



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 10.11.1999
COM(1999) 571 final

COMMUNICATION FROM THE COMMISSION

Security of EU Gas Supply

1.	WHY A COMMUNICATION ON SECURITY OF EU GAS SUPPLY? - INTRODUCTION AND BACKGROUND.....	1
1.1.	Security of supply - one of the three pillars of EU energy policy.	1
1.2.	What is security of gas supply?.....	2
1.3.	The October 1995 Commission Communication and the May 1996 Council mandate.....	2
2.	EU GAS DEMAND AND SUPPLY TRENDS - THE INCREASING IMPORTANCE OF GAS.....	3
3.	AN ASSESSMENT OF CURRENT SHORT-TERM SECURITY OF EU GAS SUPPLY.	5
3.1.	Analyses of short-term gas security at Member State and EU level.	5
3.2.	The importance of continued integration of gas markets and networks.....	7
3.3.	Evaluation of the gas security tools - the added value of the EU dimension.....	7
4.	THE CHANGING EU ENERGY MARKETS: CHALLENGES AND IMPLICATIONS OF INCREASING COMPETITION AND ENLARGEMENT IN RELATION TO GAS SECURITY.....	8
4.1.	Security of gas supply in the single gas market.....	8
4.2.	Convergence of the gas and electricity markets and its impact on gas security.....	10
4.3.	Security of supply in an enlarging EU.....	11
5.	SECURITY OF GAS SUPPLY IN THE LONG-TERM - MOBILISING GAS RESERVES AND CAPITAL FOR BRINGING ADDITIONAL GAS TO THE EU MARKET.	12
5.1.	The gas reserve outlook for Europe.....	12
5.2.	The EU's long-term supply options - role of present suppliers and new sources.....	12
5.3.	How will expected demand be met? Bringing gas reserves to the market - financing the EU's future gas supply.....	13
6.	CONCLUSIONS AND RECOMMENDATIONS.....	17
7.	ANNEXES.....	21

1. WHY A COMMUNICATION ON SECURITY OF EU GAS SUPPLY? - INTRODUCTION AND BACKGROUND.

1.1. Security of supply - one of the three pillars of EU energy policy.

Modern society demands energy at reasonable cost and with least possible environmental impact and both consumers and industries rely on energy to be readily and continuously available without interruption. These priorities are reflected in the agreed three main pillars of European Union energy policy, which are:

- overall competitiveness;
- protection of the environment and;
- security of energy supply.

Natural gas has a major contribution to offer in achieving all three objectives.

With the entry into force of the Gas Directive, national gas markets will be opened up to competition to the benefit of customers and will gradually be integrated into one single EU gas market. The internal market for energy will enhance the industrial competitiveness of Europe in an increasingly integrated and global market place.

Gas contributes to the protection of the environment and the path towards sustainable development and, being the cleanest fossil fuel, natural gas can play a significant role in both meeting the EU's Kyoto commitments to reduce emissions of CO₂ by replacing higher carbon content fossil fuels and less energy efficient technologies and in meeting the EU's SO₂ and NO_x targets.

Natural gas is playing an increasingly important role in the EU's overall energy supply. The growing share of gas in the EU's fuel mix has, mainly by reducing oil dependence, in itself contributed to a more diversified and better balanced energy fuel mix of the EU and thereby contributed to an improvement of the overall energy security of the EU.

The share of gas in EU energy consumption is still only half of that of oil (42%). It therefore seems that there is room for further increase in the share of gas without compromising the EU's overall energy security.

Today, security of supply is not the key geopolitical issue it was in the 1970s during the time of the oil crises when Europe was excessively dependent on one single fuel controlled by a small number of oil producing countries. The world has in many respects changed since then and become increasingly open and economically interdependent. Also world energy markets have become increasingly integrated and supplies more diversified both in geographical terms and with regard to the fuel mix. Despite this, however, the oil supply crises of the 1970s bear evidence to the fact that complacency is not an option for the EU with regard to security of energy supply. On the contrary, security of energy supply requires continued vigilance and careful monitoring with a view to manage increasing external dependence and vulnerability and avoid, or at least be able to manage, major crises should they occur.

Legitimate questions in relation to the EU's security of gas supply arise as a result of trends in EU gas demand and supply. These trends include the growing overall importance of gas in the EU fuel mix and in particular the strong growth in the use of

gas for power generation; the expected increase in the EU's gas import dependence from currently 40% to around two-thirds by 2020 from a relatively limited number of producing countries; and the changes which increased competition and EU enlargement will bring about.

In large parts of the EU, natural gas is still a newcomer in the energy supply but it is coming of age and with the increase in gas use also follow increasing responsibilities to manage security of supply.

1.2. What is security of gas supply?

The term security of supply is widely used to cover a range of issues spread over different time frames. In this Communication, security of supply comprises both short-term operational aspects as well as strategic and longer-term aspects.

Short-term security of gas supply includes the ability to maintain continuity of gas supply despite exceptional demand and difficult supply conditions including possible disruptions of gas supply whether of a technical, economic or political nature.

Longer-term security of gas supply is the ability to ensure that future gas demand can be met by a combination of indigenous and imported gas supplies. This requires adequate investments in production, transmission infrastructure and supply diversity and clearly has a geopolitical dimension.

1.3. The October 1995 Commission Communication and the May 1996 Council mandate.

In October 1995, the European Commission adopted a Communication entitled "European Community Gas Supply and Prospects"¹ which addressed EU gas demand and supply issues and made an initial assessment of EU gas security.

In its conclusions adopted on 7 May 1996², the Energy Council welcomed the Commission's Communication and requested the Commission to examine in depth the various issues raised in the Communication. The Commission was requested to report back to the Council and, if necessary, to make proposals to strengthen EU gas security.

The European Parliament³ as well as the Economic and Social Committee and the Committee of the Regions adopted resolutions on the Commission's Communication and also encouraged the Commission to deepen the analysis.

The present Communication represents the Commission's response to the May 1996 Energy Council's call for an in-depth examination of EU gas security.

¹ COM(95)478 final (18.10.1995).

² 1921. Council (Energy - Brussels 07-05-1996) - Nr. 6803/96 (Presse 123).

³ PE 217.775/fin (9 July 1996).

2. EU GAS DEMAND AND SUPPLY TRENDS - THE INCREASING IMPORTANCE OF GAS.

The EU gas market has been steadily expanding geographically and growing in demand since the 1960s when natural gas supply first really started in Europe.

Natural gas is currently the fuel of choice throughout Europe and is continuing to increase its market share in virtually all market sectors and in all EU Member States. Today, all 15 Member States use natural gas in their energy supply and gas has increased its share of EU energy supply to more than 21% in 1998 compared to 16% only ten years ago. Large differences remain, however, between Member States with a share of less than 2% in Sweden and Greece and more than 46% in The Netherlands.

Natural gas is set to continue its growth and increase its current EU energy market share. With an expected 45% increase in demand from 1998 to 2020 (from approx. 300 to 430 MTOE – Million tonne of oil equivalent according to the Commission's long-term base-line energy forecast), natural gas will increase its share of EU energy supply from around 21% in 1998 to around 27% by 2020. Around two-thirds of this increase in demand will be due to power generation including combined heat and power production (CHP). The forecast increase in the use of gas in power and CHP-generation is expected to increase the share of gas use in this sector from 23% in 1995 (83 MTOE) to around 40% by 2020 (192 MTOE).

The power and CHP sector is expected to become the largest single gas consuming sector, representing nearly 45% of all gas consumption by 2020. Gas presents significant advantages in power generation including lower investment costs; high efficiency plants; lower emissions and short construction lead times. →

With a view to combat climate change, developed countries have committed themselves, under the Kyoto Protocol adopted in 1997, to achieve binding targets of reducing emissions of a basket of six greenhouse gases (the most important one of which is CO₂) by an average of 5.2% below 1990 levels over a period between 2008 and 2012. The EU has committed itself to an 8% reduction in its greenhouse gas emissions at Kyoto.

Natural gas can contribute considerably to achieving the goal of reduction of emissions. Using today's Combined Cycle Gas Turbine technology, natural gas can more than halve CO₂ emissions per produced unit of electricity compared with existing coal-fired plants and also reduce SO₂ and NO_x emissions. With the increased use and production of gas, however, approaches will need to be developed that reduce methane leakage from the gas system with a view to maximise the environmental benefits of using gas.

