. and 15 degrees Celsius;
- a standard cubic meter is defined by a cubic meter at 0 atm. and 0 degrees Celsius. On average, the calorific value of European gas (including Norway) is 40 MJ per cubic meter.

<sup>58</sup> GasTerra's data.

<sup>59</sup> CIEP, 'The Dutch Upstream Fiscal Regime in Northwest European Context', *CIEP Briefing Paper* (June 2008).

<sup>60</sup> BP, *Statistical Review of World Energy*, London, June 2008.

<sup>61</sup> CIEP, *The Dutch Upstream Fiscal Regime in Northwest European Context*, CIEP Briefing Paper, The Hague, 2008.

<sup>62</sup> Ibid.

<sup>63</sup> BP, *Statistical Review of World Energy*, 2008.

The UK reached its peak in 2000 at 108.4 bcm and its production in 2007 was 72.4 bcm.<sup>64</sup> All its produced gas is used domestically. Only during the summer does the UK occasionally export its gas to the European continent via the Interconnector.

### *Germany*

Germany has a very mature gas system, with declining production and limited remaining resources.<sup>65</sup> The German gas reserves are estimated at 0.14 tcm (end of 2007). Its production in 2007 was 14.3 bcm.<sup>66</sup>

### *Romania*

Romania is the only significant gas producer in Central and Eastern Europe.<sup>67</sup> The Romanian gas fields still hold gas reserves of 0.6 tcm (end of 2007). Its production has been declining in past decades and dropped to 11.6 bcm in 2007.<sup>68</sup>

### *Denmark*

Denmark has a small reserves base of 0.12 tcm (end of 2007). However, it produces more than it consumes (7.2 bcm in 2007).<sup>69</sup> Denmark exports its gas to Germany, Sweden and the Netherlands. The Danish gas company Dong wants to increase its gas production in the coming decades.

### *Other European gas-producing countries*

Other European gas-producing member-states have very mature gas systems with declining production and limited remaining resources. Besides the already mentioned countries, Italy is a relatively large gas producer within the EU (8.9 bcm in 2007). Other EU member-states – such as Poland, Hungary, France, and Austria – produce less than 5 bcm/yr.<sup>70</sup>

### *Unconventional gas potential within Europe*

Unconventional gas<sup>71</sup> is natural gas contained in difficult to produce rock formations, which require different or special completion, stimulation, and/or production techniques to retrieve the resource. Typical examples are gas trapped in coal seams (coal bed methane), in shales and in tight, low permeable sandstone. Production of gas from such sources not only requires special

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<sup>64</sup> Ibid.

<sup>65</sup> CIEP, *The Dutch Upstream Fiscal Regime in Northwest European Context*, CIEP Briefing Paper, The Hague, 2008.

<sup>66</sup> BP, *Statistical Review of World Energy*, 2008.

<sup>67</sup> Outside the EU, Ukraine also holds significant gas reserves (0.41 tcm, at the end of 2007). In 2007 its gas production was 19.0 bcm. However, all its gas production is consumed domestically. Since Ukraine wants to make itself less dependent on Russian gas, this usage will probably remain for the next decade.

<sup>68</sup> BP, *Statistical Review of World Energy*, 2008.

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> Unconventional gas is categorised into coal-bed methane, shale gas and tight-sand gas.

and expensive techniques, but also a dense spacing of production wells. The yearly production per well is limited, but can extend over a long time (ultimate recovery is 0.2-0.5 bcm per well).

Although unconventional gas could play a significant role in the future global gas supply, for Europe its potential is still uncertain. Europe's geologic conditions are less favourable for unconventional gas than they are in North America, for example. In addition, development will be more difficult due to the required dense well-spacing, which may not be easy to achieve in many areas in Europe.

In North America, production of unconventional gas currently plays an important role in its gas supply. In the USA and Canada a significant share of domestic production is unconventional gas. North America's (potential) reserves may be considerable. In Europe, at this moment, unconventional gas plays a minor role, and its potential is very uncertain. In some EU member-states, fiscal measures have been taken in order to stimulate unconventional gas production.

It is uncertain how important unconventional gas would be in the future for Europe. The development of unconventional gas reserves will be dependent on, among other things, the level of gas prices, the impact on the environment of dense production infrastructures and fiscal measures from the governments.<sup>72</sup> Developments in Hungary are probably the most advanced, with a potential of some 3 bcm/yr.

### **Russia**

Russia holds a quarter of the world's gas reserves (44.65 tcm, at the end 2007) and is the biggest gas producer in the world (607.4 bcm in 2007).<sup>73</sup> Gazprom has an export monopoly over the gas flows from Russia to foreign markets. Its supply to Europe has increased by around 50 percent from 1990 to 2007 (156 bcm in 2007). According to Gazprom's data, their gas sales in the CIS were 104.4 bcm in 2007.<sup>74</sup> At the moment, Gazprom's long-term contractual agreements to Europe are about 180 bcm/yr until 2015.<sup>75</sup> It is uncertain how much additional gas will be made available to Europe on the basis of long-term contracts. Much will depend on the realisation of the ambitions to lay the Nord Stream and South Stream and the availability of additional gas for exports.

### **Norway**

After Russia, Norway is the second largest gas exporter (88 bcm in 2007) to Europe. Norway has proven natural gas reserves of approximately 3 tcm (end of 2007).<sup>76</sup> This could probably be much higher because of undiscovered gas fields – mainly in the Barents Sea. Upstream activity from new gas fields – mainly Ormen Lange and Snohvit – will increase Norwegian production capacity to a maximum of 115 bcm/yr in 2012; currently, it is around 100 bcm/yr.<sup>77</sup>

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<sup>72</sup> CIEP, *The Dutch Upstream Fiscal Regime in Northwest European Context*, CIEP Briefing Paper, The Hague, 2008.

<sup>73</sup> BP, *Statistical Review of World Energy*, 2008.

<sup>74</sup> Gazprom, *Annual Report 2007*, Moscow, 2008, pp. 61; 63.

<sup>75</sup> GasTerra's data.

<sup>76</sup> BP, *Statistical Review of World Energy*, 2008..

<sup>77</sup> GasTerra's data.

Nearly all Norwegian gas production will be exported. However, LNG gas from the Snohvit field could be used for other markets than Europe. Gas from the Ormen Lange will be sold in the spot and short-term markets in the UK via the Langeled pipeline. Recently, gas production from the Troll field has been postponed. Development of this gas field 'would reduce the possibility to recover large volumes of oil from the field'.<sup>78</sup> The share of spot and short-term trading has increased (15 percent) in recent years and will remain on the rise for the near future.<sup>79</sup> In combination with transport overcapacity, Norway could optimise its export revenues from gas sales.

Depending on different variables, such as fiscal and regulatory conditions, the company's oil and gas portfolio strategy and gas prices, Norway would be able to increase its production and export.<sup>80</sup>

### North and West Africa

Traditionally, countries in North Africa are gas exporters to Europe by pipeline and LNG. A new pipeline transport capacity to Europe from this region is being developed.

#### *Algeria*

Algeria is an important gas exporter country to the EU. Its remaining gas reserves account for approximately 4.5 tcm (end of 2007).<sup>81</sup> Gas export has increased in the past decades to 64 bcm in 2007 (of which 27 bcm is by pipeline). Algeria's goal is to increase its production capacity in order to increase its sales in Europe to 85 bcm/yr.<sup>82</sup> The proposed new pipeline infrastructure will make this possible.

Algeria's state-controlled gas company, Sonatrach, is looking to secure its demand by acquiring downstream assets, a strategy of vertical integration similar to that of Gazprom. Recently, Algeria started to sell gas directly in the Italian market. Algeria is an attractive place for IOCs as a result of its relative openness towards (foreign) upstream activities.<sup>83</sup>

Uncertainties about domestic demand and Algerian desires to maximise revenues from LNG sales in other regional markets may reduce the availability of additional exports to Europe.

#### *Libya*

Libyan gas reserves account for 1.5 tcm (as of the end of 2007), but are under-explored.<sup>84</sup> In past decades Libya has had to deal with a shortage of investment capital under the Iran and Libya

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<sup>78</sup> Norwegian Ministry of Petroleum and Energy, 'Troll Future Development', *Press release no. 151/07*, October 2007.

<sup>79</sup> GasTerra's data.

<sup>80</sup> OME, *Natural Gas. Supply and Market Security Issues. Europe and its Suppliers*, OME Discussion Paper, June 2007.

<sup>81</sup> BP, *Statistical Review of World Energy*, 2008.

<sup>82</sup> GasTerra's data.

<sup>83</sup> OME, *Natural Gas. Supply and Market Security Issues. Europe and its Suppliers*, OME Discussion Paper, June 2007.

<sup>84</sup> BP, *Statistical Review of World Energy*, 2008.



Sanctions Act (ILSA) and has focussed on an oil-oriented export strategy. Libya is developing its export capacity to Europe through the Greenstream pipeline and LNG. Its current exports to Europe are 10 bcm/yr (in 2007), of which 8 bcm is by pipeline. This will increase in the near future to an expected level of 12 bcm/yr (e.g., LNG and pipeline gas). However, Libya's export aspirations are much higher: 40 bcm/yr in the next decade.<sup>85</sup>

Uncertainties about domestic demand and Libya's position towards its competition<sup>86</sup> may influence the level of exports to Europe in the medium term.

### *Egypt*

Egypt's gas reserve position has recently been upgraded to 2.1 tcm (at the end of 2007). Although its production has increased, much of its output will remain earmarked for domestic use. Its actual LNG export to Europe is 16 bcm/yr (in 2006). Egypt has also planned to increase its liquefaction capacity to some 28 bcm/yr by 2012.<sup>87</sup>

Egypt may become a pipeline supplier to Europe when gas could be transported through the Arab Gas Pipeline (AGP) to the Nabucco pipeline. The AGP links Syria via Jordan to Egypt, then extended to Turkey and Iraq by 2009. Egypt may deliver 2 bcm/yr to Europe via the Nabucco pipeline.<sup>88</sup> However, this is very uncertain given the increasing domestic demand and LNG liquefaction capacity.

### *Nigeria*

If the Trans-Saharan Gas Pipeline would be built, Nigeria could become a pipeline supplier to Europe from 2015 onwards (maximum volume 25 bcm/yr). However, the realisation of this project and the availability of Nigerian reserves are uncertain.

