

Enlarged EU/EEA gas supply and the policy framework

**An updated analysis of the enlarged
EU/EEA and the external gas
production potential and their
relationship to the policy and
regulatory framework**



Table of Contents

Introduction	1
Executive Summary and Key Messages	2
Resources.....	2
Drivers for Realisation.....	2
Risks	3
EU Facilitating Role	3
Gas Resources	4
The gas resource position of the EU.....	5
Position of external resources.....	6
Drivers for Realisation	8
Technological Challenges.....	8
Gas Supply Projects.....	8
Investors' Requirements.....	9
Main Drivers.....	9
Risks	11
EU Facilitating Role	12
Energy Objectives.....	8
Focus Areas	8
Gas Exporting Regions	13
Africa.....	13
FSU.....	13
Middle East.....	13
Caribbean.....	13
Appendix	14

Introduction

In the Conclusions of its fifth meeting on 7 and 8 February 2002, the European Gas Regulatory Forum

"welcomed the comprehensive work undertaken by the International Association of Oil & Producers (OGP) analyzing the domestic EU/EEA gas production potential and the potential of existing and new external gas suppliers within the context of a competitive single market for gas. The Forum stressed the importance and quality of the work carried out by OGP and invited OGP to continue its work on these issues and to prepare a more detailed paper for the next meeting of the Madrid Forum".

OGP has taken the opportunity to continue its work. In so doing, and in the light of more recent data since its first analysis report OGP has updated the indigenous production potential, included the major producing accession countries and will provide a closer look at the external resources. This latest data supports the encouraging supply forecast provided in the previous OGP analysis and reaffirms the view that there is enough resource potential to satisfy demand of an enlarged EU¹ well up to the end of this century even if a conservative approach in the assessment and the analysis of the domestic and external resources is used.

The commercial environment and the policy and legislative framework within which gas producers operate is, however, critical in terms of what resource is likely to be developed when and most importantly where. Again OGP has to stress that the success of the EU's internal market in natural gas will rely on sufficient supplies of indigenous and external gas being developed by gas producers to meet anticipated demand. To this end a diversified resource portfolio is essential for sustained supply security of an enlarged EU. Timely external diversified supply is best engendered by placing energy objectives at the forefront of EU foreign relations, especially the promotion of political stability and open investment regimes in non-EU nations. The maximization of indigenous production potential depends very much on getting the policy and legislative framework right.

For both, internal and external policy supply security will be maximised by encouraging competitive market entry in a liberalised market where all customers enjoy the supplier of choice.

¹ Any reference to "EU" in the context of this paper shall include the EU15 plus Norway and the accession countries.

Executive Summary and Key Messages

Analysis from the EU Commission has confirmed the growing importance of gas to the EU's primary energy needs. This is also true at a global level where gas is now recognised as the fuel of choice. To maintain gas supplies to Europe over the period up to 2020, capital investment of up to 500 billion Euro will be required. The oil and gas industry has a track record of delivering secure and affordable gas supplies to Europe over the past five decades.

Resources:

There is sufficient gas resource within and outside the EU area both to sustain gas production within the EU through this century and, in total, to supply expected EU and global demand for at least 100 years. The physical existence of the resource will be no limiting factor.

- The updated remaining potential EU recoverable natural gas resources - including the undiscovered potential - are about 13,000 billion cubic meters (BCM). At current consumption levels this would be equivalent to supply the EU area with natural gas for the next 30 - 40 years.
- Gas resources potentially available for export to Europe - domestic demand and - for the "Reserves" category - economic and technical feasibility have been taken into account - amount to approximately 180,000 billion cubic meters.
- About one third of the gas resources are undiscovered potential whose exploitation depends critically on a supportive and enabling policy framework.
- The undiscovered potential as included in this report represents a midpoint with a considerable upside potential. For some regions this upside potential is difficult to grasp, as major areas remain as yet unexplored.

Drivers for Realisation:

Realisation of gas imports to meet forecast demand depends very much on political, economic and business stability. Other driving factors include the timely investment in infrastructure and field development.