The expected strong increase in gas consumption could be even larger taking into account the latest and progressively competitive technological developments of micro gas turbines for heat and power production in individual dwellings. Natural gas based fuel cells in the power and transport sectors may also enhance this tendency.

In the longer term, the uncertain future of nuclear in certain Member States could also affect gas demand.

Annex 1 illustrates the growing quantitative importance of natural gas in the EU's energy supply balance.

On the supply side, domestic EU gas production is expected to start gradually declining after 2005 gradually leading to a significant increase in import dependency.

In 1998, 40% of the EU's gas demand was covered by imports from mainly three gas-producing countries: Russia, Algeria and Norway while other countries including Libya and Qatar exported minor volumes to the EU in the form of LNG (liquefied natural gas). Russia, Algeria and Norway represented respectively 17%, 12% and 11% of total EU gas consumption in 1998. The long-term supply outlook for the EU is presented in annex 2.

The import dependence for gas is expected to grow faster than for energy overall. The EU's overall energy import dependency in 1998 was approximately 50% while it was 40% for gas. By 2020, gas import dependency is expected to be at a level (67%) similar to the overall energy import dependency (66%). The expected total gas imports by 2020 (approx. 290 MTOE) are nearly equivalent to today's total EU gas consumption.

Gas import dependency is not, however, expected to increase to the level of oil import dependency, which is expected to reach 85% by 2020. However, the structure of the oil market is quite different from the gas market, which has a higher degree of concentration with much gas production in the hands of relatively few countries. Gas utilisation is, however, often combined with the possibility of switching to alternative fuels, which in itself enhances security of supply and alleviates the issue of dependence.

The three largest gas exporters to the EU (Russia, Algeria and Norway) and The Netherlands are expected to remain predominant in EU gas supply and intra-Community trade over the next two decades. Of the EU's expected 67% imports of its total gas demand in 2020, two-thirds are already contracted for, of which more than 95% are contracted with Russia, Norway and Algeria.

The above import dependency figures remain high even when considering that Norway is physically and commercially fully integrated into the EU gas market and through the EEA agreement is also politically committed to and part of the internal market and that in practical terms it may therefore be considered comparable with domestic EU production. If the already contracted imports from Norway instead of being considered as extra-Community imports were considered as domestic EEA gas production, the import dependencies for the European Economic Area would be around 29% for 1998 and 52% by 2020 i.e. significantly less than for the EU, but still high and with a growing trend, in particular after 2010.

While gas supply diversity may seem relatively limited both within and outside the EU when considered on the basis of the number of producing countries, it is worth noting that in 1996, it took no less than 33 individual gas companies to produce around 94% of total West European gas production from a very large number of fields. Only the three largest of these companies produced between 10 and 15%. The remaining 6% was produced by an even larger number of very small producers. Similar situations already apply to various degrees to the external gas producing countries and are

expected to further develop. This illustrates the potential for supply side competition within as well as outside the EU.

Policies aimed at stimulating economically viable domestic EU gas exploration and production activities should be encouraged and producer incentives should not in any way be inhibited by unreasonable constraints, barriers or excessive regulatory intervention.

3. AN ASSESSMENT OF CURRENT SHORT-TERM SECURITY OF EU GAS SUPPLY.

3.1. Analyses of short-term gas security at Member State and EU level.

The main short-term gas security concerns.

The European gas industry employs a combination of different supply-side and demand-side tools and procedures to respond to short-term security of supply difficulties. These include system and supply-side flexibility, storage and interruptible customers. A more detailed analysis of these gas security tools is given in annex 3.

Supply disruption represents the most serious threat to security of supply, whether caused by an infrastructure failure through technical difficulties or because of political events or terrorist actions.

The main EU gas security concerns relate to the dependency on Russia and Algeria. It is worth stressing, however, that for both Russia and Algeria, the track record in keeping supply lines open even in politically tense periods has been excellent. Despite several political crises and difficult supply circumstances, there has never been any major problems related to gas supplies from Russia or Algeria, which are both considered by the European gas industry to be long-standing, reliable suppliers. →

In addition, EU gas security concerns are matched by a reciprocal need for security of markets and hard currency revenues of gas producers such as Russia and Algeria to finance investments in exploration, production and transportation infrastructure and, perhaps more importantly, to contribute to the financing of the state budget.

However, despite such a mutual dependency, it would be a mistake to ignore potential risks, which could endanger security of gas supply. Diversification of gas supply sources and routes should therefore in any case remain a strategic objective of the EU. A multitude of supply and transit routes enhances security for consumers and producers alike and are therefore of mutual interest.

Some external gas supply and transit countries are in a very difficult economic and financial situation. The continued ability of external gas producers and transit countries to maintain and develop their gas supply infrastructure is crucial for the EU. However, it is also in the interest of external suppliers to open up their oil and gas sectors to attract foreign capital investments, which may contribute to maintaining and developing their production and transportation capabilities, which represent important sources of revenues. The EU should facilitate closer co-operation to ensure this.

A more detailed assessments of the risks and mutual dependence in relation to gas supplies from Algeria and Russia is made in annex 4.

In-depth analyses have been carried out regarding the main risks of possible scenarios of a supply shortfall and their likely impact on the security of gas supply of Member States potentially concerned and the EU as a whole. It is important to note, that the main gas supply risk of several Member States (e.g. those with high import dependence on Russian and/or Algerian gas) is a risk they have in common with a group of countries. Supply disruptions from these suppliers could therefore have an impact in a large geographical area of the EU.

With respect to Russia, the most notable risk is the risk of disruption of exports due to a breakdown of relations with Ukraine, the most important transit country transiting more than 90% of Russian gas to Europe.

With respect to Algeria, the greatest risk is considered to be a politically motivated disruption, as a result of potential terrorist damage to the gas supply infrastructure.

While highlighting those countries, which are exposed to a single supplier (or more importantly a single supply route), the analyses carried out for the short-term EU gas security situation, as it was in 1998, have concluded that:

- Apart from Greece, all Member States affected by a disruption of Russian gas in the Ukraine are likely to be able to survive beyond twelve months. Nevertheless, this is a significant period and it is highly unlikely (albeit difficult to quantify) that gas supplies would be interrupted for such a long period;
- With the exception of Portugal and Spain, the rest of the EU Member States could survive for over 12 months with a complete loss of Algerian gas. Given the political considerations as outlined in the risk assessment analysis Algeria is highly unlikely to interrupt for this period of time;
- In conclusion, the survival time is beyond the expected downtimes for the vast majority of supply risks.

The analyses carried out demonstrate that seven Member States (Austria, Belgium, France, Germany, Italy, The Netherlands and the United Kingdom), among which are the largest EU gas consuming countries representing more than 90% of EU gas consumption in 1998, would be able to survive what would be their most serious possible disruption of gas supply based on the three conventional tools (supply flexibility, storage and demand interruption).

Three Member States (Denmark, Luxembourg and Spain) would be able to survive their worst-case disruption scenario by supplementing the above three tools with co-operation agreements with other Member States including additional LNG supplies. Nevertheless, five Member States (Finland, Greece, Ireland, Portugal and Sweden) are currently constrained from securing their gas supply in the event of a sudden crisis because of a lack of physical interconnections, which also renders impossible or difficult any cross-border co-operation.

However, the security of supply position of some of the relatively exposed countries has recently been or is expected to be substantially improved due to further interconnections and supply diversification. This applies to Denmark (second offshore pipeline); Luxembourg (interconnection to Germany); Portugal (planned future LNG terminal); Spain (new LNG supplies from Trinidad and Tobago and from Nigeria);

Ireland (promising new domestic gas discoveries and/or possibly a second interconnector to the UK) and Greece (planned interconnector to Italy).

In the Baltic Sea region, which has no integrated gas infrastructure, studies have been or are currently being conducted regarding the feasibility of major new supply pipelines or interconnectors. These efforts have been supported by Community initiatives such as the Baltic Energy Task Force and the Northern Dimension as well as the Trans-European Networks-Energy activities (TEN-Energy).