## **Caspian Region**

The export potential from the Caspian region (Turkmenistan, Azerbaijan, Kazakhstan and Iran)<sup>89</sup> to Europe is featured prominently in various discussions. Most of the former Soviet Republics in the Caspian region have export commitments to Russia. Moreover, other pipeline initiatives from China and Afghanistan, Pakistan and India compete with Europe for Caspian gas. Nowadays, these countries supply CIS countries, such as Ukraine, using the transportation capacity of Russia.

### *Azerbaijan*

In late 1999 the Shah Deniz gas field was discovered in Azerbaijan, which has increased Azeri's reserves (1.3 tcm, at the end of 2007) and export potential.<sup>90</sup> It is already exporting 6.6 bcm/yr

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<sup>85</sup> GasTerra's data.

<sup>86</sup> 'Gazprom offers to buy all Libya's gas', *Financial Times*, July 10, 2008.

<sup>87</sup> GasTerra's data.

<sup>88</sup> 'Growing problems threaten to make the Nabucco project a pipedream', *Energy Business review* (, June 9, 2008.

<sup>89</sup> Uzbekistan's gas production is consumed domestically. According to estimates, this situation will remain for the near future.

<sup>90</sup> BP, *Statistical Review of World Energy*, 2008.

gas through the South Caucasus Pipeline (SCP) to Turkey (although this contract is not solid).<sup>91</sup> The Shah Deniz project could be a potential supply source for Nabucco (8-15 bcm/yr), however, Europe has yet to compete with Iran and Russia for these supplies.

#### *Turkmenistan*

Turkmen gas reserves are estimated at 2.7 tcm (at the end of 2007).<sup>92</sup> Its direct supply capacity for Europe will remain uncertain due to competition from different pipeline initiatives, the biggest challenge coming from Russia and its existing infrastructure in the region. Recently, the Turkmen president promised to export 10 bcm worth of gas to Europe by 2009. However, how this gas will be transported to the EU countries remains uncertain since the Trans-Caspian Gas Pipeline (TCGP) is still merely a speculative project, at best. Furthermore, the Turkmen's spare capacity is doubtful because of other export commitments to Russia and possibly China.

#### *Kazakhstan*

Kazakh gas reserves account for 1.9 tcm (as of the end of 2007).<sup>93</sup> Its upstream gas sector is relatively under-developed; the giant Tengiz and Karachaganak gas fields are under-explored. In the Caspian region, Kazakhstan has the relatively closest ties with Russia. In the future, gas could be transported directly to Europe via the TCGP. However, this is uncertain because of competition from other potential export routes for gas, as in the Turkmen case.

#### *Iran*

Iran is a country rich in gas, with gas reserves accounting for 27.8 tcm, the second largest in the world. Its gas sector is severely under-developed and it suffers from a lack of investment capital due to the different sanctions, for example the ISLA sanction, in order to export its gas. Nowadays, it is only exporting 7 bcm/yr to the Turkish market – although this contract is not solid. Iran has aspirations to become a world player, with a 10 percent world market share in 2020.<sup>94</sup> However, due to political and practical reasons, it will take time until Iran becomes a significant gas exporter. In the long term, it could supply gas to Europe by pipeline via Nabucco.

### **Middle East**

The Middle East is essentially an LNG supply region. Europe has to compete with Asia for eventual LNG flows from the region. Economically speaking, the only pipeline supplier to Europe in the future could be Iraq.

#### *Iraq*

According to BP, proven Iraqi gas reserves are 3.2 tcm (at the end of 2007).<sup>95</sup> Iraqi gas available for exports is still highly uncertain due to country and legal risks and increasing domestic demand. In the long-run, it could become a supplier to Europe via Nabucco, but this remains purely speculative.

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<sup>91</sup> GasTerra's data.

<sup>92</sup> BP, *Statistical Review of World Energy*, 2008.

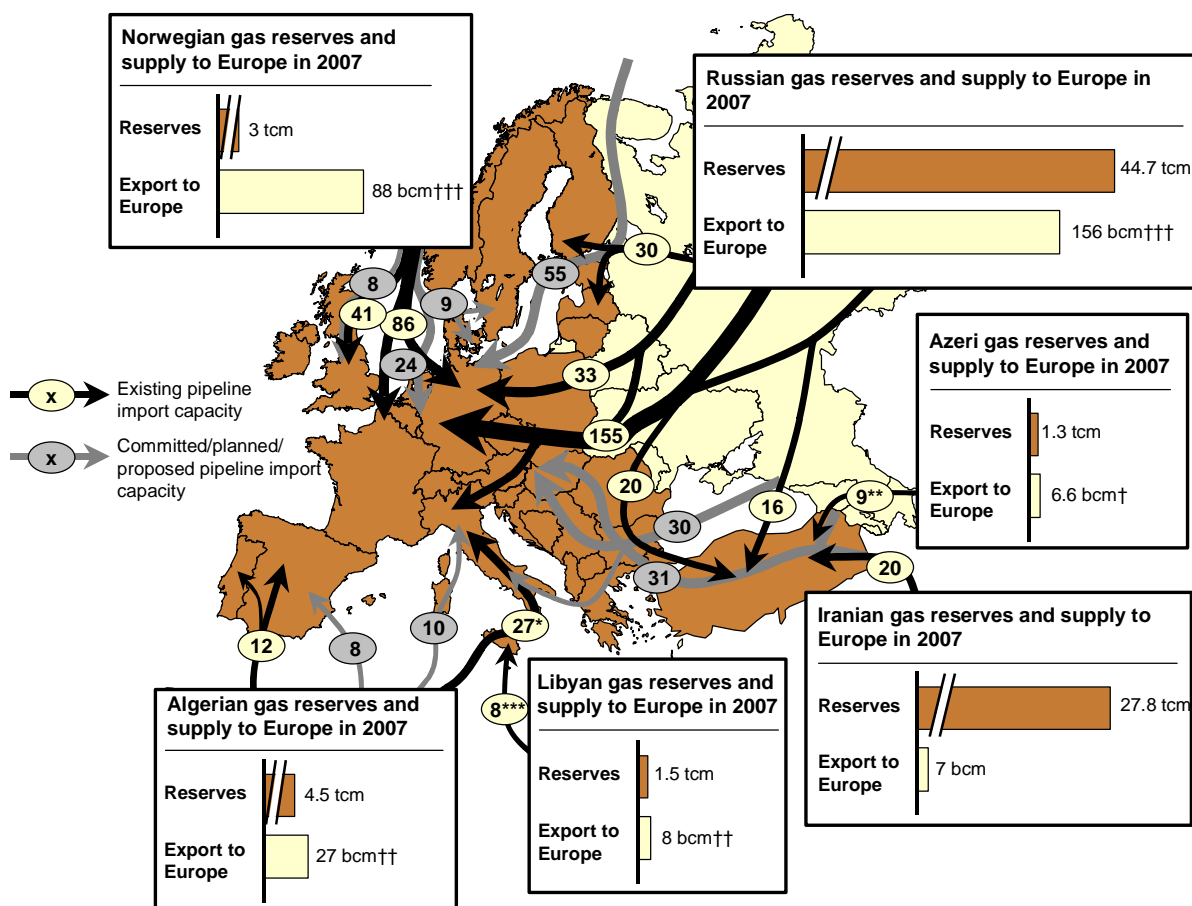
<sup>93</sup> Ibid.

<sup>94</sup> GasTerra's data.

<sup>95</sup> BP, *Statistical Review of World Energy*, 2008.

In a map of Europe (Figure 6) the existing, planned and proposed pipeline projects to Europe are shown, including their maximum transportation capacity. The bars in the inserted boxes give an overview of the gas reserves and the current export level<sup>96</sup> (2007) to Europe of the non-European gas producing countries (including Norway).

FIGURE 6: EXTERNAL EUROPEAN GAS PIPELINE SUPPLIES AND CAPACITY<sup>97</sup>



SOURCE: GASTERRA, BP, GAZPROM, OME, CIEP ANALYSIS

\* The TransMed will be extended to 33.5 bcm/yr in 2008.  
 \*\* The South Caucasus gas pipeline could be extended to 16 bcm/yr in 2012.  
 \*\*\* The Greenstream could be extended to 11 bcm/yr.  
 † Data from 2006; contract is not solid.  
 †† Excluding LNG supply to Europe.  
 ††† Converted to European bcm.

### 4.3 LNG SUPPLY SOURCES AND THEIR POSITIONS RELATIVE TO THE EUROPEAN MARKET

LNG, with its lower incremental transportation costs relative to distance rather than pipeline gas and its ability to cross oceans, has a wider reach than pipeline gas. Given today's gas prices, all LNG sources could reach virtually every destination in the world. Consequently, LNG is being hailed as the commodity that will globalise the gas industry.

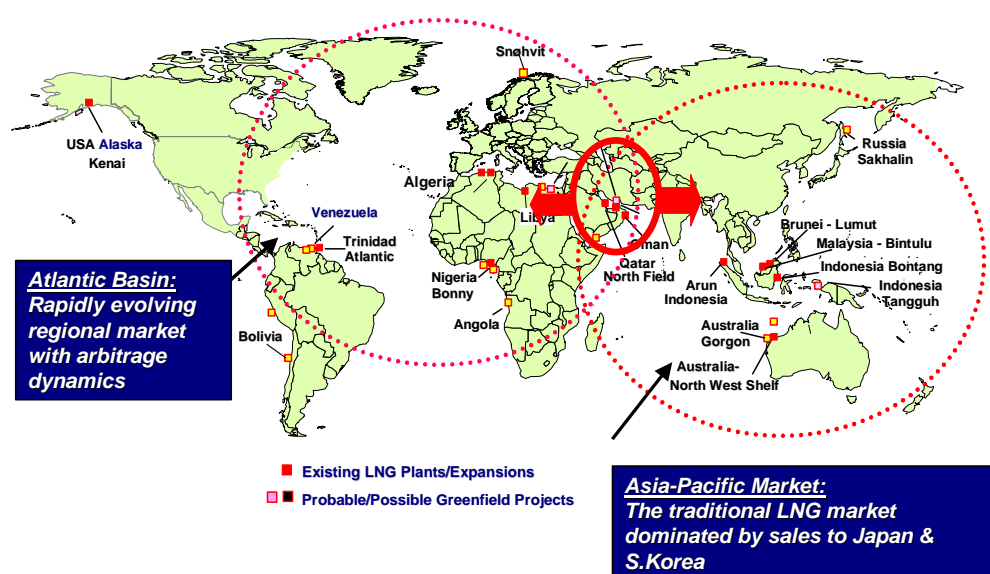
<sup>96</sup> The export level is estimated by only pipeline deliveries (thus, excluding LNG deliveries to Europe).