- Political and economic stability are important factors. Political unrest or extensive state control over gas production are limiting the willingness to engage with these areas and might lead to concerns with respect to security of supply.
- Much of the gas from outside the EU area has to travel considerable distances - either through pipelines or as liquefied natural gas (LNG) - to reach the European market. Reliable infrastructure needs to exist including the legal framework to facilitate the construction of such infrastructure and to support the uninterrupted transport through the infrastructure.
- Investment required to develop and produce resources is considerable and long lead times for new projects add to the risk. A stable, simple and pro-investment regulatory climate and predictable and appropriate fiscal policies are essential to allow adequate risk assessment and to foster investor confidence.
- The future import requirements are set to increase and investment in infrastructure has to be made today to be able to maintain existing and realise future and increasing import.

- Maximum exploitation of gas resources will depend on the development of the necessary technologies and the availability of a skills base.

Risks:

The availability of natural gas for import into Europe could be limited by economic and political barriers rather than the physical existence of the resource.

- In some countries with the potential to attract investment that will maximise gas export to Europe and beyond, political, legal and economic stability will remain key determinants in meeting the risk assessment criteria of foreign investors. The extent and manner in which state control is exercised is also a critical factor in underpinning the viability of the investments.
- Given the long lead times (5 to 10 years) for new projects, decisions have to be taken in a timely manner in order to safeguard continuous supply. If confidence in the ability to operate a project profitably over a long time period is not given, foreign investors and exporting countries alike will be hesitant to enter into such projects.
- Indigenous EU production continues to play an important role in the overall supply portfolio. It is essential that all measures are in place to encourage optimal use of domestic resources.
- OPEC quotas for oil might also affect associated gas production.

EU Facilitating Role:

The EU has a major role to play in facilitating secure energy supplies by providing a stable and predictable framework inside Europe and at the same time to foster relations to gas exporting countries

- Support the required business environment and offer financial instruments to facilitate investment in infrastructure.
- Continue to support long-term contracts and long-term capacity reservations in order to bring gas timely to market.
- Support the development of infrastructure including the construction of LNG liquefaction and exporting facilities.
- Support in general political and legislative development in the gas exporting countries which are conducive for the evolution of long term political and economic stability, support the resolution of political conflicts and promote appropriate actions to lift sanctions.
- Enhance the accessibility of the European energy markets by further supporting the development of a market driven European pipeline network..
- Take a leading role in market development by providing a stable, predictable regulatory and fiscal environment. Communicate in a constructive fashion the rationale behind EU policy to exporting countries, whilst recognizing their internal policy requirements.

Gas Resources

The data quoted in this paper are based on information provided by companies and national industry associations that are OGP members and information taken out of the public domain and from a Wood Mackenzie study commissioned by OGP. The numbers represent estimates of unprocessed well stream gas resources, producible or produced as the case may be, which can be brought for processing or have been processed already to sales specification and sold to the market.

In the case of volumes available for export quoted for areas external to the enlarged EU (including Norway) but in economic reach, the OGP has used unprocessed well stream volumes less local demand. No attempt has been made to adjust or optimise the production in such external areas based on any market conditions or take into account existing or planned export contracts. Also infrastructure limitations have not been taken into account.

Since different national associations and indeed most companies use a wide variety of sometimes very detailed reserve and resource definitions the OGP has adopted a simplified format of three categories (applied to all resources for the enlarged EU area and all external areas), which are defined as follows:

Reserves: Meaning remaining resources in all currently known gas accumulations which will be produced in the future under the current economic conditions and the current available technologies i.e. this category may include nearly all gas volumes which in some countries are classified as proved and probable remaining reserves.

Discovered Potential: Meaning all other known remaining gas resources, including gas from undrilled structures which need new, advanced technologies, or improved economic conditions or any other incentives to be developed and brought to the market.

Undiscovered Potential: Meaning remaining gas resources which are of exploratory nature or speculative i.e. leads indicated by seismic.