3.2. The importance of continued integration of gas markets and networks.

The market place for gas is the pipelines. A well-integrated network is therefore an essential precondition for the effective operation of the internal energy market as well as for security of supply and supply diversification. Gas network investments are undertaken by the commercial market operators but governments; the Community and international financial institutions support these as appropriate.

Generally speaking, gas network interconnection within the EU is developing well driven by a combination of market demand developments, needs for additional transport capacity and gas security considerations.

Over the last few years, a large number of major new pipeline systems have been brought into operation, which have strengthened and further integrated the EU gas network both internally within the EU and in relation to external suppliers. A list of these new pipeline interconnections is included in annex 5, which also elaborates on the importance of continued integration of the trans-European gas network. In this respect, the role of the Community TEN programme and other Community instruments are also described.

3.3. Evaluation of the gas security tools - the added value of the EU dimension.

It is clear that not all Member States can fully ensure security of gas supply on the basis of tools directly available to them, since their physical situation precludes certain alternatives. These countries therefore have to look outside their national boundaries for means to further enhance their own security of supply.

These circumstances emphasise the need for cross-border back-up agreements and commercial co-operation regarding development and utilisation of storage facilities and for non-discriminatory access to such facilities where capacity is available. This is an even more important and valid policy measure today, when national gas markets become increasingly open and interconnected in a single EU gas market.

Co-operative arrangements for times of supply shortfall already exist between European transmission companies in various forms including formal back-up agreements; mutual assistance on a reasonable or best endeavour basis; swaps or reverse flow arrangements; access to storage or specific emergency co-operation measures.

A good, practical example of cross-border co-operation is the recent agreement between gas dispatching officers of the main European gas companies in response to a European Commission inquiry into the preparedness regarding cross-border gas transmission over the turn of the millennium to mitigate conceivable disruptions as a

result of possible Y2K problems. The objective of this co-operation is to ensure stable international gas transport operations over the millennium night based on a continued exchange of information with upstream suppliers; planned contingencies and reinforced emergency communication systems and operational procedures.

Another example of co-ordination and exchange of information regarding the security of supply situation may be found in Germany. Federal and state-level authorities and the main gas companies and associations meet at least once a year to discuss the situation with regard to security of gas supply. Similar procedures and exchange of information exist in other Member States.

Although, the technical and operational responsibility for gas security must remain with gas companies, a more formalised system of exchange of information on gas security issues seems to be justified and useful at European level. This might be organised by a group of government, Commission and gas industry experts meeting, for example, once a year to discuss the development of gas security issues at national and European level. Such a forum could thereby assist the authorities and companies in co-ordinating and identifying any actions which might be required and - as an early warning mechanism - provide advice on EU gas security matters and assist the Commission in making recommendations for political intervention, when considered necessary.

4. THE CHANGING EU ENERGY MARKETS: CHALLENGES AND IMPLICATIONS OF INCREASING COMPETITION AND ENLARGEMENT IN RELATION TO GAS SECURITY.

4.1. Security of gas supply in the single gas market.

The European energy landscape is under rapid transformation these years with the internal energy market being completed implying an increased competition, which in turn demands increasing efficiency at company level. This process introduces new dynamics and forces into the European energy market, which could also impact on security of gas supply.

Security of gas supply is and should remain paramount also within the liberalised internal market for gas. Security of supply and competition are compatible objectives and gas security can be enhanced in the single EU gas market. Nevertheless, gas security can not be taken for granted and needs to be properly planned for by companies in liaison with the responsible authorities. The transition to the new market regime is obviously particularly important with regard to ensuring a continued high-level of security of gas supply.

Hitherto, the task of planning and developing the gas network to fulfil gas security targets (as often defined by the gas industry itself) was relatively straightforward as the dominant suppliers possessed all the infrastructure requirements and information necessary to conduct this planning. In addition, direct state involvement was not necessary as the national gas companies responsible for security of supply in many cases were publicly owned.

In the new liberalised gas market, no single player will necessarily maintain the overall responsibility for short- and longer-term security of gas supply as industry restructures, new entrants emerge and competition develops. In this new context, emergency procedures may need to be reviewed and formalised under the new circumstances also

taking into account article 24 of the Gas Directive in relation to a sudden crisis in the energy market.

In a competitive gas market, security of gas supply - i.e. product availability and regularity - becomes a competitive parameter in itself contributing to the quality of the product or service offered by individual gas suppliers and thereby influencing the reputation of reliability of these. In this context, eligible gas customers should only be willing to pay for the security of supply, which they need. This will elucidate the real costs of gas security and lead to an explicit gas security pricing hence providing new incentives for commercial optimisation of gas security instruments and assets such as storage.

Liberalisation of the gas market, not only changes the market but also the role of government. The role of government will be to ensure that the market is working efficiently and giving true signals to guide the participants in interpreting and managing change while maintaining the appropriate level of security of supply.

A key message, which has emerged from the analyses related to this Communication, is that each gas market has different characteristics. Consequently rigid, EU-wide security of supply criteria and mechanisms do not seem to be the most appropriate response. What seems more appropriate and important, in view of the increasingly liberalised gas market, is to define the security objectives including the roles and responsibilities of each of the players and to make these operational within the new legislative framework for the gas market following the entry into force of the Gas Directive. Government guidelines combined with licensing systems, agreed industry codes of practice and penalty or incentive systems could provide the necessary instruments to ensure this.

Any general public service obligations, which may be defined at the political level, can in this way be shared and translated into concrete and operational measures and hence be dealt with by all involved players on a fair, non-discriminatory and commercial basis.

It is important to ensure that security of supply policies, obligations and commercial practices are not in any way used as an artificial and therefore unjustified obstacle to competition and market entry.

Any such security of supply policies and obligations shall be objective, non-discriminatory, necessary for the effective protection of the objectives in question and proportionate to their purpose. Furthermore, the development of the larger single EU gas market should be taken into account.

It is equally important that all market players recognise the strategic importance of, and demonstrate responsibility in, security issues in order for the market as a whole to be able to co-ordinate gas security obligations and to avoid "free riders". The experience with gas market liberalisation has, however, confirmed that market based mechanisms and incentives can be created which can deliver security and match supply and demand.

The ambition of the internal gas market is to gradually create one single market for gas in the EU rather than merely liberalising 15 national markets. Security of supply will be an integral part of the functioning of the internal market for gas. Competitive markets

will become the general setting within which security of supply objectives will have to be defined and operate.

The more energy networks are integrated and the larger markets become, the fewer consumers in one Member State need to rely only on the production, supply or storage capacity in their own country. The opening up of markets and removal of obstacles to system use, trade and investments will yield new sources of supply, flexibility and supply security. Cross-border co-operation and synergies in terms of optimising national security back-up capacities can be more fully exploited while the same degree of overall security can be achieved at lower costs.

Interoperability of gas networks with different technical and operational characteristics is essential and must be pursued with a view to ensuring a level playing field and smooth functioning of the internal market for gas and thereby also to enhancing security of supply. Some degree of harmonisation at EU level of technical or commercial practices may be required in this respect.⁴

Communication, transparency and a properly co-ordinated exchange of information, in full respect of EU competition rules, is key to enabling liberalised markets to operate under normal conditions as well as to respond to supply disruptions or exceptional demand conditions.

With the integration towards a European gas market, security of supply in gas becomes a matter of common interest. There is therefore not only a role for Member States but also for the Commission more than in the past to closely monitor gas market developments with regard to security of supply aspects.

4.2. Convergence of the gas and electricity markets and its impact on gas security.

Convergence of European gas and electricity markets and companies is increasing. This process is driven by the parallel opening up of both markets; the growing use of gas for power generation and the increased use of electricity price indexation of gas for power generation. Energy sector mergers and other forms of alliances as well as the emergence of companies offering a wider range of energy supply services further push this process.

While the increase in dependency on gas in the electricity sector, combined with the general increase in dependency on external gas suppliers, might be seen as a double risk for the electricity sector which can be seen as a legitimate cause of concern, the EU gas and electricity industries generally agree that such an increase in the use of gas for power generation is manageable from a security of supply point of view. Secure gas supplies clearly are a prerequisite in the first place for any significant development of gas-fired power generation and CHP which would be unlikely to develop to its full potential if such conditions did not prevail.