<sup>97</sup> Including Norway.

Nevertheless, travelling over long distances does not come free, so some LNG supply sources lend themselves better as supplies to the EU than others. For this reason the gas sources in the Asia-Pacific region<sup>98</sup> will be left out of this evaluation of potential LNG sources of supply for the EU. These sources have markets in the same region that are sufficiently attractive and show sufficient demand to keep Asia-Pacific LNG from travelling to Europe (other than the occasional spot cargo).

What is left as possible supplies to Europe are the LNG sources in and around the Atlantic Basin and in the Middle East. Homing in on the current and potential LNG supply sources from these areas and their position to Europe:

FIGURE 7: GEOGRAPHY OF THE LNG MARKET



SOURCE: WOOD MACKENZIE

## North Africa

Very clearly the distances from its supply sources to the European markets are considerably shorter than to other markets. Geographically, Europe is well placed to acquire any new supplies if these were to come up for sale.

### Algeria

Geographically, Algeria is a serious option for additional LNG supplies to the EU. There are plans for more LNG capacity other than the refurbishment of their Skikda plant (notably the planned Gassi Touil project), but these have suffered some delays and are awaiting firm commitments.<sup>99</sup>

<sup>98</sup> The oil and gas producing nations that supply LNG *almost exclusively* to the Asia-Pacific market (now and in the future) are Australia, Indonesia, Malaysia, Brunei, Papua New-Guinea, Russia's Sakhalin Island, Alaska and the West Coast of South America (Peru, Bolivia).

<sup>99</sup> 'Spanish oil firms say Sonatrach ends Gassi Touil JV', *Reuters*, September 3, 2007: <http://www.reuters.com/article/companyNewsAndPR/idUSL0334118520070903>; and 'Governments to discuss demise of Gassi Touil deal', *Meed.com*, December 4, 2007: [http://www.meed.com/energy/news/2007/12/governments\\_to\\_discuss\\_demise\\_of\\_gassi\\_touil\\_deal.html](http://www.meed.com/energy/news/2007/12/governments_to_discuss_demise_of_gassi_touil_deal.html)

Algeria, the natural supplier of pipeline gas to Southern Europe, is experiencing the effect of security of supply issues in Spain, which may affect Algerian perceptions of the attractiveness of the EU market. It has not yet decided on the destination for its Skikda LNG. From an Algerian perspective, a return to the US market could be an interesting diversification option.

#### *Libya, Egypt*

Today, both countries have relatively small reserve positions, but sufficient for a limited export potential. LNG is the most likely source of supply (although Libya also exports gas to Italy by pipeline). Egypt has plans for new facilities<sup>100</sup> and Libya has plans to refurbish and expand its LNG liquefaction facilities, but there are, as yet, no concrete commitments for new developments.

#### **West Africa**

Distances from West Africa to the European market are shorter than those to North America. However, there are signs that the South American markets are also becoming interested in acquiring LNG. If that materializes, the geographic distances to these markets could be shorter than those to Europe.

#### *Nigeria*

Current supplies and developments are essentially committed. Nigeria is preparing itself for the next LNG development. It is more or less equally well placed for the US market and the EU (and also for a future South American market). With its last project supplies destined for the US market, Nigeria may now focus on Europe again. Other than the next LNG train from NLNG, various other new LNG projects are on the drawing board. Among these are Brass LNG and the OK LNG project.

#### *Equatorial Guinea*

EG's first LNG train was committed to BG Group. Arbitrage opportunities will determine the destination of this LNG supply. There are plans to build another train: Ruhrgas and Union Fenosa have joined the consortium.

#### *Angola*

The final investment decision for the Angola LNG project<sup>101</sup> was made in December 2007. Angolan LNG looks earmarked for delivery to the US market.

#### **Russia and Norway**

There could be a rationale to bring LNG from very remote (polar) parts of these countries to the EU. However, both countries are essentially pipeline suppliers to Europe. Therefore, as and when new LNG projects emerge from these countries, it must be assumed that the supplies will primarily focus on the US and Asia-Pacific markets to diversify demand. Norway's first LNG plant at Snohvit is reaching its planned capacity of 6 bcm/yr. The infrastructure foresees a second train being added around 2015, but the problems around getting the first train started may create some delay. Gas from development of the Shtokman natural gas field in the Barents Sea

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<sup>100</sup> 'New LNG Trains Still Eyed in Egypt', *World Gas Intelligence*, May 16, 2007

<sup>101</sup> Angola LNG main shareholders: Chevron, Sonangol, Total, BP and ENI.

may feed a future LNG export facility near Murmansk. Other Russian LNG projects are situated on Sachalin Island, and in the future LNG projects will probably be developed on the Yamal Peninsula.

### **The Middle East**

Current supplies and developments are essentially committed. There are no concrete plans for new developments. If and when new LNG projects emerge from these countries, the EU will be in competition with the Asia-Pacific markets, while geographically in a slightly better position with regards to the East Coast of the US market.

#### *Qatar*

Qatar has called for a moratorium on new projects while it is bringing to fruition some massive, committed LNG and gas-to-liquid (GTL) projects. The extensions to the existing RasGas 2 and Qatargas 2, 3 & 4 LNG ventures tap into the world's single largest natural gas field and together will form the cornerstone of additional LNG supplies coming to market in this decade. Qatar Petroleum and ExxonMobil are the main shareholders in the RasGas extensions. The three Qatargas extension projects are all led by Qatar Petroleum with other main shareholders including ExxonMobil (Qatargas 2, trains 4 and 5), Total (Qatargas 2, train 5), ConocoPhillips (Qatargas 3), Mitsui Trade Co (Qatargas 3), and Shell (Qatargas 4).<sup>102</sup> Over the past few years it was expected that most of the additional RasGas and Qatargas LNG would go to US terminals, with some supply moving to Spain, Belgium and Taiwan. Producer strategies are, however, not cast in stone. Target destinations could still shift, with the large and growing Asia-Pacific customers an interesting alternative option for Middle East producers. The target LNG production level of Qatar currently stands at 100 bcm/year.

#### *Oman, Abu Dhabi and Yemen*

Total has developed the Bal Haf LNG project in Yemen. The bulk of supply from Oman and Abu Dhabi will continue to head for the Asia-Pacific and US markets. No further projects are expected in the near future in Yemen, Oman or the United Arab Emirates.

#### *Iran*

Iran is struggling to launch its first LNG project.

### **South America and the Caribbean**

#### *Trinidad & Tobago*

Trinidad originally started with part of its supplies destined for Europe and part for the US, but today it predominantly supplies the US market.<sup>103</sup> A fifth LNG train has been proposed.

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<sup>102</sup> Petroleum Economist, *Encyclopedia of LNG 2006*, p. 38; and official corporate websites of RasGas and Qatargas.

<sup>103</sup> Today, approximately 70% of Trinidad LNG is shipped to US terminals, including Puerto Rico (BP, *Statistical Review of World Energy*, 2007).



### Venezuela

Venezuela has for some twenty years been trying to launch an LNG project. With ample gas reserves, the country would be a natural LNG exporter. However, the proposed Mariscal Sucre LNG project is still merely a proposal.<sup>104</sup>

### Relative positions of the EU and North American markets for LNG supplies

Virtually all potential sources of LNG supply lie south of the EU. Southern Europe is obviously well positioned to take LNG from North Africa and the Middle East. Northwest Europe has a cost advantage in LNG supplies over the East Coast of the US for supplies from Africa and the Middle East (approximately \$.50 US/MMBtu). However, these cost differentials may well be dwarfed by price differentials between market outlets in the US, Northwest Europe and Southern Europe.

Current LNG supplies and developments are essentially committed (but not necessarily with fixed destinations). There are only a few projects for additional LNG supplies, from the regions which would normally be expected to supply the Atlantic Basin, in a sufficiently advanced stage of planning to start discussions with possible buyers in the near future, but there are more interested buyers than there will be new capacity. Consequently, there will be serious competition for new LNG from all regions.

## 4.4 NEW BUSINESS MODELS IN THE GAS INDUSTRY

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In the gas business, under the traditional business model, gas is sold in large volumes under a long-term contract to a substantial buyer in a specific market (or with limited defined destination flexibility). This process of commercialising gas reserves is still employed by many gas producers and remains the solid financial foundation for new pipeline or LNG projects. These projects tend to be among the biggest capital projects undertaken in producing countries in absolute size and, therefore, generally require very large financing packages. The quality of the sales agreements often plays an important part in the finance-ability of new plants. However, new forms of marketing pipeline gas and LNG are coming into play. As these gain weight in the market, they could have an impact on the EU's ability to secure future supplies.

These new developments include:

- a) Pipeline suppliers reserving capacity for short-term supplies to the wholesale markets and via the hubs, notably producers from Norway and Gazprom. Volumes are still relatively light.
- b) Pipeline suppliers reserving capacity for direct marketing through a subsidiary. Gazprom, in particular, has sales offices in various European markets and so does Sonatrach (Spain and Italy for pipeline gas, UK for LNG). Volumes are small, with the exception of Gazprom in the UK, publicly aiming for some 20% of the UK market (to date their turnover still constitutes small volumes of Russian gas).
- c) LNG producers reserving part of the capacity of new LNG liquefaction projects for short-term marketing (arbitrage).

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<sup>104</sup> 'Venezuela Back in Pipes-over-LNG-mode', *World Gas Intelligence*, September 26, 2007.

The combination of the emergence of the US market and the high gas prices has encouraged LNG producers to accept more risks in return for higher rewards. By not committing all capacity under long-term contracts to financially robust buyers in specific markets as security for their investment, producers retain some capacity to “play” the market on a global basis. This policy may be followed by LNG producers already established in the market with assured cash flows from earlier investments or by new LNG players, to the extent there is sufficient cash flow from supplies committed under long-term contracts.

- d) LNG producers reserving or self-contracting (part of) the capacity of new liquefaction projects for their own marketing.