The Undiscovered Potential does not include any estimates in respect of future resources that are based on geological statistical methods or other statistical models such as the historical rate of discovery

The gas resource position of the EU

Table 1 shows estimates as of the end of 2002 of remaining recoverable gas resources of the enlarged EU, with a supporting national breakdown. The updated table now includes the resources of France and Austria and also covers the major producing accession countries. Reserves reassessments conducted in Norway, Germany and The Netherlands during 2002 are included. In view of the basis for compiling these figures, the overall estimates should be viewed as conservative.

Table 1: Reserves and Potential in Europe and Accession Countries (BCM)

Country	Reserves	Discovered Potential	Undiscovered Potential (Midpoint)	Total
Norway	2362	1472	2510	6344
Netherlands	1434	304	333	2071
Germany	343	296	100	739
UK	1161	567	878	2606
Ireland	28	1	100	129
Denmark	152	-	-	152
Austria	24	5	19	47
France	8	-	-	8
Total EU/EEA	5512	2645	3940	12096
Hungary	73	22	50	145
Poland	85	65	100	250
Romania	200	177	200	577
Total AC	358	264	350	972
Total	5870	2909	4290	13068

The total estimated potential resources of 13068 BCM (standard billion cubic meters) is distributed among the three classifications as 45% Reserves, 22 % Discovered Potential and 33% Undiscovered Potential. Based on the enlarged EU year 2001 gas consumption the total potential is equivalent to between 30 to 40 years' demand, although it is recognized that the EU gas demand will grow significantly up to the year 2020. This does not mean that OGP foresees at any time a situation in which production could satisfy all annual consumer demand for gas in the enlarged EU. Allowing for the fact that there will always be significant imports alongside EU production, a realistic assessment based on estimated annual production rates, including reasonable assumptions about rates of decline, suggests that this resource base can be expected to sustain significant levels of EU production for at least 50 to 70 years. And with respect to the possible upside potential referred to, the resource base could sustain the indigenous production throughout the century.

Chart A (see Appendix) shows the aggregated production forecast for the enlarged EU area up to 2020. Recognizing major revisions in reserves and production forecasts conducted during 2002 in member countries of the EU the base production profile, showing in general a sustained annual production rate close to the 300 BCM level until the year 2008, is using only remaining resources tabled in the "Reserve" category. The majority of remaining resources used in the additional potential forecast, however, is taken from the "Discovered Potential" category underpinning that advanced technologies, or improved economic conditions or other incentives need to be in place to develop and bring these resources to the market.

To assess the degree of the future import dependency the chart shows a demand forecast for the EU. The forecast is based on the 2002 Eurogas demand forecast enhanced by the OGP's estimate for the demand of the accession countries except Turkey. While in 2002 nearly 70% of Europe's demand still can be met by indigenous production, the comparison shows that by 2010 the value drops to 46% and declines to 24% in 2020. The production of the additional indigenous potential will improve these values to 60 % and 33% for the years 2010 and 2020 respectively. The addition of production from Undiscovered Potential would improve these figures further. An appropriate regulatory framework therefore would assist to curb the import dependency and according to OGP's latest estimates increase the indigenous annual production rate in the EU area to level in the range of 360 BCM and indeed beyond if one considers the possible upside potential discussed earlier. The 2020 annual production rate of the profiles of about 150 BCM and 200 BCM respectively indicates continuous indigenous EU production for some time to come

Position of External Resources

The resources external to the EU area, but in economic reach of it, are shown in more detail in Table 2 below. Listed as per the OGP resource categories the resources amount to 172 TCM disregarding all resources in the Eastern part of the Russian Federation, which under current scenarios will be developed most likely for export to the East Asian market. The resources are split in four major areas with 43% and 45 % located in the Middle East and the FSU, respectively. Africa with 11% and the Caribbean area with 1% share the remainder.