⁴ In accordance with article 27 of the Gas Directive (98/30/EC), the Commission is currently preparing a first report to the European Parliament and the Council on possible gas market harmonisation requirements.

The commercial and technical interdependence between the gas and electricity sectors may in fact offer new opportunities with regard to optimising the integrated supply capacities and operational performance of the two network-based sectors in combination. This may offer more cost-effective solutions to energy supply and redundant excess capacity in meeting the combined peak-day demand of the two sectors combined may be reduced.

In the single energy market, the contractual arrangements between gas suppliers and gas buying power producers, including their security features and obligations, should in principle be left to the actors themselves to agree upon on a commercial basis

4.3. Security of supply in an enlarging EU.

The EU gas market is already integrated with some parts of the gas network of Central and Eastern European countries (CEECs). The existing EU-CEEC gas sector relationship is strong, particularly at gas company level. In many cases, this is borne out by several years of co-operation between EU and CEEC companies relating to the transit of Russian gas supplies or by foreign direct investments, transfer of know-how and other forms of co-operation.

The EU accession candidates are well aware of the challenges facing their gas sectors and are preparing for these. Transition is underway both in terms of preparation of new regulatory frameworks; gas pricing reforms as well as restructuring of the industry.

Compared with the EU gas market, the Central and Eastern European gas market is much smaller. Gas consumption of the 10 CEEC candidate countries was less than one fifth of EU gas consumption in 1998. The CEEC gas market is, however, also expected to grow in the future and probably more than double before 2020. The Turkish gas market is expected to grow even more rapidly over the coming two decades in particular due to high demand for new gas-fired power generation capacity. To meet this gas demand, Turkey will need large additional gas imports to be delivered through new large-scale supply projects. These requirements are likely to facilitate further interconnections in the Black Sea region between Europe and Central Asia.

Most CEECs are highly dependent on gas imports, particularly on Russian gas supplies. Compared with an average dependency on Russian gas of around 17% for the EU, the CEECs today depend on average for around two-thirds of their gas consumption on Russian gas. Security of gas supply in the CEECs has been enhanced in recent years by the construction of new storage facilities and through some diversification of gas supplies based on new physical interconnections between CEEC and EU Member States and between the CEECs themselves.

In a future enlarged EU, import dependency in general, as well as in relation to Russia, is therefore expected to be at a higher aggregate level than at present. The overall gas import dependency of, for example, an EU25 would be around 72% by 2020 while the dependency on Russian gas would be around one third. In this situation, the level of network integration will need to develop further to ensure adequate co-operation, diversity of supply portfolios and the most efficient utilisation of security of supply tools.

In addition, gas-pricing reforms in the CEECs, which will better reflect the full supply costs and the real value of gas, will have a sound demand side effect on gas

consumption, which will gradually contribute positively to gas security. In most CEECs, issues related to the structure and level of gas pricing hamper investments in supply diversity and gas security. A solution to these issues therefore seems to be a pre-condition for significantly diversifying gas supplies and improving security of gas supply in the CEECs.

5. SECURITY OF GAS SUPPLY IN THE LONG-TERM - MOBILISING GAS RESERVES AND CAPITAL FOR BRINGING ADDITIONAL GAS TO THE EU MARKET.

5.1. The gas reserve outlook for Europe.

Today, the EU represents 16% of world gas consumption; but only 10% of world gas production and 2% of proven gas reserves in the world. At first sight, the gas reserve outlook for Europe may therefore not look bright.

However, in gas terms the EU is not an isolated region but an open and attractive market already well interconnected with, and importing gas from, other countries and regions of the world neighbouring Europe. In fact, the EU is in a rather favourable gas supply situation being surrounded by abundant gas reserves to the North (notably by Norwegian gas in the North Sea, the Norwegian Sea and the Barents Sea and by Russian gas in Barents Sea); to the East (in particular by the gigantic gas reserves in Russia and significant Central Asian and Caspian Sea reserves); to the Southeast (the Middle East with countries such as Iran and Qatar and to a lesser extent Saudi-Arabia and Abu-Dhabi holding very large gas reserves) and to the South (Algeria, Nigeria, Libya and Egypt). In addition, gas reserves in Latin America, for example in Trinidad and Tobago or Venezuela also represent potential gas sources for the EU in the form of shipped LNG. In fact, Spain recently received its first shipment of LNG supplies from Trinidad and Tobago.

Together, these regions, from which the EU is already importing gas or from which it is within reasonable distance, possess more than 80% of total proven gas reserves in the world of nearly 160,000 billion cubic metres (BCM) and together hold proven reserves capable of meeting also the EU's import requirements far into the future. At current rate of production, the lifetime of proven gas reserves in the world reach beyond 2060.

Although gas sourcing for Europe will have to come to the market from increasingly distant sources, the above figures suggest that both in the short and medium term as well as in the longer term, Europe will be in a relatively comfortable supply situation and have sufficient potential for broadening its supply base provided that the necessary economic (price) incentives prevail.

The security of supply issue will therefore not be one of availability of reserves.

Analyses on the gas reserve outlook for Europe is given in annex 6.

5.2. The EU's long-term supply options - role of present suppliers and new sources.

Long term security of gas supply is the ability for the future demand for gas to be met by a diversified combination of indigenous and imported gas supplies. Domestic EU gas production will remain significant for many years to come and Dutch gas

production in particular will maintain an important role in EU gas supply also in relation to supply flexibility. There could also be considerable prospects for finding more gas in deep waters in both the UK and Norway.

The existing three main external suppliers, Norway, Russia and Algeria are expected to remain the most important external gas suppliers to Europe for the time horizon up to 2020. It is not unlikely that by 2020, Russia, Norway and Algeria may still cover about 90% of total EU gas imports. However, before 2020 it should be expected that gas imports from these countries will no longer only be made under contracts with the traditional state-controlled companies and entities (Gazprom, GFU and Sonatrach) but a wide range of producers including EU/western oil and gas companies engaged in upstream gas exploration and production.

In 1998, these three countries exported around 160 BCM to the EU. Their potential annual export capacity to Western Europe could well become as high as 350 BCM or even higher in the future.

Further details on the reserve and supply potential of the current and possible future gas suppliers to Europe including the important role of LNG is given in annex 7.

5.3. How will expected demand be met? Bringing gas reserves to the market - financing the EU's future gas supply.

Information from Member States and the European gas industry indicate that present supply contracts will cover the foreseen demand until around 2005-2010. Thereafter, a gas supply deficit will arise and gradually widen to reach around 100 MTOE or nearly a quarter of EU gas demand forecast for 2020 (see annex 2).

The future supply gap does, however, not represent a problem of security of gas supply but mainly reflects the fact that gas producers develop reserves gradually and that gas companies prefer to procure supplies on a rolling basis in view of the risks and uncertainties involved. Moreover, the future supply gap represents an important opportunity for new players to procure gas and enter the competitive market. Demand and supply should, therefore, in any case match each other at some point.

The EU's long-term gas security challenge is mainly related to the continued ability to ensure, remunerate and finance adequate investments in gas supply infrastructure which in turn depends on the ability of the market to pay a rewarding gas price to cover the supply costs related to bringing new supplies from increasingly remote areas to the European gas market.

According to a European gas industry estimate, investments in the order of US\$ 100-200 billion will be required in the overall supply infrastructure to meet Europe's increasing gas demand over the next two decades. The European gas industry estimates that the forecast gas demand can be met by supplies at a price level which is competitive against other energy supplies at relatively modest energy prices including an assumed oil price level ranging from 10 US\$/bbl (in 1999 prices) raising towards 20 US\$/bbl by 2020. On the other hand, if gas were not competitive in the future, for example against oil due to very low oil prices, then the demand for gas may be lower and the incremental import requirements correspondingly so. The demand forecast for gas should therefore not rigidly be seen as something exogenous but rather as

dynamically determined by demand and supply in a competitive energy market and subject to uncertainty.

The growing and opening European gas market is by its virtues and appetite for more gas an attractive market for external suppliers and provides opportunities for launching new supply projects to Europe.