For liberalised markets, producers can elect not to depend on major buyers to take their LNG under long-term contracts, but to acquire capacity in LNG regasification terminals and sell the regasified gas directly to the markets. The duration and reliability of supplies to a particular market become far more uncertain. While the producers of the LNG may have initially earmarked specific markets for their production, they can always decide to take the LNG elsewhere, if better value can be realised by doing so. This process of controlling and owning supplies all the way along the value chain is applied by some IOCs and also by combinations of IOCs and NOCs. The development of LNG from Qatar by Qatargas/ExxonMobil for the UK market and the supply of LNG to the UK by Sonatrach are examples.

- e) The emergence of LNG aggregators.

In some LNG projects IOCs have contracted part of the LNG production. With regasification capacity in the US market as a backstop, they aim to develop a portfolio of LNG from which they will sell under long- and short-term contracts in various markets.

In addition, the phenomenon of medium-term LNG contracts is developing:

- f) LNG producers entering into medium-term (e.g., 3-5 year) contracts from existing liquefaction plants.

Algeria has indicated that it is considering selling LNG under medium-term contracts from its existing liquefaction plants. This half-way-house contractual model, which offers a compromise between flexibility and revenue security, positioned between long-term contracts and spot sales, could be appealing to those LNG producers whose assets have been largely paid off and who expect a continuation of today’s sellers’ market or who, like Qatar, have developed a project under model “b” above and find an opportunity to sell in another market.

Market liberalisation in Europe has prompted pipeline suppliers to further integrate down the value chain and develop their own direct marketing competencies. Also, these suppliers may aim to convert the limited flexibility offered in long-term contracts to flexibility offered by the supplier at its discretion. While the supply of Norwegian gas remains “captive” under the new business model, Russian flexible gas may be less secure for Europe in the future.

Driven by arbitrage opportunities, high market prices, market liberalisation and the opening of the liquid US market for LNG, new business models are emerging which have in common that more and more “flexible” gas is coming to the market, notably in the Atlantic Basin. This LNG is not committed to any particular market.

## 5. COMPETITIVENESS OF THE EU IN THE GLOBAL LNG MARKET

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### 5.1 THE LNG MARKETS

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There are three main LNG consumer market regions: North America, Europe and Asia-Pacific:

#### **North America**

For LNG supplies, this market mainly consists of the US market, with some supply coming via Mexico. The region is blessed with vast gas reserves in Mexico, the US and Canada.<sup>105</sup> But production is declining. Pipeline imports into the US from Canada and Mexico are expected to decline substantially in the coming years. As demand for gas in the US is seen to increase, the region has no other option than imports of LNG. Consequently, a major boost in LNG imports may be expected. Based on these expectations, new LNG regasification terminals have been built or are under construction and a large number are planned.<sup>106</sup> Most of the capacity is owned or booked by potential LNG suppliers. It remains to be seen how many of the planned and speculative designs will see the light of day. It is expected that the added capacity from the projects that are already under construction will be sufficient to cover increased demand for the foreseeable future. The demand outlook for the US market is uncertain, given the political drive to reduce dependency on imports of oil and gas. Future demand for LNG in the US is also highly uncertain, given the potential of the new inland production and of energy saving.

The speed at which the US managed to develop LNG regas terminals was helped by the decision in 2002 by the Federal Energy Regulatory Commission (FERC) to remove regulatory barriers to the construction of new terminals, also known as the “Hackberry decision”. In essence, from a regulatory perspective, LNG import facilities would be treated as supply sources rather than as part of the transportation chain.

Most regas terminals are on the East Coast and are expected to be supplied by the suppliers in the Atlantic Basin and the Middle East.

The gas market in the US is characterised by short-term and spot contracts. It has a high liquidity. Also, LNG imports are based on short-term supplies. Only very few long-term supply contracts with buyers in the North American market exist. “Henry Hub” prices have become a household word in the LNG business in the Atlantic Basin. It is believed that various contracts concluded between producers and their buyers in recent years contain price formulae, partly or wholly indexed with Henry Hub (HH) prices. To attract new supplies, the US market will have to continue to compete for LNG with Europe and Asia on price as its most important instrument, in the absence of long-term contracts. HH prices have historically had a strong correlation with oil-product prices. In recent years they have shown strong swings around oil-related prices.

Where it comes to imports to meet its growing demand, the North American market has virtually no alternative to LNG. Its markets are mainly short term, with HH prices as the prime criteria. HH prices show significant swings around oil-product prices.

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<sup>105</sup> See BP, *Statistical Review of World Energy*, 2007.

<sup>106</sup> The Petroleum Economist, *Encyclopedia of LNG 2006*, lists 30 planned, proposed or speculative LNG regasification projects in the US, with 6 new or expansion projects under way (pp. 45-46).

## The European Union

By contrast to the US, the EU is already a significant importer of gas. Most of it is pipeline gas, supplied under long-term contracts, with prices indexed with oil-product prices. Europe has significant domestic reserves, concentrated in North Sea countries (UK, Norway, the Netherlands), but production is dwindling. With gas demand forecasted to grow, imports will have to increase substantially. The EU's gas market is not one integrated entity. Overall, the dependence on pipeline imports from Russia and North Africa is significant and must grow if demand growth is to be met. Demand projections for Europe show a wide range of uncertainty (see Chapter 3).

Today, the EU sources its LNG mainly from Nigeria, Algeria, Egypt, Trinidad and Qatar.<sup>107</sup> Most LNG imports today are based on long-term contracts with oil-indexed prices (but below oil parity). LNG provides two-thirds of the natural gas supply to Spain and over half of Portugal's gas supply.<sup>108</sup> In other parts of Europe, LNG plays a role more at the margin of the market. Europe will have to compete for LNG with the US and Asian markets.

Like the US market for gas, the market in the EU is expected to grow, but the degree of growth is uncertain. Unlike the US, imports of LNG to date are mainly based on long-term supply contracts with oil-related price indexation. Unlike both the US and today's main Asian markets, Europe is not solely dependent on LNG imports to meet the expected growth of its markets. Additional pipeline gas supplies form a realistic alternative.

## Asia-Pacific

Asia-Pacific is still by far the largest market for LNG.<sup>109</sup> In the Pacific Basin, Japan, South Korea and Taiwan are the main consumer markets. None of them are connected to foreign natural gas pipeline systems and all have to rely on LNG for 100% of their gas supply portfolio. Although pipeline plans to Russian gas fields have long been discussed in both Korea and Japan, such plans should not be expected to materialize in the near future, nor would they fundamentally alter the LNG dependence of East Asia. These countries will therefore seek increased LNG imports to cover the increasing demand for gas. Today, India and China have appeared on the scene as important growth markets. They are planning pipelines to import gas from Russia, Turkmenistan, Uzbekistan, Myanmar and Iran. Also, they are expected to become increasingly substantial players in the LNG market. This development is being watched closely by the Asian markets's incumbents: Japan, South Korea and Taiwan. Furthermore, the demand for natural gas is increasing quickly in the developing economies of Indonesia, Vietnam, Thailand, the Philippines, et cetera. This puts pressure on the available export capacity from Indonesia, in particular.

Pacific Basin LNG suppliers include Indonesia, Malaysia, Brunei, Papua-New Guinea, Australia, Alaska and Sakhalin. Increasingly, Asia-Pacific consumers have looked towards the Middle East

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<sup>107</sup> BP, *Statistical Review of World Energy*, 2007.

<sup>108</sup> BP, *Statistical Review of World Energy*, 2007.

<sup>109</sup> According to figures from BP's *Statistical Review of World Energy 2007*, the Asia-Pacific region held a market share of over 64% of the world market for LNG in 2006. It kept its leading position in 2007, with imports growing in all of the region's LNG importing countries. (*Oil and Gas Journal*, February 5, 2008).

for additional LNG supplies. Most of the LNG in this region is acquired under long-term contracts with oil-related indexation. Historically, the region has paid a higher price for its LNG than the EU, with prices around parity with oil. In the current market, this appears to continue to be the case.

New consumer markets in the Asia-Pacific region are Mexico (also as a way of accessing the US market) and Chile.

In line with the other gas markets, the Asian market is expected to grow. While international pipeline supply options are being pursued, there are many political and economic obstacles in the way to these becoming real options. Meanwhile, LNG imports are the only real alternative. These are generally secured under long-term contracts with oil-price indexation.

### 5.2 COMPETITIVENESS OF THE EU FOR FLEXIBLE, SHORT-TERM LNG SUPPLIES

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Flexible LNG can respond relatively quickly to price signals from the markets and could be directed to the markets that offer the best netback value at the time of a decision to direct a cargo. A condition is that there is ample capacity in LNG shipping and regasification terminals. This seems to be the case in the current Atlantic LNG market.

It is worth noting that currently some Qatar LNG, originally earmarked for the US and Europe, is being diverted to the Asian market, which currently offers a higher netback value than Europe.<sup>110</sup> Moreover, Qatar has entered into long-term contracts with buyers in the Asian region from LNG facilities under construction. It is not unlikely that these supplies were originally destined for the European and US markets.

Given the geographical advantage of the EU relative to the East Coast of North America, and hence the lower cost of transportation from most LNG supply points, spot-price parity between both markets would thus bring the short-term LNG supplies to the EU, all other things being equal. However, market prices may differ considerably. For example, in summer the US is generally more attractive as a result of the higher demand for air-conditioning.

### 5.3 COMPETITIVENESS OF THE EU FOR LONG-TERM LNG SUPPLIES

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Possibly more important is the EU's long-term Security of Supply. While markets like the US market seems to be willing to rely on their gas prices to achieve supply security, for the EU its ability to secure pipeline and LNG supplies under long-term agreements plays a vital role for the security of supply, particularly given its growing import dependence and reliance on Russian gas supplies.

For the last three to four years LNG producers in the Atlantic Basin have been strongly influenced by the attractiveness of the US market with relatively high spot prices. In many

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<sup>110</sup> See, for example, 'Qatar targets Asia in 'Flexible' LNG Strategy', *World Gas Intelligence*, March 19, 2008.

projects LNG was sold under long-term contracts on the basis of price formulae containing a reference to Henry Hub prices with a view to supplying the US market. Firm long-term supplies to European buyers were not high on the agenda of LNG producers. Today, the Middle East LNG suppliers are focussing on the Asian market, with its prices and price expectations still being on average higher than in the Atlantic Basin, while in the Atlantic Basin the markets await new concrete developments. Markets in both the EU and the US have ample regasification capacity. Firm ownership of regas capacity is nowadays an essential prerequisite for reaching any shortlist of potential buyers of LNG supplies. Also, LNG suppliers have been actively acquiring regasification capacity, particularly in the US and UK markets. Together, these developments have created a comfortable capacity for new LNG in a number of EU countries.