Table 2: Gas Reserves and Potential in Economic Reach of EU (BCM)

Area	Reserves	Discovered Potential	Undiscovered Potential (Midpoint)	Total
Africa	6544	4942	7240	18726
Middle East	15410	33760	23950	73120
FSU	32960	14906	29830	77696
Caribbean	850	142	1100	2092
Total	55764	53750	62120	171634

The nearly even distribution of the resources among the categories 33% reserves, 31% discovered potential and 36% undiscovered potential is masking the fact that the last category is quoting a midpoint value taken from a large range, in particular within the FSU and the Middle East area. A favorable but balanced and fair legislative framework for imports into the EU in combination with economic assistance where needed and the fostering of long-term political and economic stability might facilitate the unlocking of this truly huge upside potential.

The further expansion of pipeline links to the EU from these areas underpinned by adequate gas prices would make the development of resources in climatic unfavorable conditions viable and provide the necessary incentives to foster the exploratory effort and the development of needed new technologies to develop the resources.

Chart B (see Appendix) shows the aggregated net volume forecast available for export by area. These volumes in economic reach to the EU either by pipeline or as LNG represent, as said earlier, unprocessed well stream volumes less local demand. The OGP has made no attempt to adjust or

optimise the production in the external areas based on any market conditions or take into account existing or planned export contracts.

The chart suggests that the enlarged EU should have in principle no difficulties in covering its gas import demand short-term and long-term from a variety of sources. Using only known reserves for the forecast the available amount for export in 2010 amounts to some 760 BCM, more than double the requirements of the enlarged EU, distributed among the four main areas as 23% from Africa, equally 37% from the FSU and from the Middle East, and approximately 3% from the Caribbean. Even in year 2020 the available volumes for export exceed the required imports.

Based on known projects, especially in the Middle East, which could commence production in the time frame 2010 – 2015 the OGP concluded that the available volumes for export into the EU area passes the 1000 BCM/a limit without considering any upside potential to be developed in the western part of the Russian Federation.

There is gas in abundance. A EU foreign policy that supports economic reforms and encourages political stability will underpin development of a European gas market.

A fair and consistent regulatory framework for importing these resources as gas or LNG while allowing the investors of the development projects an appropriate risk sharing management will definitively secure future gas supply into the EU area and promote the much needed diversity of gas supply.

Drivers for Realisation

Future gas developments in the EU will be a combination of small fields in the mature areas and medium to large developments in deep water, with little existing infrastructure at increasing distances from markets. Projections for EU gas production to 2020 indicate a large range in the potential production outcome. This reflects the technical uncertainty as to the magnitude of the resource itself but also the commercial challenges that most future developments will face.

Technological Challenges

Technological and economic challenges in developing gas resources are closely related. Technological advances can contribute positively to project economics. Investment in technological innovation is costly, however, and the commitment of such funds depends on the overall economic climate and the market signals communicated to gas producers.

In broad terms the history of the EU's indigenous upstream industry has been one of long-term technological innovation and improvement. Over time this has contributed in a number of important ways to the industry's performance, including through significant improvements to overall or anticipated final recovery rates of resource from producing fields. Technological innovation is contributing positively to prolonging the forecast production life of mature fields and to making the exploitation of previously uneconomic fields viable. All such achievements in turn enhance headline estimates of remaining recoverable EU resources.

Technological advance - and its subsequent deployment - is dependent on a sufficient base of skilled manpower being available to the industry. One of the challenges of increasing maturity in the EU's upstream industry is the maintenance and further development of this skills base in order to meet future exploration and development needs. The promotion of suitable economic conditions and technological innovation within the industry will help provide a positive climate for the continued recruitment of personnel with the right skills into the industry.

Gas Supply Projects

Gas supply development projects always entail significant levels of investment. Even the comparatively small developments now characteristic in mature areas of the North Sea may require investment of €100s million. Large-scale projects to develop new gas supply sources outside the EU for the market are likely to require many billions of Euros irrevocable up-front commitment with long pay-back periods.

Development projects also require many years to plan and implement before gas can actually flow to the market. The timing, economics and technical capability have to be right. Some North Sea discoveries now being developed were originally made 20 or 30 years ago but were uneconomic or technically impossible to develop at the time.