A number of factors will influence the equation of how much investment will be made in new gas supply infrastructure and how much additional gas is likely to reach European markets. These factors include i) the general level and trend in energy prices and taxes; ii) technical, economic and political risks and, in function thereof, required rates of return; iii) technology and efficiency drivers reducing unit production and transportation costs; iv) strategies of existing and future new market players; v) project organisation and financial feasibility and vi) longer-term environment policy constraints (even for natural gas, which is considered a clean fuel but nevertheless a fossil fuel, the climate change issue may represent an element of uncertainty in relation to gas infrastructure investments which are typically planned for an economic lifetime of some decades).

New gas supply projects around the world will be competing against each other and indeed other investment projects in other sectors in attracting risk capital. The relative economics as well as financing risks of these projects will determine those which will materialise and when. As financial institutions including private commercial banks will have a major role to play in the financing of new gas supply projects to Europe, their assessment of risks and project economics will be key to their realisation. Mobilising new gas resources for the market is not only a question of costs and prices. It also raises significant organisational and financial challenges. Appropriate organisational and contractual solutions as well as political and governmental support and international co-operation between gas sellers and off-takers including equity financing and credit enhancement schemes by potential buyers can facilitate project realisation.

The financial resources of oil and gas companies can play a key role in project realisation. The increase in size of gas companies through mergers, joint ventures and other forms of corporate combinations is likely, in a larger and competitive market, to increase efficiencies, create economies of scale and strengthen the financial capacities of companies required for new projects. This will have positive implications on gas security and could enhance competition in the larger single market. It is, however, necessary to ensure that such corporate developments do not hamper competition in specific markets. In particular, it is necessary to ensure that such developments do not lead to the creation or strengthening of a dominant position as a result of which effective competition would be significantly impeded.

International gas purchase arrangements have been based on take-or-pay contracts, which have provided a risk sharing mechanism between sellers and buyers and facilitated financing of gas supply projects based on more or less captive markets. The purchasing price under such contracts has typically been linked to the oil price as established for example by the Rotterdam spot oil market.

European gas purchasing contracts are, however, gradually being adapted to the emerging new competitive regime with increasing flexibility and market response. More flexible pricing provisions; shorter duration contracts and more flexible volume provisions as well as new forms of market responsive re-negotiation provisions, may

well be needed for securing market share in reflection of the dynamically changing market value of gas.

New financial and hedging instruments are emerging in the gas market which are likely to change the traditional perception and management of risks. Such new risk covering and sharing instruments may underpin the financing of future gas supply for Europe complementary to take-or-pay contracts. Linking the gas price to the oil spot market seems to provide no more security or predictability in prices and project economics than linking it to the spot price of gas as it develops or partly to the European electricity pool prices. However, due to inter-fuel competition and the possibility of substituting gas by oil in most market sectors, oil prices are likely to remain important also in relation to gas prices in the future.

Spot markets already exist in the UK and a trading hub is currently being established at Zeebrugge in Belgium, which is a European crossroads for gas flows. Other similar gas trading platforms and energy commodity exchanges are expected over time to emerge across Europe as markets become liberalised and more liquid and as supplies are diversified.

While in fact the market will decide, the development of natural resources is also in many cases politically driven. The EU therefore has a supporting role to play to minimise political risks related to project development.

By co-ordinating existing Community actions more closely with Member States and international financial institutions, the combined efforts will bear more fruit to the benefit of both producing and consuming regions. Such supporting political actions can underpin operational measures of the EU gas industry.

Managing geopolitical risks.

The best recipe to reduce or manage geopolitical risks and to ensure security of supply for Europe in a situation in which gas will have to be produced further afield and transported over longer distances is one that is based on free trade; integration of markets and closer and strengthened co-operation with external suppliers and transit countries. A reciprocal integration and opening of upstream and downstream markets will attract capital and thus provide new ways of financing projects.

Such co-operation could, based on free market principles similar to those of the internal energy market i.e. free movement of goods, non-discriminatory right of building new gas facilities and of access to the gas system, gradually de-politicise gas resource development. This co-operation and integration should be pursued through joining forces within the EU and with other interested parties including international financial institutions. In this way, the EU will be in a stronger position to safeguard, when necessary, its interest with regard to secure and diversified gas supplies.

In an international political and economic situation where it, in any case, is in the interest of the EU to ensure stability in neighbouring regions including the NIS and northern Africa, gas market integration and co-operation with these regions is not only the necessary and best formula with regard to ensuring EU gas security. Despite the uncertainties, the increasing dependency of the EU on gas imports from these regions

may in fact also be seen as a challenge and an opportunity, which creates conditions for closer commercial co-operation and industrial development.

Further integration of markets in- and outside Europe should therefore be encouraged. In this respect, the Commission expects that the opening up of the EU energy markets will have a positive and spill-over effect in countries neighbouring Europe, which might facilitate a gradual de-coupling of gas resource developments from political issues.

EU gas market opening should not be a one-way street. The EU should ensure that there would not be unilateral advantages of EU market opening for external suppliers and that reciprocity in market liberalisation and integration of markets is respected.

The purpose should be to give a common strategic external dimension to EU gas market liberalisation and ensure sufficient, multiple export pipeline capacity from potential supply sources to the EU.

It is therefore important for the EU to promote the implementation of market rules upstream such as access to energy resources and to the network and thereby to promote supply-side gas-to-gas competition among individual producing companies. This would also help facilitate the establishment of a European gas price, which could provide a reference and commercial basis for planning and implementing future investment projects.

Diversification of supply should, as far as possible, be left to the market and the role of governments should primarily aim at providing stable and predictable frameworks and incentives favourable to investments taking into account the Community dimension.

International trade and security of transit.

To help the market mechanism, the EU in co-operation with other regional organisations and international financial institutions should concentrate on risk reducing measures, creation of favourable investment opportunities for new gas supply infrastructure, promotion of diversification of supply routes, co-ordination of feasibility studies and integration of networks and markets. This should be based on a wider acceptance of market principles, general competition policies, a systematic and targeted use of its foreign and trade policies and financial resources available.

The provisions of the WTO and the Energy Charter Treaty as amended by the Trade Amendment will play a key role in ensuring the legal framework for such an integration of markets and for the promotion and safeguarding of energy sector trade and investments. Other international agreements may complement this as a basis for international gas sector co-operation. International political co-operation is therefore key to support long-term EU gas security of supply.

Secure transit regimes are essential as long-distance transit increase in importance and in order to stimulate investors' confidence. Strengthening international rule of law with regard to energy transit should therefore be welcomed and the work under the auspices of the Energy Charter Conference on analysing the usefulness of a legally binding Multilateral Transit Framework agreement or Model Agreements and Codes of Conduct should be encouraged and strongly supported by the EU as it would help secure transit and sanctity of transit agreements. It would also open up transit routes

on a non-discriminatory basis to interested parties when capacity is available thereby avoiding that gas resources are locked-in and unable to compete for markets. The role of Russia and NIS are, in this respect, essential.

6. CONCLUSIONS AND RECOMMENDATIONS.

Two main axes of issues have been identified in this Communication with regard to security of gas supply. Firstly, issues related to short-term gas security, which will have to be addressed mainly within the framework of the internal gas market.

However, the internal gas market can not, due to the increasing import dependency, be seen in isolation from the external geopolitical and economic realities. Secondly, therefore, a series of external issues and policies will have to be addressed also in the future mainly relating to longer-term aspects of security of gas supply. These internal (short-term and operational) and external (long-term and strategic) security aspects are in turn summarised below.

Internal gas market issues.