Once the first condition of having firm regas terminal capacity is met, there are other factors which may specifically influence the EU's standing positively or negatively as a potential market for long-term LNG supplies. These include:

- uncertainties around the gas demand outlook.

These uncertainties are felt not just with regard to the EU, but exist universally, albeit to different extents. For the EU, demand uncertainty is compounded by the strong position of pipeline suppliers of gas and questions regarding future incremental pipeline supplies to European markets;

- the “regulatory” environment;
- Europe's hybrid pricing system;
- Europe's tradition of scouting for new supplies.

The last three points will be discussed in the following section.

## 5.4 OTHER FACTORS AFFECTING THE EU'S STANDING IN THE GLOBAL LNG MARKET

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### 5.4.1 THE REGULATORY ENVIRONMENT IN THE EU

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At the World Gas Conference in Amsterdam in June 2006, Mr Al Suwaidi, the then CEO of Qatargas, said in his keynote address that he regarded “regulatory” risks as the biggest family of risks facing his business.

Indeed, issues around granting permits for new LNG receiving terminals, as well as the ongoing processes of changing market design, and, hence, the conditions under which business is to be conducted in the EU pose a risk of doing business in or with the EU. These risks will be discounted by LNG producers as they weigh their export options. Issues regarding the rules of access to infrastructure, the possible consequences of unbundling, the ruling against destination clauses (which forced changes in existing contracts), possible measures limiting the marketing options of non-EU suppliers, debates around the acceptability of long-term contracts and price indexation based on oil products are among the concerns of the producers considering entering into long-term contracts. Similarly, the ongoing discussion regarding the independence of regulators from governments, although maybe logical in an EU environment, poses a threat for



exporting producers and their governments. It implies that even agreements with EU governments are not secure with respect to regulatory intervention.

For long-term contracts, the prospect of the long-term stability of terms and market conditions is a prerequisite. LNG producers have more marketing options and will always seek to minimise risks, or at least relate these to potential rewards.

The ongoing political debate, new legislation, and regulations around market reform in the EU do not help to inspire confidence with LNG producers interested in developing long-term supply contracts as a robust basis for their investment in LNG projects. In this respect, the EU is probably less attractive than other markets prepared to enter into long-term agreements or the US where, for instance, the Hackberry decision demonstrated a pragmatic awareness of the need to accommodate imports.

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### 5.4.2 CONTINENTAL EU'S HYBRID PRICING SYSTEM: HELP OR HINDRANCE?

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A very large proportion of the EU gas market is based on international supplies by pipeline. As long as the majority of these supplies are offered under long-term contracts with oil-indexed prices, it creates different conditions for price competitiveness and risks for LNG suppliers from those in the North American market, rather more similar to the supply conditions of the Asian market. What makes the EU continental market unique is that it has hybrid markets, combining both spot and oil-indexed prices.<sup>111</sup> Given the lower volume of business in the spot markets, and the lower number of market parties, its prices are likely to be more exposed to manipulation.

For the EU consumer market, the hybrid system means that its prices will be less affected by this volatility, as the great body of supply contracts is based on oil indexation, which dampens the impact of spot prices. It is questionable whether an LNG producer would be interested in selling to a European continental buyer under a firm long-term contract on the basis of its spot prices (though this cannot be excluded as it has already happened). Their volatility and unpredictability may not necessarily offer an attractive prospect for the producer.

If the LNG producer is looking to capture spot prices, the temptation to aim for arbitrage opportunities, seeking the best price from different worlds, must be great. In such a case, the producer is more likely to self-contract or sell to an aggregator. However, there is a cost associated with playing both markets: the cost of redundancy in ships and regas terminals, which may add up to some 75 US\$/MMBtu.

The producer may aim for flexible contracts with European buyers, allowing him to divert LNG to different markets from time to time. For European buyers this undermines their security of supply, so these contracts would most likely require the consent of buyers to divert, and would include a value-sharing arrangement.

An EU continental buyer would be taking considerable risks by buying at spot prices in a market that is predominantly governed by oil-indexed prices, in which the spot market has little liquidity, thereby leaving not much room for price hedging.

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<sup>111</sup> For a thorough discussion of trends in natural gas pricing in the EU see: CIEP, *Pricing Natural Gas: The Outlook for the European Market*, CIEP Energy Paper, The Hague, 2008.

As regards the question of whether LNG producers would be willing to sell their gas on the basis of oil-indexed prices, this would be largely influenced by their perception of future spot prices, particularly in the US market. Virtually all existing long-term LNG contracts with continental buyers are oil indexed. A few years ago the producers appeared to be mesmerised by the US prices, which indeed turned out to be higher than those in Europe. A round of new LNG contracts followed, mainly linked to Henry Hub (and NBP) spot prices (from Nigeria, Equatorial Guinea, Egypt). Price levels have changed since then, and sentiments on the part of producers may have changed, but in recent years there have not been any new long-term sales contracts with continental buyers (or any buyers in the Atlantic Basin). Therefore, here again, the jury is out... What is clear is that the European oil indexation has shown to offer more price robustness than spot prices. This may be a valuable factor for producers considering long-term contracts with continental European buyers. However, oil indexation in contractual prices based on the netback principle is complex. It requires a very good understanding by producers of the market in which they are selling, its segmentation and its evolving dynamics. Producers need to establish a way to measure and monitor market developments in order to assess and negotiate a fair market price and indexation formula, and to stand their ground at times of price reviews.

If the medium-term LNG contracts become a new contractual model (as has been suggested by Algeria), then producers like Algeria and NLNG, who already have oil-indexed contracts in the market, will have little problem making use of the experience from their existing oil-indexed price formulae. For new sellers, however, the process of developing a complex oil-product indexation formula may be too cumbersome for a five-year contract. Alternatively, these producers may apply oil indexation in the medium-term contracts without a price review clause, to avoid the lengthy, cumbersome renegotiations.

Finally, major LNG producers may seek to develop sales portfolios for different markets with different pricing structures. A combination of long-term and short-term contracts, of spot prices and oil-indexed prices, in different markets may add to the long-term robustness of their production and their revenue stream. However, particularly for Middle East producers of LNG, selling under long-term contracts with oil indexation to the Asian markets may be more attractive, as long as prices in this region remain structurally higher than those of long-term contracts in Europe.

Spot prices in the continental EU are probably more easily manipulated than those in substantial markets like the US. Indexation based on these prices, therefore, could create significant price uncertainty for LNG producers. Against this option, oil-price indexation offers more price/income robustness. In addition, major LNG producers may well find comfort in a portfolio strategy under which they sell to a variety of markets under different price formulae, unless they believe that gas prices will rise faster than oil-related prices, for which we have not found any real evidence. However, LNG prices under oil-indexed long-term contracts in the Asian markets are structurally higher than those in the EU long-term contracts. The jury is out...

For buyers in the continental market, a major long-term LNG contract with other than oil indexations creates significant price exposure in a market dominated by oil-indexed prices. However, this is a sellers' market. The producers have a choice of markets and prices.

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### 5.4.3 THE EU'S TRADITION OF SCOUTING FOR NEW SUPPLIES

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Contrary to the US market, the EU has historically been active in looking for and arranging international supplies for its markets. In the past, consortia of buyers managed to unlock

supplies from Russia and Norway by creating the conditions needed by the producers to develop their resources. Many EU gas companies have shown interest in moving upstream, particularly if only to help to bring gas to their markets. There is a tradition among the major European gas companies of approaching producers and producing countries to negotiate supplies to their markets. More recent examples include the scouting for pipeline supplies of the Nabucco group, and for LNG the supply line created by Union Fenosa and the positioning by Ruhrgas in Nigeria and Equatorial Guinea.

But Europe holds no monopoly on this business of scouting for gas supplies. The main consumers in the Asia-Pacific market have a tradition of scouting for LNG supplies that is at least equal to, if not more thoroughly established than, that in Europe. In particular, Japan and South Korea, still by far the largest importers of LNG in the world, have successfully built long-term supply chains with producers in Asia-Pacific (Indonesia, Malaysia, Australia, Brunei), the Middle East (UAE, Oman, Qatar) and Russia (Sakhalin-2). China is now following this example.

In comparison to the US market, EU players have been far more active in looking for new supplies and creating the conditions for new supplies to their markets. These initiatives should come in good stead in a sellers' market. However, the EU is facing similar competition from the Asian markets, which have also shown their ability to secure supplies in this manner.

## 6. WHAT COULD HOLD UP NEW PIPELINE IMPORTS?

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The total import capacity of the pipelines stands at 467 bcm/yr. Adding the committed, planned and proposed construction, this capacity will rise to almost 650 bcm/yr (see also Figure 5). As regards the addition of further capacity, there is considerable uncertainty.

### Russia

The main uncertainties with respect to extra Russian gas exports to Europe are:

- The level of domestic demand in Russia.
  - The availability of Russian gas for export may increase due to a higher domestic gas price level which is planned to reach export parity by 2011-12, the energy conversion, and reducing dependency on gas-fired power generation.
  - The growing Russian economy may, on balance, require more gas for its domestic market. Supply to this market will be given priority over exports.
- The pace of additional gas production from new gas fields (mainly Zapolyarnoye, South Russkoye, Shtokman and the Yamal Peninsula) in order to replace declining production from four giant gas fields (Medvezhye, Yamburg, Urengoy and Orenburg) and increase production for the export market.
- The level of gas imports from Central Asia to Russia and gas production of independent gas companies.
- Investment programmes in Gazprom's Asia strategy may reduce the availability of capital and gas for additional supplies to Europe.
- The present uncertainty about future gas demand in Europe may delay new commitments on contractual agreements.
- The Nord Stream pipeline is facing transit issues which could delay its development. South Stream still needs to find a sufficient critical mass in supply contracts to justify its development.
- The relationship between Russia and the EU may be of a nature in which a substantially greater participation of Gazprom on the EU gas market will not be encouraged.

Due to the above-mentioned uncertainties, Gazprom may remain flexible and focus on selling additional gas on the European spot market, instead of only entering new long-term contractual agreements. It also suggests that the laying of a second pipeline as part of Nord Stream may be suspended.