To realise these projects, a combination of new technology, an enabling fiscal regime and flexible contracting / pricing arrangements is required. Gas liberalisation has the potential to underpin short and long term security and diversity of supply by promoting efficient short and long-term economic signals between gas consumers and suppliers, including the value placed on particular levels of supply continuity. Such signals need to function on a long term as well as a shorter term basis if producers are to be able to assess the viability of major investments with long lead times and long payback periods. Within this context and driven by market forces, long-term contracts - with or without formal links to oil prices - and short-term spot sales will both evolve in response to the requirements of managing risk and continuing competition between fuels in the market.

Investors' Requirements

The ultimate objective - if EU energy goals are to be achieved - is the creation of investor confidence, both for sources of finance and shareholders. Such confidence in turn depends on the adoption of an enabling approach to different forms of risk-management. Diversity of risk-management mechanisms - the adaptation of existing mechanisms as well as scope for the development of new ones - will be critical to ensuring an optimised future gas supply portfolio for the EU market.

Such an enabling approach is also important in view of the many different types of investment that will be involved in meeting future EU gas needs. Different investments are likely to have their own specific requirements in terms of risk-management and the wider market framework rules. For investment in the upstream gas sector - in exploration, development and production - a key point is that the funds for such investment in the EU face growing global competition from possible alternative investment options elsewhere. Upstream projects within the EU and for the supply of its market therefore need to offer rates of return post-tax which are competitive with other opportunities, taking into account risk profiles and the means of managing these. This fact is of great importance and needs to be considered in shaping the appropriate policy and regulatory framework within the EU.

To realise gas exports to Europe, not only economic conditions have to be met, but also the framework in terms of regulatory provisions, infrastructure availability and general political environment has to support the confidence of the potential investor.

Much of the gas from outside the EU has to travel considerable distances - either through pipelines or as liquefied natural gas (LNG) - to reach the European market.

Main Drivers

- Economic and business environment
 - The existence of international standard business practice is vital. Given the long lead times and the level of investment involved, confidence in stability and predictability is a prerequisite.
 - The gas volume available for export depends on the domestic energy use in the exporting country and to this end from the general economic development and the efficiency of energy use in these countries.
 - In many cases natural gas is associated with oil deposits and the amount of available gas depends on the oil production.
- Political environment
 - Political stability is as important as economic stability. Political unrest in some exporting areas represents an obstacle in the way of reliable trade relations.
 - Non-discrimination of foreign investment. The development of major resource areas is often carried out by or in cooperation with international companies.
 - Political conditions in some of the potential gas exporters do not at present allow for such export projects.
- Infrastructure availability
 - Infrastructure needs to be available to either transport gas to market or/and, in the case of LNG, gas liquefaction and LNG loading facilities need to be constructed and maintained. The investments required are typically multi billion Dollar investments.
 - Assured long-term access to LNG importation facilities is required.
 - In case of gas transportation through other countries on the way to market reliable infrastructure needs to exist including the legal framework for a secure transportation arrangements.
 - Accessibility of the European gas network. For diversification of supply all export areas need to have adequate connection to the EU market, either by transit pipelines or by the

existence of LNG landing and regasification facilities. In some cases better interconnections and the further market driven development of the European pipeline network would facilitate imports.

- Resource location
 - Future gas resources tend to be in more remote areas and require in some cases advanced technology. Often remote and technically challenging resources are only producible at rather high cost.
 - The realisation of the undiscovered potential depends to a high degree on continued exploration success. This in turn is closely linked to available technology and appropriate skills base.

- Technology and alternative energy supplies
 - A considerable proportion of the resource figures shown may depend on technological advancements; not necessarily to be able to find and produce these resources in general, but to be able to do this economically.