1. Security of gas supply has been managed successfully by the European gas industry during a phase of steady growth and expansion over recent decades. As gas becomes increasingly important in the EU's overall energy fuel mix, it also becomes more important for the EU's overall energy security and hence the responsibility of the EU gas sector increases.
2. The progressive completion of the single gas market gives security of gas supply an increasingly important EU dimension. The removal of barriers to supply-side competition, trade and investments within the internal gas market as well as closer cross-border co-operation, continued network development, market integration and removal of obstacles to interoperability of gas systems with different characteristics will facilitate the realisation of this EU dimension.
3. In view of the transition towards the single gas market, Member States should, according to their gas market features and structures, ensure that security of gas supply policies adapted to the new market environment are properly translated into clear roles, operational responsibilities and emergency procedures for all participants involved in the gas business. While the operational responsibility must remain with the gas industry, Member State governments as well as the Community have an important co-ordinating and supporting role to play in this respect.
4. Care should be taken to ensure that security of gas supply policies and obligations of market participants do not constrain the development of competition in the single gas market including cross-border trade and entrance of new market players.
5. The Commission has a role in monitoring the appropriate establishment of security of supply policies and definition of roles and responsibilities of the different market players in order to ensure a level playing field. The Commission should, in close co-operation with Member States and the European gas industry, actively monitor the development of EU security of gas supply.
6. Due to the structure of the gas supply to the EU, the main supply risks of individual Member States is a common risk shared with other countries. This gives a common

EU dimension to measures aimed at preventing or managing a major gas supply crisis. This is also recognised by article 24 of the Gas Directive relating to a sudden crisis in the energy market. Moreover, as set out in article 99 of the Amsterdam Treaty, Member States shall regard their economic policies as a matter of common concern and monitor and co-ordinate these. The energy sector is an important component in the overall EU economy and security of energy supply is crucial for the functioning of the EU economy. Continued monitoring of security of EU energy supply is therefore important.

7. With a view to be able to continuously monitor the general state of security of EU gas supply, transparency and exchange of information between companies and authorities on gas demand and supply and system capacities is crucial. The Member States and the Commission should agree on the most appropriate ways in which to ensure sufficient transparency in this respect and methods to ensure the availability of the relevant data in order to allow, also in the future, a reasonable assessment of the development of EU gas security to be made. Such an assessment can be made without compromising confidential commercial information of gas companies and without hampering competition.
8. Further integration and increased capacity of the pan-European gas grid is essential for enhancing security of supply in particular for the most exposed Member States. In respect of the existing TEN programme's stated aim to enhance security of gas supply, there should therefore be particular emphasis on:
 - removing non-financial barriers to the future development and integration of gas networks of European interest;
 - prioritising the identified "missing links" that preclude present and future Member States from the ability to improve their security of gas supply position.

External issues

9. The EU has a common interest in continuing and deepening the development of strategic relations with external suppliers and transit countries in order to mitigate both political and technical risks associated with future supplies to the EU and to ensure multiple import pipelines supplying Europe. This will become increasingly important in the future and the Community should therefore play a stronger role in this respect. This is particularly important in view of the development of the single EU gas market.
10. While energy matters are already part of EU external relations (e.g. through Partnership and Co-operation Agreements with Russia and Ukraine and the Common Strategy of the European Union on Russia), a further integration of the energy dimension in EU foreign policy including international trade policy would generally have a positive impact on security of EU energy supply and in promoting industrial co-operation between the EU and key non-EU gas producing and transiting countries.
11. Closer gas sector co-operation with non-EU countries should be based on the principles of free trade, integration of open, competitive markets and reciprocity in market liberalisation consistent with WTO provisions.

12. The roles of Russia, Ukraine and Algeria are particularly critical and closer dialogue with these countries and potential new gas exporting countries to Europe as well as key transit countries should be pursued. Given the challenges and potential difficulties facing some of these countries, the market mechanism may need to be complemented by political support and regional co-operation schemes.
13. Opportunities for involvement of EU companies further up the gas supply chain in these regions (in exploration, production, transmission and trade) would have a beneficial impact on security of gas supplies for the EU. The dialogue with the EU gas sector and external producers and transit countries on how best to facilitate, support and safeguard investments and commercial operations of EU companies abroad within the framework established by the Energy Charter Treaty and the WTO should be deepened.
14. A continued close co-ordination of the financial means available to the EU to promote and stimulate investments should be ensured for the gas sector in relation to the external dimension of the EU energy market. The scope for joining forces with other regional organisations and international financial institutions as well as the private sector should be assessed.
15. This co-ordinated action should promote key projects of European interest including gas supplies from new sources such as Central Asia; the Middle East; North Africa or the Barents Sea and focus on the state of existing gas transit pipelines to Europe.
16. An increasing emphasis should be given to the external dimension of the TEN-Energy programme, for which an up-dated Communication from the Commission to the Council and the European Parliament is foreseen.
17. Secure transit regimes are essential, as long-distance transit will increase in importance and in order to stimulate investors' confidence. Strengthening international rule of law with regard to energy transit should therefore be welcomed and the work under the auspices of the Energy Charter Conference on analysing the usefulness of a legally binding Multilateral Transit Framework agreement or similar measures should be encouraged and brought to a rapid conclusion as it would help secure transit and sanctity of transit agreements on the basis of non-discrimination and equality of treatment. The Commission will be proposing to the Council a mandate for the negotiations on an international transit framework agreement.

General.

18. An advisory forum for monitoring and analysing EU gas demand, supply and security issues should be established with representatives of Member States, the European gas industry and the Commission. The scope of work of the advisory forum should include a co-ordinated, formal and transparent exchange of information among commercial players and authorities on shorter-term EU gas security developments as well as a forward-looking dimension aimed at fostering closer gas sector co-operation between the EU and key external gas producing and transit countries. The terms of reference of the advisory forum should be further elaborated in liaison with Member States and industry.

19. The Commission will report on a regular basis to the Council and the European Parliament on EU gas security issues. If and when appropriate, the Commission will make proposals to strengthen security of EU gas supply and further develop the common framework for EU security of gas supply.
20. The Commission will submit a Communication on energy security more generally. This Communication will be an opportunity for further analysis and stocktaking of the EU gas security situation and for considerations of possible EU policy measures to ensure security of supply.

7. ANNEXES

The following annexes are attached:

- Annex 1: The increasing importance of gas in EU energy supply.**
- Annex 2: The long-term gas supply outlook for the EU.**
- Annex 3: Gas security tools.**
- Annex 4: Risk assessments for gas supplies from Algeria and Russia – mutual dependency.**
- Annex 5: The importance of continued integration of gas markets and networks.**
- Annex 6: The gas reserve outlook for Europe.**
- Annex 7: The EU's long-term supply options – the role of present suppliers and new sources.**

The increasing importance of gas in EU energy supply.

Table 1: The increasing importance of gas in EU energy supply: 1985-2020 (MTOE).

<i>MTOE</i>	1985	1995	1998	2000	2010	2020
EU Gas Demand	198	273	299	338	401	431
Energy Demand	1241	1366	1401	1454	1556	1612
Share of Gas	16%	20%	21%	23%	26%	27%
EU Gas Production	132	167	180	204	191	141
Net Gas Imports	69	109	120	133	210	290
Import Dependency	35%	40%	40%	39%	52%	67%

Source: Eurostat and DG Energy (Primes – Baseline for Shared Analyses). Preliminary estimate for 1998.

Gas demand has increased in both absolute and relative terms over recent decades. Between 1985 and 1998, gas demand increased by 51% compared with the overall growth in energy demand of 13% during the same period. Domestic EU gas production increased by 37% during the same period, much of which, however, can be attributed to a strong growth in UK gas production.

EU gas demand is expected to increase by nearly 45% between 1998 and 2020. Based on the current outlook, EU gas production, however, is expected to level off after 2005 and decline thereafter.

In 1998, 60% of the EU's gas consumption was covered by domestic EU gas production. The main gas producers within the EU in 1998 were the UK (82 MTOE); The Netherlands (57 MTOE); Italy and Germany (15 MTOE) and Denmark (7 MTOE). France, Ireland and Austria produced minor volumes of gas and Spain and Greece insignificant volumes.

The net external dependency therefore differs considerably between Member States from 0% (The Netherlands, the UK and Denmark) to 100% (Belgium, Finland, Sweden, Greece, Luxembourg and Portugal).

The Netherlands is a major exporter of gas to Germany, France, Belgium and Italy. In 1998, the share of Dutch gas exports represented 9% of total EU gas demand. Also Germany, the UK and Denmark export some gas in intra-Community trade. Some gas is being exported from the EU to Switzerland and Central and Eastern Europe.

The long-term gas supply outlook for the EU.*Table 2: The long-term supply outlook: 1998-2020 (MTOE):*

<i>MTOE</i>	1998	2010	2020
EU Gas Demand	299	401	431
EU Gas Exports	1	3	3
EU Gas Production	180	191	141
Required Gas Imports	120	213	293
Net Contracted Gas Imports	120	198	196
<u>Of which:</u>			
Russia	50	74	75
Norway	33	70	66
Algeria	35	44	45
Others	2	10	7
Gas Supply Deficit	0	15	97

Source: Eurostat, DG Energy (Primes – Baseline for Shared Analyses) and Eurogas (for EU Gas Exports and Net Contracted Imports 2010-2020). Preliminary estimate for 1998.