### Norway

Norwegian producers are still evaluating the desirability of a new pipeline (Europipe III). The issues include the uncertainty of whether new gas production will more than offset the declining production from existing fields and, if so, against what timeframe. More insight is expected in 2009.

### Algeria

The GALSI pipeline from Algeria has is still making progress, its timing could still be a matter of uncertainty. There is also uncertainty around the total volume of gas flowing through the Medgas pipeline, but this is only of a marginal nature.

### **Caspian Region, Iran**

The future of Nabucco still hangs in the balance. Gas from Turkmenistan is already spoken for by Gazprom and Chinese buyers, and there are no indications of any slackening of the political isolation of Iran. This leaves an uncertain prospect of limited volumes of gas from Azerbaijan.

## 7. THE IMPACT OF NEW BUSINESS MODELS ON SECURITY OF SUPPLY

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### 7.1 PIPELINE GAS IMPORTS

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Flexible supplies are not only a new phenomenon of the LNG business, they are also showing up in pipeline supplies to European markets. Both Norwegian gas and Russian gas supplies show signs of retaining more flexibility in their future supplies: long-term contracts still form the backbone of their supplies, but these are likely to be topped off by gas supplies without firm contractual commitments, for which the producer retains control over the volumes on offer. As more pipeline capacity is planned from Russia, and new long-term contracts do not seem to fully match the added capacity, such supplies could find a way to the European markets over and above the contractual levels. For Norwegian gas, these flexible supplies are going to find their way to the European markets. The main drivers for the Norwegian suppliers: to use some of this gas for direct marketing, and to capture the value of the spot prices in the wholesale market, in addition to the oil-indexed prices in their long-term supply contracts. These may also be drivers for Gazprom, but there may be another one for Russian supplies which poses a security of supply risk for Europe: the need to cater to domestic Russian gas demand as a matter of priority. In a supply-constrained scenario, Gazprom cannot be seen entering into new long-term export contracts at the expense of demand from its own home market. Thus, while the pipeline capacity is there, Europe cannot count on the future supply of flexible gas from Russia at times of high European demand.

### 7.2 FLEXIBLE LNG

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In the event of a supply disruption in Europe, the first response of the market will be to seek to acquire alternative supplies. Flexible LNG may offer such an alternative, provided the European markets are willing and able to offer the prices necessary to attract the LNG. This could help those in Europe's markets that have LNG terminal facilities. In general, however, increasing supply security in one part of the EU may benefit other parts, if there are sufficient pipeline connections.

Flexible LNG is by its nature not committed to the European markets and cannot become committed by policy or administrative action. It mainly follows price. The three conditions that facilitate the role that "flexible" LNG can play in alleviating short-term security of supply matters are:

- adequate shipping capacity;
- adequate LNG regasification terminals;
- easily accessible short-term markets or buyers with ready access to LNG suppliers.

The first is not under the control of the EU or its markets. As regards the latter two, Europe seems to be in good shape, developing significant regas capacity and creating short-term markets, particularly in those countries where flexible LNG can play a role.

The role that flexible LNG can play in meeting short-term market disruptions is well illustrated by the closure, for maintenance, of nuclear power stations in Japan. Usually these outages are planned in advance and can be managed without sudden impact on resource markets. The story is



more complicated when disaster strikes, but in such an event, too, it has proven possible to attract large LNG volumes. When a severe earthquake forced Tokyo Electric Power Co to shut down Japan's largest nuclear power station in July 2007, eight gigawatts of production capacity was suddenly no longer available.<sup>112</sup> The company immediately increased its acquisition of LNG to make up for this sudden disruption of supply. According to World Gas Intelligence, Tokyo Electric succeeded in securing unplanned LNG volumes of over 5 bcm (on an annual basis)<sup>113</sup> from the market during the remaining 8 months of Japan's 2007 fiscal year. As a consequence of Tokyo Electric's market interventions, prices for delivered spot LNG in Asia-Pacific spiked.<sup>114</sup>

The example illustrates that, within limits, buyers of LNG can use the logistical flexibility of the LNG market to acquire "flexible" LNG in the event of a disruption of other supplies. They may, however, have to pay a sizeable premium for flexibility, as was the case in the market in Asia last year. As a consequence, very little flexible LNG landed in European regas terminals.

While the EU can be cost-competitive for LNG with the East Coast of North America, the question remains whether the EU will be able to acquire short-term LNG when it needs it, at times of high demand. The main feature of flexible LNG is that it is not committed to any market by means of a long-term contract. The EU, like other markets, depends on the preferences and strategies of producers and aggregators. Price is likely to be the most important means of attracting these flexible supplies. Short-term spot markets in Europe will offer the platforms from where the EU can set its short-term prices to acquire this gas in competition with the US and Asian markets. Whether the EU will be able to match prices from these regions in the event of high shortages in other regions remains to be seen. It may well be that its markets, with a very high share of pipeline supplies, may find alternative ways of meeting high demand at lower prices. It is also conceivable that other factors, like political or commercial relationships, will determine the destination of flexible LNG. In any case, the EU cannot count on these supplies as a secure means of meeting seasonal high demand.

The corollary of the rise of flexible LNG is that less LNG will be available for dedicated sales to markets under long-term contracts.

Estimates of the volume of short-term LNG vary. The share of flexible LNG is growing, particularly in the Atlantic Basin. The analysis in part 1 of this study suggests that some 50% of new LNG production can be regarded as flexible LNG, but in any case it will do little more than contribute to meeting short-term deficits on the margin of total supplies to the EU, of course in competition with other global markets. In the UK, where the market is struggling, increasingly, with the need for seasonality in its supply portfolio and where we find considerable LNG terminal capacity, short-term LNG may make an even more frequent, though unreliable, contribution to meeting winter demand.

The notion that flexible LNG could be found and imported during conditions of very high demand (e.g., extreme winters) may lead market players to decide that catering to these conditions by means of storage is unnecessary in the future. Certainly, in Europe, the level of seasonal storage is not keeping pace with the growth of (inflexible) gas supplies from remote sources. This does not contribute to Security of Supply.

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<sup>112</sup> See for analysis: Chrisstoffels, Jan-Hein, *Earthquake Alarm: The Kashiwazaki Nuclear Incident and the Consequences for Japan's Nuclear Policy*, CIEP, The Hague, 2007.

<sup>113</sup> *World Gas Intelligence*, January 30, 2008; Calculated with BP conversion calculator ([www.bp.com](http://www.bp.com)).

<sup>114</sup> 'Japan Costly LNG Flight', *World Gas Intelligence*, January 30, 2008.

Flexible pipeline gas will be a new feature in European supplies. It is likely to be priced on a spot price basis. As regards the security of supply, European demand for flexible gas from Russia may, in the future, be in competition with demand from the Russian market, in which case the gas will not reach European markets.

If flexible LNG continues to grow in volume and given the sufficiency of the LNG regas terminal capacity for winter demand, the EU may be geographically better placed than the US market, but will be facing global competition for this LNG. It is conceivable that other factors, like political or commercial relationships, will (co-) determine the destination of flexible LNG.

Thus, flexible LNG can alleviate short-term security of supply problems and help to meet higher winter demand in the EU, but at a price and always without the certainty that the LNG will be there when needed, as it is not inconceivable that other factors, like political or commercial relationships, will determine the destination of flexible LNG. Therefore, it should be noted that the EU market players do not have any control over the movement of flexible LNG.

If the notion of reliance on flexible gas leads market players to abandon the prudent process of maintaining supplies in storage to meet severe winter conditions, it could also reduce the Security of Supply.

## 8. THE FUTURE: SCENARIOS FOR GAS SUPPLIES – 2015

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Uncertainties of the types and magnitude now being faced by the gas industry lend themselves even less easily to forecasting than has been the case so far. For future demand, the main uncertainties are found in policies surrounding the use of gas in the power generation segment (e.g., the role of renewables, the effectiveness of the CO<sub>2</sub> emission trade and the prospects of CCS), including the potential for energy savings. With regard to supply, the questions are whether and to what extent the considerable remaining gas reserves will be developed. Scenarios form a useful tool to explore the limits of the diverging developments in the market, to understand their interaction and to identify signposts for early warnings about the direction in which markets develop.

There is a wide range of possible scenarios for the EU gas market. Various scenarios have been prepared for the year 2015 to explore the different roles that LNG can play in that market. These scenarios address uncertainties around both the supply side and the demand outlook.

### 8.1 THE SCENARIO PROCESS

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The process followed is based on two premises:

- pipeline gas suppliers are captive and hence will find a way to the European markets ahead of LNG, leaving LNG the role of balancing the market;
- the developments of demand and pipeline supply are largely independent of each other. Therefore, the call on LNG is derived from a matrix of cases for demand and supply.

Different assumptions, mainly varying the effectiveness of the 20/20/20 targets, suggest a range of gas demands in Europe, from 600 – 680 bcm/yr.

On the supply side, different scenarios have been developed for international pipeline supplies to Europe. These offer a range of 330-410 bcm/yr. Adding an estimated indigenous production of some 130 bcm/yr, these supplies lie in the range of 460-540 bcm/yr.

The balance needs to come from LNG.

As regards the global market for LNG, new liquefaction capacity is slow to come to the market (see also section 4.3). There is a serious possibility that the global LNG market will remain tight, at least until 2015. Hence, the main regions will be competing for new LNG supplies. Against this backdrop, it is assumed that the Asian markets will continue to lay claim to regional LNG and a large part of the LNG from the Middle East, while markets in the Atlantic Basin have first-call on the LNG from the Atlantic Basin. This leaves two subsidiary scenarios describing the level of demand for LNG in the North American market, resulting in different levels of competition that impact price and the availability of LNG in the Atlantic Basin.

Volumes used as part of the description of these scenarios should be regarded as indicative and are mainly used to dimension the width of uncertainties.

## 8.2 THE SCENARIOS

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### DEMAND CASES

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#### **1. Substantial growth (680 bcm)**

Restoring economic growth takes precedence over 20/20/20 targets. Renewables grow to some 10% of final energy consumption. Concern about the effective introduction of CCS reduces the support for “capture-ready” coal-fired power plants. Combined with high CO<sub>2</sub> emission costs and high coal prices, power generation will focus on gas. Limited savings are more than offset by demand from a growing economy.

#### **2. Reduced growth (640 bcm)**

Efficiency programmes take effect. Renewables grow well beyond 10% of final energy consumption. A mix of coal- and gas-fired power generation develops in the European markets. Energy savings begin to take effect.