Risks

The availability of natural gas for export to Europe is mainly limited by economic and political considerations rather than the physical existence of the resource. As has been shown above, the upside potential is huge and major prospective areas outside Europe remain as yet unappraised. Given the right economic, political and regulatory conditions, resource realisation should not be physically limited in the foreseeable future. The required investments have an order of magnitude, which require long-term confidence in the stability of overall conditions. Future gas reserves will be more difficult and hence more costly to produce. In these circumstances it is even more important that the trust of the investor in the revenue stream exists.

In this context the main risk areas are:

- Political instability; insecure transportation routes

Some of the future gas resources are located in politically difficult and unstable areas. Such a climate is obviously not conducive to the investment required to develop resources.

- Loss of indigenous production

Although the demand supply balance for Europe shows a widening gap between indigenous production - with or without additional potential - and projected demand, domestic resources will continue to play an important role in the overall balance and also from a security of supply point of view these resources should be properly addressed and developed. Exploration, field development and production are an interlinked process and require continued attention to the technology and the skills base. It is not a process that can be turned on and off at will.

- Gas availability

The availability of gas for exports does of course depend on many factors, including the economic development and the domestic gas consumption in the exporting countries. In addition to this, oil production volumes have an influence in cases in which the production of associated gas is linked to oil.

EU Facilitating Role

Energy Objectives

The OGP strongly believes that the energy objectives of the EU Member States and the Commission should be at the heart of EU foreign relations. A particular reason for suggesting such a focus is that issues relating to the achievement of future EU security of supply are inextricably linked with external relations given the forecast level of future EU gas supply from external sources. The OGP would stress, however, that external dependence is not itself a cause for policy concern given the availability of global gas resources that can potentially enter the EU market.

Rather the issue is to ensure that investment conditions are appropriate both within and outside the EU to ensure the timely development of all of the indigenous resources and of sufficient and diverse external supplies.

The EU has a major role in facilitating secure energy supplies by providing a stable and predictable framework inside Europe and at the same time to foster relations to gas exporting countries in order to establish and maintain a relationship conducive to a long-term supply scenario. The main focus areas

Focus Areas

- Support political and legislative development and the introduction of international standard business practice; linking aid to economic and free market development should be contemplated.
- Support the resolution of political conflicts and promote appropriate actions to lift sanctions.
- Offer the required business environment and financial instruments to facilitate investment in infrastructure. To this end the recognition of the importance of long-term supply contracts in the Gas Directive draft and other directive drafts is appreciated. It should be the understanding that the long-term character extends to both supply (import) contracts and the required capacity rights to bring the gas to market.
- Enhance the accessibility of the European energy markets by further supporting the development of the pipeline network. It is our understanding that infrastructure development is the responsibility of market participants. The role of the EU is to establish the required framework and foster a positive investment climate. The proposed powers of regulatory authorities in respect of "interconnections" should be clarified to ensure they do not create uncertainty or disincentives for new upstream or downstream infrastructure projects. The construction of new upstream connecting infrastructure may be a significant means of helping to maximize gas resource recovery. There will, however, be open market competition for such projects and it is important that regulatory arrangements do not undermine the effective operation of this aspect of the future market but support the creation of an integrated European pipeline network.
- Facilitate the development of a stable and predictable economic/fiscal environment within the EU. In this context new taxes on hydrocarbon production and also specifically on gas are not helpful.

Gas Exporting Regions

Africa

Undiscovered potential in the major African countries considered (among others Algeria and Nigeria) is in total (midpoint) similar to existing reserves. Export potential and the feasibility of developing yet undiscovered reserves are a function of easy access to European markets and exporting opportunities. Political and economic stability needs to be enhanced; in some countries there are encouraging sign of opening markets and developments towards a more positive attitude to foreign investment. Domestic gas demand and fiscal and government pricing policies and subsidies have an impact on the further development of internal gas markets. Export from the countries bordering the Mediterranean are clearly targeted to Europe, either by way of pipeline transport or alternatively as LNG. In the absence of other pipeline connections, Nigeria exports natural gas as LNG, targeting either Europe or America as possible markets.