Gas security tools.

The European gas market is characterised by a high degree of diversity between the 15 Member States. In function of the specific characteristics of the different markets, the gas industry of the different Member States employs a combination of a range of different tools available to balance supply and demand and, if necessary, respond to disruptions in supply to ensure short-term security of supply.

On the gas supply side, the so-called line-pack, i.e. gas stocked in the pipeline, can be used as a first means to balance demand and supply fluctuations within the day. Beyond this, the most obvious response to a sudden need for additional volumes of gas is to increase indigenous gas production. If indigenous gas production is not available, gas imports may be increased to make-up for any deficit. Both of these solutions find their upper limits in the availability of gas supplies and transport capacities.

Withdrawals from gas storage facilities is another source of supplementary gas supplies. However, not all Member States have such facilities available.

On the gas demand side, gas suppliers often conclude interruptible contracts with certain large industrial consumers and power generators. These, in return for a discount on the gas price, have the contractual obligation to switch from gas to alternative fuels in times of need.

Contingency plans normally exist that plan for specific emergencies and detail appropriate responses in order to minimise difficulties. These usually include interruption of customers on a predetermined priority basis. Much effort is obviously made by gas companies to prevent emergencies in the first place.

Risk assessments for gas supplies from Algeria and Russia – mutual dependency.

Risk assessments and probabilities of prolonged disruptions of external gas supplies are often difficult to assess. This is a reason for the European gas industry to have established contingency plans and back-up for the event of a possible disruption.

The increasing EU dependence on non-OECD gas suppliers and transit countries could be a potential cause for concern taking into account the politically uncertain situation in some of these countries. Any concerns of gas importing countries with regard to security of supply would be matched by reciprocal concerns and needs for security of markets and hard currency revenues of gas producers such as Russia and Algeria to finance investments in exploration, production and transportation infrastructure and, perhaps more importantly, to contribute to the financing of the state budget.

This mutual dependency is further accentuated by the rigidity of dedicated long-distance transportation pipelines. Firstly, the supply country would not wish losing a significant source of income in hard foreign currency by interrupting gas flows. Moreover, the suppliers would have difficulties in selling its gas elsewhere as the long distance pipeline infrastructure is relatively rigid. The same argument also applies, albeit to a lesser extent, to transit countries, which are often paid in kind with gas for their transit services.

However, despite this mutual dependency, political risks can not be ignored. Diversification of gas supply sources and routes should therefore in any case remain a strategic objective of the EU and be encouraged with a view to reduce risks of disruptions and improve the functioning of the market by providing supply competition. The diversity of supply and transit routes enhances security for consumers and producers alike.

The continued ability of external gas producers and transit countries to maintain and develop their gas supply infrastructure is crucial for the EU. It is a matter of some concern that the financial and economic situation in countries such as Russia and Ukraine, including their dominant gas companies, as a result of massive domestic non-payment is suffering from a shortfall in investments in maintenance of existing capacity and development of new production and transportation infrastructure.

The interest of the EU is to maintain external suppliers, which are financially strong and capable of undertaking the necessary investments in the up-stream sector. Similarly, it is in the interest of external suppliers to open up their oil and gas sectors to attract foreign capital investments, which may contribute to maintaining and developing their production and transportation capabilities.

The importance of continued integration of gas markets and networks.

The issue of network investments, is an issue mainly for the market itself to deal with although governments, the Community and international financial institutions should support the efforts of gas companies as appropriate. Some Member States remain, however, constrained by a physical lack of supply interconnections and related cross-border possibilities of co-operating on using security tools.

In view of the significant benefits of increased use of gas, it is important that national and regional authorities take a balanced view of both local environmental considerations, which often cause significant delays in authorisation procedures, and the global environmental advantages of an increased use of gas. Further network development will make the need of the Member States having efficient and well co-ordinated authorisation procedures even more apparent.

Under the TEN-Energy programme, the Community is co-financing feasibility studies for potential new gas supply infrastructure. Although the financial resources available under the TEN programme are relatively limited in relation to the investments necessary to realise such projects, the support of the Community clearly has a stimulative effect in relation to launching feasibility studies on potential new projects of common interest and is considered to play a catalytic function. Both the Community regional development funds and the EIB are contributing considerably to the financing of EU energy projects. Community funding from the European Regional Development Fund for energy was about 2.1 billion € over the period 1994-1999 while EIB loans for energy TENs totalled about 4.7 billion € for the same period.

Over the last few years, the following major new European gas pipeline projects have been completed or are in the process of being completed:

- *Europipe I* (from Norway to Germany - in operation since 1995)
- *Netra pipeline* (from North-western Germany towards Berlin - in operation since 1995)
- *Maghreb-Europe pipeline* (from Algerian via Morocco to Spain and Portugal - in operation since 1996)
- *Yamal-Europe pipeline* (first stage - interconnection between the Polish and German networks (1996) and first line through Poland and interconnection with the Belarus section (1999))
- *HAG Pipeline* (from Austria to Hungary - in operation since 1996)
- *Scotland-Northern Ireland Interconnector* (in operation since 1996)
- *Bulgaria-Greece* (in operation since 1996)
- *Trans-Mediterranean crossing II* (from Algeria/Tunis to Italy - in operation since 1997)
- *Portugal-Northern-Spain interconnection* (in operation since 1998)
- *NorFra-pipe* (now called *Fran-pipe* - from Norway to Dunkerque in France - in operation since 1998)

- *UK-Continent Gas Interconnector* (in operation since 1998)
- *RTR pipeline system* (reinforcement of the Belgian gas transportation system - in operation since 1998)
- *WEDAL pipeline* (interconnecting WINGAS' network in Germany with the Belgian system and thereby with the Interconnector - in operation since 1998)
- *Second Danish off-shore gas pipeline* (in operation since October 1999)
- *Europipe II* (from Norway to Germany - in operation since October 1999)
- *Trans-Austrian Gasline (TAG) III* (under construction)
- *France-Switzerland-Italy interconnection* (under construction)
- *Existing export corridor from Russia via the Slovak and Czech Republics* (under expansion).

Also underground gas storage capacities have been increased throughout Europe and LNG terminal capacities have been reinforced. In 1998 alone, the EU gas industry invested nearly 9 billion € in new gas infrastructure.

In addition, a large number of further potential gas pipeline interconnector projects, underground gas storage and LNG terminal facilities are currently being studied including Northern transport routes for Russian and Norwegian gas to and through the Baltic Sea region; pipeline projects from the Central Asian region (Caspian Sea basin and Caucasus) towards Europe; links in the Adriatic and Ionian seas; and possible links between Northern Africa and Southern Europe including a link between Libya and Italy. Several LNG projects mainly in the Southern and Mediterranean parts of Europe are also being analysed including LNG terminals in north-western Spain and offshore the Italian coast in the Adriatic Sea.

The main gas suppliers of the EU gas market are not interconnected between themselves in all Member States. While this may not be economically feasible in all circumstances, priority should be given to the "missing links" in the trans-European gas network. A continued development of network interconnections between Member States and countries outside the EU is central to enhancing security of supply within the Union. For the Member States most concerned, the following missing links have been identified:

- Greece: Links to Italy and Turkey.
- Portugal: Development of LNG facilities.
- Spain: Increased links to France and development of LNG facilities.
- Finland: Interconnections to Nordic countries and/or Baltic States.
- Ireland: Second Inter-connector to UK (e.g. Northern Ireland or Scotland) or development of new offshore production fields.
- Sweden: Further interconnection to Denmark, Norway, Finland or Germany.

A general need to further increase capacity and the availability of storage has also been identified for most Member States.

By 1 January 1999, the total working volume of underground natural gas storage within the EU was around 50 billion cubic metres contained in around 85 storage facilities in 9 Member States. This storage volume is equivalent to nearly 15% of EU gas consumption in 1998 or 50 days of average gas consumption. According to estimates by the European gas industry, the capacity of underground gas storage of the EU will increase by 50% at the very least over the next 20 years thereby more than keeping pace with the expected consumption growth.

