

# Oil and natural gas supply for Europe

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At the beginning of the 21st century, European energy consumption is rising while the production of fossil fuels is slowly but steadily decreasing. The increased dependency on imports for oil, gas and coal consumption is a major concern for the European Union. Security of supply is a key issue and the European Union has to decide if markets transparency and efficiency is enough to ensure a steady flow of energy for its consumption or if other steps must be taken.

## 1. World situation

At the end of the 20th century, energy appeared abundant and cheap. Real or potential surpluses of production capacity made it possible for consumers to benefit from relatively low prices: the price of oil oscillated between \$15 and \$25 per barrel—the price of gas, indexed to that of oil, remained moderate; the price of coal was actually on a downwards trend.

However, since 2000, the energy landscape has undergone dramatic changes: the price of oil is at record levels, and the price of gas in the United States at historic highs. An unforeseen increase in demand, very tight production capacities and deregulation of the energy sector were the principal factors giving rise to the current situation.

### 1.1. Energy and economic development

Energy consumption is increasing rapidly, both in the short and long term. From 1950 to 1973, the increase was substantial and closely connected to the economic growth. From 1973 to now, several factors have affected the total energy consumption: the two oil shocks of 1973 and 1979, the oil countershock in 1986 (price collapse), the fall of the Soviet Union in 1990, which was accompanied by a large reduction of oil production and consumption in this region,

and, lastly the monetary crisis in the emergent countries in 1997–1998, particularly in Asia.

Oil supplies 35% of energy requirements, coal 23%, natural gas 21%, nuclear power 4% and hydro 4%. Biomass (12% of energy production) remains a major fuel in many African countries. New renewable energies (solar, wind, geothermal, etc.) are of great interest but they only represent less than 1% of power consumption (Table 1).

Over the last two years, oil consumption, as a result of a record world economic growth, has increased much faster. While, for more than 10 years, oil demand increased – on average – by less than 2% annually, this demand increased in 2004 by more than 3%, and this tendency is continuing in 2005. Gas consumption is also following this trend.

### 1.2. Energy consumption forecasts

World energy consumption will continue to grow over the next few years because of the increase in population and the rise in the standard of living. Many scenarios are possible, according to the pace of economic growth and the degree of environmental protection required. Thus, in 2020, world energy consumption could be between 12 Gtoe and 15 Gtoe (against 11 Gtoe in 2003). In 2050, uncertainty is great but a doubling of energy requirements is possible.

The majority of the scenarios have many points of convergence, at least until 2020:

- energy intensity decreases by 1% per year;
- annual world energy demand grows by about 2%;
- fossil fuels continue to represent nearly 90% of the commercial energy requirement;
- the share of hydrocarbons in the commercial energy consumption will remain at about 60%;
- the share of oil will maintain a share of about 40%.

Oil will remain the dominant energy source: its share of the total requirement will change very little and its

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Table 1  
Assessment of the EU 15 hydrocarbon requirements

2003	Oil (Mt)	Gas (Mtoe)
Production	135	184
Consumption	626	363
Net imports	491	179
Import dependence (%)	78	49

consumption could approach 5 Gtoe in 2020 (3.6 Gtoe in 2003). World production of gas could increase from 2.3 Gtoe in 2003 to more than 3.5 Gtoe in 2020. The share of gas, a clean fuel, in the overall requirement, will increase.

### 1.3. Oil and gas production

Oil production increased 10-fold between the Second World War and now. Initially concentrated in North America, production diversified to the Middle-East, the Far East and then North Africa, sub-Saharan Africa and the North Sea.

Since the beginning of the 1990s, Saudi Arabia has been the largest world producer. Its production, about 9 million barrels daily, occasionally exceeded by that of Russia, is however related to the decisions to increase or decrease OPEC quotas. Saudi Arabia indeed holds a dominating role inside the cartel because of its reserves (25% of the world proven reserves), its production (12% of world production) and of its low production costs.

OPEC's objective is to keep a balance between supply and demand and to maintain a price high enough to meet producing countries' budget requirements and low enough to avoid replacement of oil by other energies. This is all the more easy to reach when the OPEC market share is high. This market share was more than 50% at the beginning of the 1970s before falling to less than 30% in the middle of the 1980s and re-established today at approximately 40%.

Natural gas production, until recently, easily met demand. The appearance of "gas bubbles" even led periodically to particularly low prices. Resources are significant and should make it possible to face an increasing demand. However, the distance from the gas fields to the market is considerable (Northern Russia and Middle-East) and results in huge investment which lead the producers to ask for guaranteed outlets (take or pay contracts) that the importing countries are more and more reluctant to give.