#### **3. Limited growth (600 bcm)**

Security of Supply and 20/20/20 feature high on the political agendas of the EU. Diversification of fuels generate support for “capture-ready” coal-fired generation. CCS gains momentum. Coal prices are low, relative to gas; production and shipping bottlenecks have been resolved. Renewables grow to 15% of final energy consumption, energy efficiency programmes become very effective.

### PIPELINE SUPPLIES CASES

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#### **1. High import pipeline supply (410 bcm)**

All planned import pipelines have been laid and are used for additional supplies. Energy savings in Russia free-up substantial volumes of new supplies in combination with increasing availability of gas for Europe from additional imports from Central Asia, increasing domestic production, supported by improved relations between the EU and Russia. Russian supplies to Europe rise from 156 to 210 bcm. Nabucco is successful connecting mainly Shah Deniz gas in Azerbaijan. Norway also increases its exports to Europe with the new Europipe III.

It is assumed that the load factor of the additional pipelines from Russia and Norway to Europe is the same as the current load factor. Nabucco will be connected to the existing South Caucasus gas pipeline and the Tabriz-Erzurum pipeline from Iran, and will take up additional gas within existing pipeline capacities.

#### **2. Current export ambitions (365 bcm)**

Producers achieve their stated plans and commitments. Russia, due to domestic demand, keeps its export levels at the committed 180 bcm (from 156 bcm in 2007). Nabucco is modestly successful with Caspian gas. Norway pipeline sales are limited to 100 bcm.

#### **3. Low export pipeline supplies (330 bcm)**

As above, but the GALSI project from Algeria has suffered delays. Nabucco’s prospects have not matured to physical gas supplies in 2015. Imports from the Caucasus and Central Asia will have ceased.

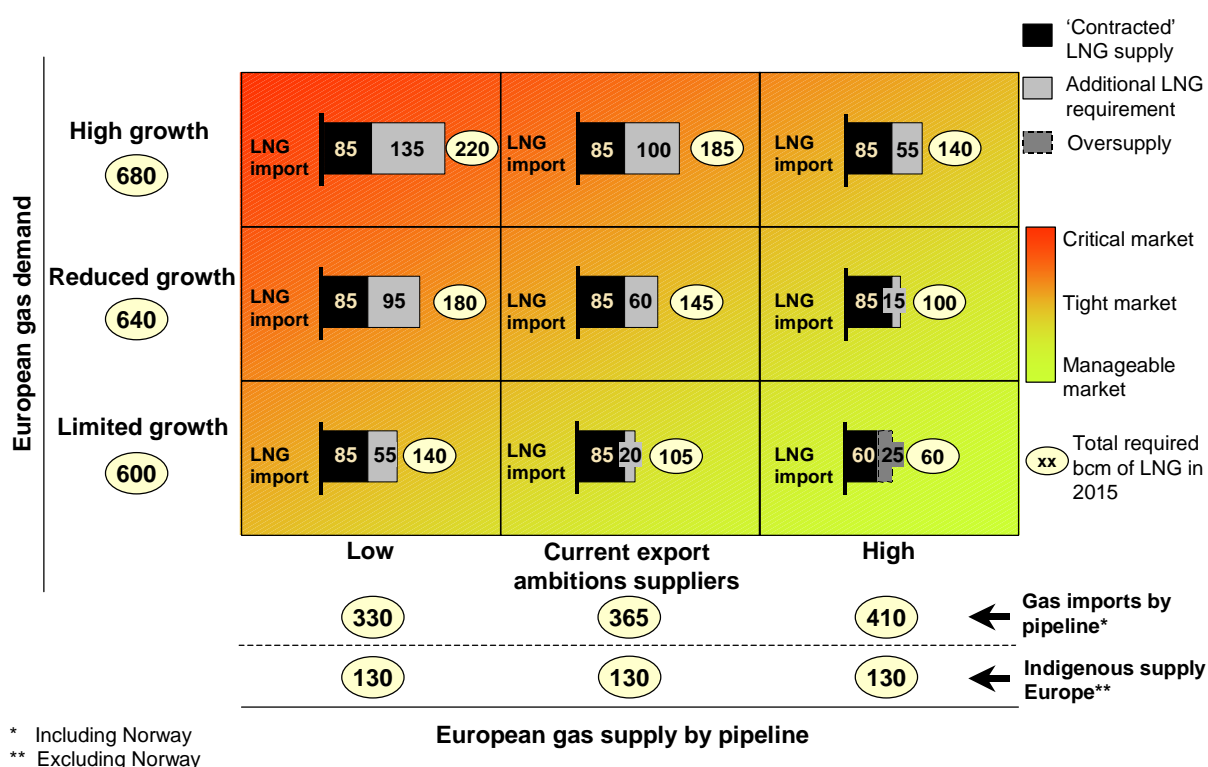
### Indigenous production

For all cases, indigenous supply has been kept at the level of 130 bcm. There is some potential upside for additional developments, for example in the UK, and from improved fiscal terms and further insights into the prospects of ‘unconventionals’, but these have not been quantified.

### THE LNG SUPPLY MATRIX

The result of combining the three demand cases with the three pipeline supply cases is shown below. It is assumed that the current total of contracted LNG supplies is on the order of 85 bcm/yr. It should be noted, however, that some of these supplies are ‘flexible’ LNG, notably the ‘self-contracted’ supplies from Qatar to the UK, or contain elements of flexibility, which means they can still be diverted to other markets.

FIGURE 8: CALL ON LNG IMPORTS BASED ON SCENARIOS OF EUROPEAN GAS DEMAND AND IMPORT BY PIPELINES IN 2015



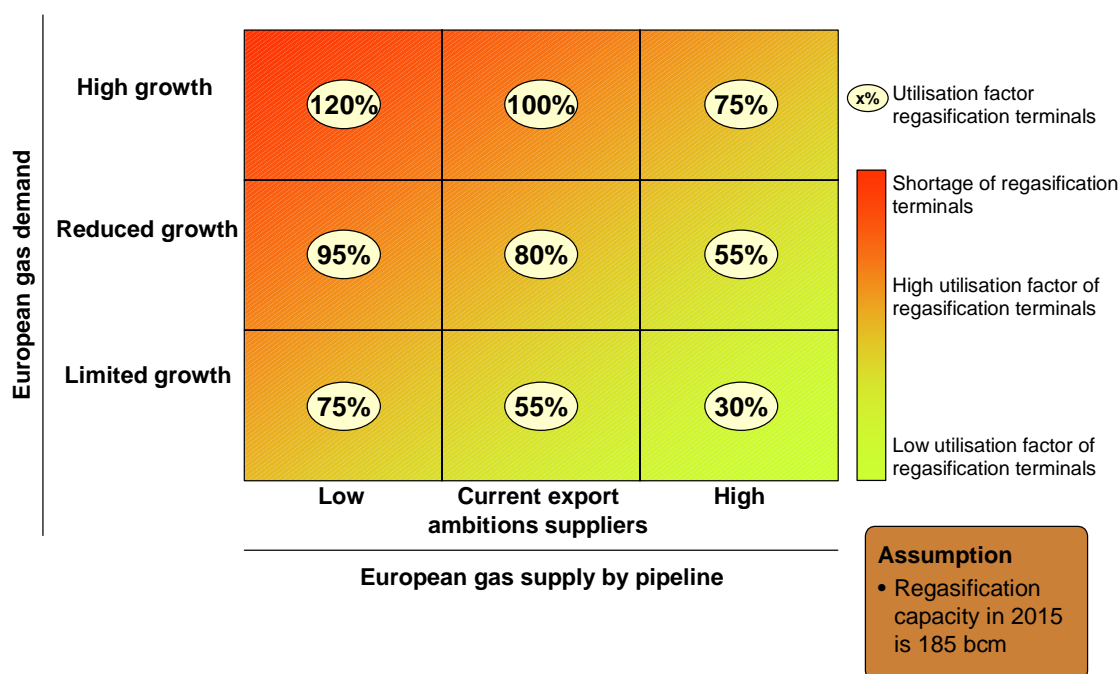
SOURCE, GASTERRA, GAZPROM, CIEP ANALYSIS

The matrix in Figure 8 suggests that the call on additional LNG to Europe may vary from nil to over 130 bcm/yr.

### 8.3 IMPLICATIONS OF THESE SCENARIOS

Given the total physical LNG regasification capacity in Europe that includes existing, under construction and planned, of around 185 bcm/yr in 2015, a realistic, but high load factor of 75% would lead to a capacity of 140 bcm.<sup>115</sup> (Europe’s current load factor for LNG regas terminals is 50-60%.) This is not enough to take in the volumes of LNG from the high end of the range. Not even at an unrealistic load factor of 90%, which would offer 165 bcm/yr of capacity, would make enough gas available to cover the high cases. The matrix in Figure 9 gives an overview of the resulting utilisation factors of regasification terminals in Europe, based on the LNG requirements in the different scenarios.

FIGURE 9: UTILISATION FACTOR REGASIFICATION TERMINALS IN EUROPE BASED ON DEMAND AND SUPPLY SCENARIOS FOR 2015



SOURCE: GASTERRA, CIEP ANALYSIS

In addition, it remains uncertain whether Europe would be able to acquire these volumes of LNG. There are essentially three possible LNG scenarios which Europe may be facing:

#### 1. A very tight LNG market

New supplies of LNG are slow to come on stream (total LNG at about 520 bcm by 2015), while demand from all markets is high. It will be physically impossible to meet all demands. It is assumed that markets in Asia and North America will acquire the LNG they need, at the prices it takes; Asia continues to buy LNG under long-term contracts with its current high

<sup>115</sup> This existing, under construction and planned LNG capacity (185 bcm/yr in 2015) is a high estimate. Some projects (South Hook and the regas terminal in Brindisi, Italy) will probably suffer delays.



pricing terms. Europe, with its hybrid pricing structure may not be able to acquire all LNG to meet the potential demand under long-term contracts. That leaves strong competition between North America and Europe for the limited volumes of flexible LNG on the market. It is unlikely that Europe will manage to secure all the LNG it needs at the expense of the US in this manner.

## 2. A high-priced LNG market

More new LNG supplies become available (stated plans run as high as 650 bcm by 2015). The markets will be in competition for the new LNG supplies, but Europe will be able to acquire the LNG it needs. However, it will need to pay an 'Asia-equivalent' price. LNG becomes a 'price-maker' in the European market.