FSU

From all countries evaluated, Russia has by far the biggest undiscovered potential, even if only that part which potentially exports gas to Europe is considered. Large, potentially hydrocarbon rich areas remain unexplored and it is therefore not possible for OGP to put a feasible upper limit to the undiscovered gas potential. Some of the future reserves potential is in remote and technically challenging areas.

One of the main supply areas, the West Siberian Basin, is well developed with infrastructure and has extensive pipeline systems. New discoveries in remote regions, however, will have higher development costs.

Middle East

Potential gas exporting areas in the Middle East include countries with proven trade relations and stable political and economic conditions as well as countries where exports are impeded by sanctions or there are question marks with respect to stability and the investment conditions. The development of gas potential for exports is in some cases closely linked to the internal economy and the domestic gas demand. It is expected, for example, that the United Arab Emirates will develop in a net importer of gas. The gas potential (discovered and undiscovered), however, is substantial and will no doubt add to diversification possibilities in Europe.

Caribbean

The Caribbean represents an emerging possible supply source for Europe. There is undiscovered potential, especially following discoveries in new deep-water acreage, and its development could target Europe as well as the Americas as possible markets.

Appendix

Chart A

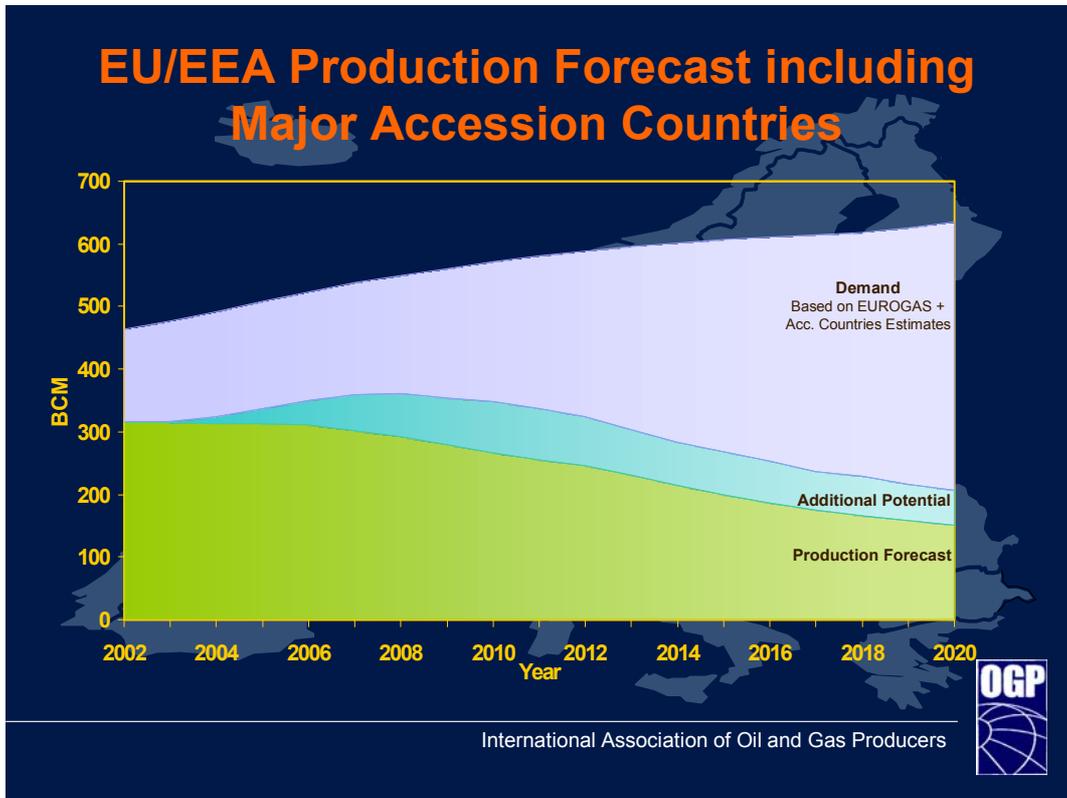


Chart B