Oil production should in the future mainly develop in the Middle-East and in Russia, in the Caspian and in West Africa. Gas production should develop especially in the Middle-East, thanks to a reduction in transport costs.

### 1.4. Energy reserves

#### 1.4.1. Resources and reserves

The total quantity of oil in a reservoir is called "resource" while the quantity that can be recovered is

called reserve. On average, one barrel of oil can be recovered out of three barrels which exist in the ground. The recovery factor depends of course on the state of the art and the cost the producer is ready to pay.

Because of the difficulty to measure the quantity of oil in the ground and to determine the recovery factor, reserves are classified as:

- *Proven reserves*: at least 90% chance of recovery; proven reserves are the quantities which can be recovered from the field under the current technical and economic conditions.
- *Probable reserves*: 50% chance to be produced.
- *Possible reserves*: 10% chance to be produced.

#### 1.4.2. Conventional crude oil reserves

Proven world conventional crude oil reserves are about 157 billion toe, which is equivalent to 40 years of production at the current rate.

Additional reserves (approximately 100 billion toe) can be expected from new discoveries.

As a result of better exploration and production technology, additional recovery from the existing fields can be expected. The rate of recovery could reach, on average, 40–50% in the future and contribute to increase the reserves.

The addition of these reserves will depend on oil price and technological advance. It will undoubtedly be spread out over time.

Distribution of crude oil reserves is very unequal. Nearly 80% of these reserves are located in the OPEC countries, of which more than 60% in five countries bordering the Arabian/Persian Gulf: Saudi Arabia, Iraq, Iran, Kuwait and the United Arab Emirates. Reserves in OPEC countries thus represent approximately 80 years of production while the reserves to production (R/P) ratio for the non-OPEC producing countries is less than 16 years. North America with 12 years of production and Western Europe with 9 years, have apparently the lowest reserves.

#### 1.4.3. Non-conventional crude oil reserves

Non-conventional oil is a mixture of hydrocarbons which cannot be produced by the "conventional" methods.

Large reserves of *extra heavy oils* are located in Venezuela in the Orinoco basin which contains some 170 Gt of oil with less than 10° API (specific gravity greater than 1). With a rate of recovery expected to be only 8%, reserves in the region would be of 14 Gt with the current state of technology. The potential reserves are estimated at 40 Gt. They would thus exceed those of Saudi Arabia (36 Gt). However, this extra heavy oil cannot be sold as such because it cannot be transported. So this kind of bitumen has to be first transformed into a synthetic crude by cracking and additional processing. The synthetic crude is a lighter oil which can easily be transported and processed in a conventional refinery.

*Tar sands* result from the migration to the surface of a conventional oil which could not find a suitable reservoir where it could be trapped. Then, the light fractions evaporated, leaving the heavy fractions (bitumen) mixed with sand. Tar sands are primarily concentrated in Canada (in Athabasca and Melville island). Current resources are estimated at approximately 300 Gt, out of which 34 Gt could be recoverable. The production cost is about \$15–20 per barrel.

*Oil shales* are rocks which contain organic matter whose transformation into hydrocarbons is not yet complete and which can, as a result of the application of extreme heat, give oils comparable to certain crude oils. They represent considerable resources but production costs are very high and the current techniques of exploitation are very harmful for the environment.

#### 1.4.4. Natural gas reserves

Proven natural gas reserves are about 158 billions toe (that is to say a ratio R/P of 57 years) and would allow a substantial increase of natural gas in the world energy balance. Additional reserves of approximately 100 billion toe can be expected from new discoveries. Non-conventional gas resources are apparently significant, but are largely unknown at present.

World proven natural gas reserves concentrate in two main zones: the CIS (32%) and the Middle-East (41%). Three countries – Russia, Iran and Qatar – have more than 60% of the gas reserves.

### 1.5. The issue of price

#### 1.5.1. Oil price

After falling to \$10 per barrel at the end of 1998, oil price increased quickly to more than \$50 per barrel in 2005, thus reaching a new record (at least in current dollars since, in dollars of 2005, oil prices after the second oil crisis were around \$100 per barrel). The main reasons for high price are:

- A very strong demand for oil, which increased by more than 3% in 2004, while the average increase over the previous years was less than 2%. This strong demand is due to a sustained economic growth, in particular in China and in the United States.
- Disappearance of the excess production capacities.
- Effect of “speculation” (the opinions differ largely on the impact of this speculation, the reality of which is apparent).