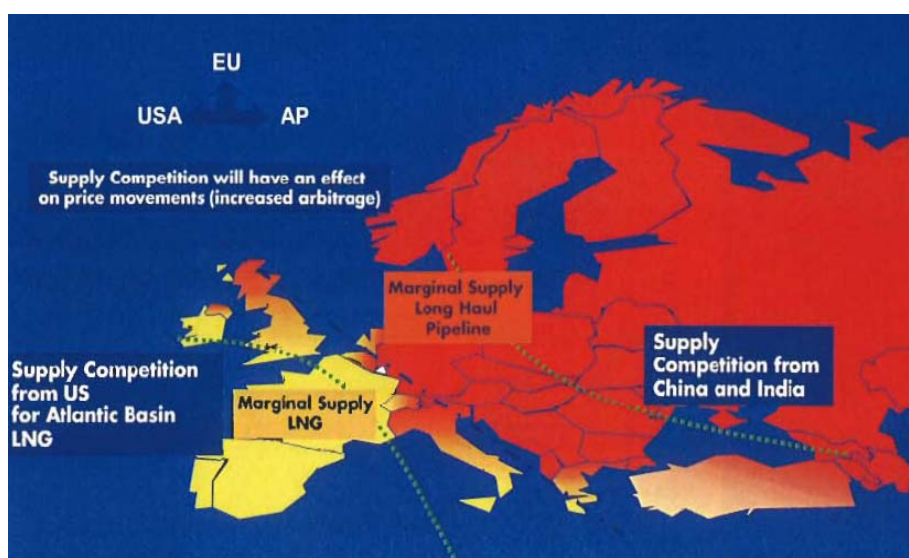
## 3. Lower demand in the North American market

Demand in North America is low, resulting from more indigenous production of unconventional gas and a drive towards sustainable energy. Europe offers higher spot prices than the US and can take the LNG it needs out of the Atlantic Basin at market prices, the balance going to the US market.

There are important questions around the ability of Europe to acquire the high end of the range of additional LNG. Creating more LNG regas capacity only to cater to such an eventuality, even before these questions have been further addressed and a clearer outlook on demand and supply availability is available, would be very speculative (nevertheless new LNG regas capacity may still be developed in Europe for different reasons, e.g., arbitrage or local market conditions).

Buying substantial volumes of additional LNG in a high-priced LNG market may well lead to an overall rise in European gas prices (this could, in turn, impact demand from the non-captive consumers in the markets).

FIGURE 10: LNG IN THE EUROPEAN MARKET: PRICE-TAKER OR PRICE-MAKER?



SOURCE: SHELL

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## OTHER SCENARIOS

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Most of the above scenarios are premised on a sellers' market for gas, in which demand potentially exceeds supply. However, it is not inconceivable that during the period 2015-2020 more supplies than the market needs become available. This is not very different from today's situation, in which current supply contracts are expected to offer comfortable levels of supply for the next few years. Such buyers' market scenarios require a radical reduction in demand, possibly driven by the effect of high gas prices on demand. Less likely is that they could also arise from faster than expected developments of new supplies.

Under these scenarios the 'liberalisation' processes of Europe would leave it well positioned to reap the benefits from gas-to-gas competition all the way from the supply sources to the consumer.

Essentially, the above scenarios offer the prospects of two main business environments for Europe:

- Russian supplies dominate the European market: Gazprom is the main balancing supplier, its marginal prices set price levels in the EU. In return, the EU will continue to be well supplied under current price regimes. LNG will play only a marginally bigger role than today;
- pipeline supplies do not meet the growth in demand, be it for political or for industry-related reasons. Significant diversification to LNG will follow, but global demand for LNG continues to be strong. LNG will become a global commodity and (netback) prices will converge. European gas prices will rise to global levels.

In all cases it would be imprudent to allow the gas market in Europe to develop a situation as shown in the top-left part of the matrix.

The scenarios do suggest, however, that in a number of cases, higher LNG supplies at or over 100 bcm can be realised under potentially manageable pricing and supply conditions. This would benefit the European market, offering a reasonable balance between pipeline gas and LNG, from diversified supply sources.

## 9. CONCLUSIONS

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The outlook for gas in Europe is characterised by growing uncertainty. There is considerable uncertainty regarding the demand for gas and the role it will play in future European energy systems. Much of this uncertainty relates to the stated environmental targets and the effectiveness of their implementation. As a consequence, demand projections by analysts vary considerably. This may not give potential suppliers much comfort. On the supply side, two different families of uncertainties can be distinguished: the future supply of pipeline gas, and the ability of Europe to acquire LNG in a global market.

More than the two other consuming regions, the EU has the potential to obtain more gas supply by pipelines, surrounded as it is by most of the world's gas reserves. But any sense of comfort that this creates may be false. Apart from their uneasiness around the question: to what extent will future growth in demand materialize; the producers and the producing countries are re-assessing their priorities and the timing of new supplies. Also, new pipeline supplies to the European markets require complex processes of bringing together demand from different markets to a total volume that makes such pipelines economically viable. Altogether, it has become far less certain whether pipeline supplies will grow substantially, let alone cover any potential growth in gas demand.

While the orchestration of creating sufficient demand for the very high volumes of gas necessary for new pipeline supplies to Europe has not become any easier under the new rules of the EU internal market design, and while diversification of supplies is regarded as a valuable complement to Security of Supply, many market players have turned to LNG supplies, which are more modular than pipeline gas and often come from new supply sources. The flurry of newly built LNG regasification terminals that has followed gives Europe a strong position to receive LNG if it can attract the additional supplies. The corollary of these investments is that there is overcapacity, which comes at a cost to the market players. It should not be surprising if the construction effort slows down, as many players may first want to see new LNG actually coming to Europe's markets.

LNG is an attractive commodity to complement the current and future gas supply portfolio of Europe. It will most likely play a bigger role in Europe than before. With the construction of ample LNG regasification capacity, the market players in Europe have rolled out the carpet for new LNG supplies, but as yet not much is coming. Price is and will be an important factor in the choice of markets by LNG producers: European prices may not always be the most attractive and little can (or should) be done by EU policy-makers to change that. "Regulatory" uncertainties, however, form another area of concern for LNG producers, and here the EU could review its position.

The LNG industry is a game-changer in the gas business. More and more "flexible" LNG appears on the market, i.e. LNG with destination flexibility, controlled by producers and suppliers. By implication this LNG is not committed to any market and cannot, therefore, be relied upon as secure supplies for the European markets. Europe, in its enviable position of having both pipeline and LNG supply prospects and having a price regime which could remain below that of the Asian market, may not be able to attract much of this flexible LNG. Then again, it may not have to. LNG will most likely provide a larger part of Europe's supply portfolio, but it will not replace the need for and the opportunity to secure substantial new volumes of pipeline gas. While Europe cannot count on flexible LNG to be available to provide secure flexibility in its

markets, the EU should definitely make sure that there are no avoidable barriers to the development of underground storage, a more secure and probably more cost-effective way of creating the necessary flexibility in the market. Further analysis to establish the relationship between the cost of and opportunities for LNG to contribute to flexibility in a secure manner and the use of underground storage would be advisable.

If new pipeline supplies can be found and brought to the EU market under the current price regimes, Europe will continue to enjoy lower prices than may be paid by the Asian markets. In such a scenario, Europe will have difficulties acquiring LNG, particularly in competition with Asia for supplies from the Middle East. Should this lead to shortages in the markets, with insufficient pipeline gas to cover these shortages in Europe, the call on LNG will grow and EU price levels will inevitably gravitate towards Asian prices.

Clearly, for the future of Europe, it is not “business as usual”. There are major uncertainties surrounding future supply and demand. Under some scenarios, only limited new pipeline gas will be coming to Europe and the markets will be very short. The result could be that European gas prices will increase to levels where Europe can effectively compete for new LNG. As it stands, however, Europe enjoys the competitive “netback” prices from the oil-indexed price regimes for most of its supplies.

It would seem prudent to prepare for a business environment in which the global competition for gas supplies is intensifying. Europe will have to make itself attractive for gas supplies, be it pipelines or LNG. In the context of Security of Supply, it should support the objective to secure gas under long-term contracts. More generally, given the likelihood of a sellers’ market for the foreseeable future, it will need to refocus from the ‘internal market’ to the ‘external market’. Competition for gas is not an internal EU affair but an international matter, which should be reflected in EU policies regarding the gas market. The internal market design is of value in a buyers’ market with an abundance of supplies. In today’s sellers’ market a successful energy policy lies in obtaining competitive gas supplies from outside the EU. With regards to its markets, EU policies should be aimed at:

- promoting energy savings, so as to avoid significant growth in gas demand, which may become very difficult to manage;
- reducing the economic and policy- based uncertainties in the power generation sector regarding the future fuel mix, thus also increasing ‘security of demand’ for suppliers;
- promoting fiscal terms in order to increase indigenous productions<sup>116</sup> and develop further insights into the prospects of ‘unconventionals’.

External EU policies should focus on relationship building: producing/consuming countries dialogue with a view to promoting more (and diversified) supplies of gas and LNG to Europe, and specifically obtaining a framework of understanding on the future supply of Russian gas to Europe. Recognising the objectives and concerns of producing countries, and lowering where possible the barriers to entry, by means of sustainable, long-term policies rather than temporary ad hoc measures, like exemptions, is part of such a repositioning. Providing a stable policy and the regulatory climate for long-term supplies, including LNG contracts, could be one of those measures that would help overcome some of the market uncertainties currently experienced by suppliers.

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<sup>116</sup> See also: CIEP, *The Dutch Upstream Fiscal Regime in Northwest European Context*, CIEP Briefing Paper, The Hague, 2008.

Unlike oil, natural gas reserves are plentiful. Development of these reserves, be it for pipeline gas or as LNG, is becoming more and more complex and costly and could lead to scenarios where rising demand exceeds the growth of available supplies. As the cleanest of fossil fuels, natural gas should continue to play an important role in future energy systems, including power generation. But phasing out nuclear power and not finding ways to accommodate coal-fired generation could allocate too big a share of new power generation to gas-firing. This could dangerously overheat the demand for gas and lead to shortages and rising prices, which would affect all consumers. Managing the supply-demand balance cannot only be a task for the market. Governments will have to take its share of this responsibility.

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DATA

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