While it may be argued that some EU Member States have easier access to external gas reserves and are better interconnected into the trans-European gas network than others, this situation may gradually change. The fact that some of the peripheral countries, paradoxically, are located relatively close to large, potentially new supply sources should provide opportunities for these countries to become further integrated in the European gas grid and for some of them even to serve as transit corridors for the larger EU gas consuming markets as demand increases and new import projects will have to be brought on stream to meet demand.

The gas reserve outlook for Europe.

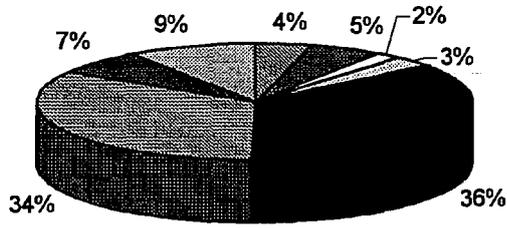
At 1 January 1999, proven gas reserves within the EU stood at approx. 3,200 BCM which would correspond to approx. 14 years of gas production at current level. The main gas reserves within the EU are held by The Netherlands (56% of total EU gas reserves) and the UK (24%).

Although no extrapolation should be made from this, both world and European proven gas reserves have increased over the past 20 years. The world's reserve/production ratio for gas has been growing continuously over the last two decades, despite rapidly growing consumption, from less than 45 years in 1980 to around 63 years of production by 1998 thereby prolonging the lifetime of proven gas reserves beyond 2060 at current rate of production. Proven gas reserves in the world are now in absolute terms as large as the oil reserves for which the reserve/production ratio currently equals 41 years of production. Moreover, historically there has been much less exploration for gas than for oil and proven gas reserves have therefore grown much faster over the last two decades than oil reserves have. In addition to the proven gas reserves, there are other, less certain categories of gas reserves and resources. The total gas reserves in the world are generally estimated to be several times bigger than the currently proven gas reserves.

Several factors have contributed to the growing proven reserves of gas including efforts made by producers to increase field recovery by use of new technology and cost reductions which in turn stimulate new exploration and production activities and render the production of otherwise non-economic and marginal fields commercially viable. Also national authorities have encouraged exploration and production activities through new licensing rounds, "open-door" policies and, when necessary, relaxation of taxation and royalty regimes with a view to provide satisfactorily incentives for oil and gas exploration and production.

In addition to the natural gas reserves, there seems to be an increasing interest in the future supply potential of natural gas hydrates. Natural gas hydrates are solid, crystalline, ice-like substances composed of water, methane (the main component of natural gas), and usually a small amount of other gases (e.g. noble gases such as helium). The central consensus on the size of these resources suggests that they are nearly 150 times the size of total proven natural gas reserves in the world. Natural gas hydrates, only known since the mid-1960s, are normally found in permafrost regions onshore or at water depths exceeding 450 meters. Provided that they can be tapped, the vast deposits of natural gas hydrates hold the promise of meeting global natural gas needs far into the future.

**Distribution of Proven Gas Reserves in the World
(End 1998 - Total: 158,000 BCM)**



- North America
- Latin America
- EU
- Rest of Europe
- FSU
- Middle East
- Africa
- Asia Pacific

Source: Cedigaz

The EU's long-term supply options – the role of present suppliers and new sources.

A brief analysis of the reserve and export potentials of the EU's current main external suppliers as well as possible new sources of supplies is made below.

Algeria:

Algeria holds considerable reserves (nearly 3,800 BCM at 1 January 1999) and has been upgrading its export capacity towards Europe. From a current export level of approx. 50 BCM/year, Algeria plans to increase its export potential to 90 BCM/year.

Algeria also depends on its EU hard currency export revenues. Exports, almost exclusively to the EU, account for 65% of the marketed production. The country has been exporting gas since the early sixties in the form of LNG. Export routes were diversified in 1982 with the opening of the Trans-Med Line to Italy and again in 1996 with the opening of the Maghreb line to Spain and Portugal via Morocco.

Norway:

Norway has considerable gas reserves (3,950 BCM at 1 January 1999) and has become increasingly well integrated into the EU gas network. Norway does not yet use natural gas of any significance in its own energy balance. The gas is being exported through six major pipelines to the Continent and the UK. Additional pipelines are under construction or being studied.

Due to a need for reinjection of gas to maximise oil recovery, gas exports are temporarily constrained to already committed growing exports. In the longer term, however, Norway may be able to increase its gas production level considerably, possibly up to as much as 100 BCM/year. Norway is expected to increase its current EU gas market share of 11% to at least 15% by 2010.

Russia:

Russia is the largest of the EU's external gas suppliers, providing around 42% of the EU's natural gas imports or some 17% of the EU's total natural gas demand equivalent to around 4% of the EU's total energy supply.

Russia is the largest gas producer in the world, with a production of nearly 600 BCM in 1998, and has the largest gas reserves in the world, holding alone nearly one third (48,000 BCM) of total proven natural gas reserves. However, the gradual depletion of large Siberian gas fields will require major investments in developing new fields, some of which will be less accessible and more difficult to develop such as the Yamal peninsula.

Gas covers about 50% of Russia's total primary energy supply. The share of Russian gas in the EU's gas demand is expected to increase in the future both in absolute and relative terms.

Given its relative proximity; the traditional strong role of Russian gas in European supply and the infrastructure already directed towards Europe, the European market is

of particular importance to Russia. During recent years, Gazprom has signed a number of long-term contracts with Italy, Germany, The Netherlands, Turkey, Poland, Hungary and a number of other Central and Eastern European countries, which will increase Russian exports to Europe.

Gazprom is promoting further export pipelines towards Europe. Currently, the main priorities of Gazprom, given its financial constraints, are the so-called Blue Stream project through the Black Sea to Turkey and the Yamal-Europe pipeline towards Germany.

Gazprom has also increased its direct presence in the European gas market through downstream joint ventures in several European countries; strategic alliances and co-operation agreements. In relation to gas security, such forms of co-operation could have a positive effect although it should be ensured that such privileged alliances are not being used unjustifiably to hamper competition.

Although the European gas market is an attractive market for Russian gas suppliers, other gas markets are growing very rapidly and in the future may compete with Europe with regard to securing gas supplies from Russia. This is particularly the case for Asia including China. Also a recovery of the domestic Russian economy could strain the availability of reserves for the export markets although there is much room for energy efficiency gains and saving in Russia, which could release significant gas volumes.

New supply provinces:

There are several potential new supply provinces for Europe including Central Asia and the Caspian Sea basin (Turkmenistan, Kazakhstan, Uzbekistan and Azerbaijan), the Middle East (including Iran, Qatar, Saudi-Arabia, Abu-Dhabi, Iraq, Oman and Yemen); North-Africa (including Algeria, Nigeria, Libya and Egypt); the Barents Sea (including both Russian and Norwegian gas reserves) and Caribbean gas reserves (including Trinidad and Tobago).

The EU gas industry is already strengthening its commercial ties with and involvement in these regions.

LNG import capacity is an important element in the EU's gas supply portfolio as it contributes both to diversification of supplies and delivery points; flexibility and peak balancing. One of the advantages of LNG is that tanker mobility enables LNG to supply other markets than initially planned and that customers have a corresponding flexibility in their choice of LNG supplier.

There are a total of eight LNG terminals in the EU. In recent years, LNG has played an important role in the European gas market and has through short-term, spot-type cargoes facilitated interesting and flexible new forms of gas trade and swaps. Such spot deliveries from often quite distant sources such as Australia and the Middle East is likely to continue when spare terminal and cargo capacity and the economics will allow it. However, LNG could also see a more general increase in base-load utilisation in the future as new terminals, in particular in southern Europe are expected to come on stream and in function of efforts made to reduce costs (e.g. by increasing the size of LNG terminal facilities and tankers and introducing new technology) and the overall competitiveness and benefits of LNG.

ISSN 0254-1475

COM(1999) 571 final

DOCUMENTS

EN

12 02 14 10

Catalogue number : CB-CO-99-565-EN-C

Office for Official Publications of the European Communities
L-2985 Luxembourg