Oil price is high, higher than the minimum price necessary for the proper operation of the oil chain and for an adequate supply of the oil market. Indeed:

- Production cost of a barrel does not exceed \$3 in Saudi Arabia, \$5 in the Middle-East, \$5–10 in other producer

countries and \$15 per barrel for high cost areas such as the North Sea, synthetic oil from Orinocco or Athabasca.

- A very large part of export revenues is coming from hydrocarbons export in the majority of OPEC countries (except Indonesia). They need an oil price between \$20 and \$25 to balance their budget.
- Oil companies decide to put a field in production if the project profitability is acceptable with a \$20–25 per barrel oil price.

Such a high price should have two effects: reduce demand and increase production. However, this does not seem to be the case. Why?

After the two oil shocks and the multiplication by 10 of the oil price, demand decreased by 15% while the high prices of the last five years have not yet affected oil consumption. Several explanations are advanced: the use of oil in the economy is much less than 20 years ago, due to a more efficient use and to an increase in the share of services in the GDP. The amount of taxes in the price of gasoline and diesel oil considerably lessens the impact of the variations in the price. So, in total, the impact of high oil prices is much less important now than it was 20 years ago.

From the supply side, non-OPEC production seems to have reached a peak in many countries, except for the CIS (Russia, Kazakhstan and Azerbaijan in particular) and West Africa. OPEC countries, and especially Middle-East producing countries, are likely the only countries with a significant potential to increase their production. Saudi Arabia announces it will develop a surplus production capacity of 1.5–2 million bbls/day and says it is ready to increase its total production capacity to 12–15 million bbls/day when the market requires it. But who will make the necessary investments?

The international private companies limit their investments. The five largest international companies (Exxon-Mobil, Shell, BP, Chevron and Total) made more than \$80 billion profit in 2004, but a very significant share of these profits is used to reduce the debt (the debt represents less than 10% of the capital in use) and pay dividends to the shareholders. Exxon Mobil, which made more than \$25 billion profits in 2004, purchased \$10 billion of its own shares to improve the stock value. Royal Dutch Shell distributed \$10 billion of dividends (for a increase in stock value of \$18.5 billion).

These companies are reluctant to invest for several reasons:

- Fifty percent of the reserves, which lie in the most promising basins, are not accessible for them. Since the nationalisation of the 1970s, OPEC countries are reluctant to reopen their oil and gas fields to large international companies. Saudi Arabia and Kuwait are completely closed. In Iran, only a few fields are developed by foreign companies. Outside the Middle-East, Venezuela only opened to foreign companies the marginal fields and the

extra heavy oil reserves. Outside OPEC, Mexico remains completely closed to non-Mexican companies and Russia, with the Yukos case, shows that it wishes to keep a tight control over its reserves. As a result, international companies assert that: “we do not have enough profitable projects”.

- They use, for investment purposes in the medium term, a price of the barrel much lower than the current price. The consensus is rather on \$25–30 than on \$50. Moreover, they consider that taxation will take the surplus income. The producing countries adapt the taxation to increase their share of the income in the event of the rise in prices and to leave the foreign companies with a more or less constant share (in dollars by barrel) of the revenue. This policy is coherent with a dominant political approach which ensures that mining resources belong to the nation and that the benefits of oil production must be directed to the state.

Regarding the national oil companies (Saudi Aramco, NIOC, KPC, ADNOC, PDVSA, Sonatrach, NNPC, ...), they must return to the State most of the revenue that they collect through fields development. They retain only a small share of the income ... but this income is inadequate to cover the investment required to maintain and develop the production.

#### 1.5.2. *Natural gas price*

Whereas transport cost of crude oil is low compared to its price (for a price of the oil of \$45 per barrel in the Middle-East, the transport charges to the United States or Japan do not exceed \$2–3), transport cost of gas represents a very significant share of its final price. There is not thus a world market of gas but three regional markets: that of North America, that of Europe and that of North East Asia.

For long time, gas prices in North America remained low, because production was abundant and sufficient to meet the local needs. On the other hand, Europe very quickly became dependant on imports coming from Russia, Algeria and, more recently, from Norway, as we will see later in more detail. North Asia and in particular Japan, the largest importer in the world, imports all the gas they use from Indonesia, Malaysia, Australia and the Middle-East. Gas price was traditionally higher in Europe than in North America, and higher in Asia than in Europe which allowed imports of expensive LNG.

The situation changed recently with the very strong increase in gas price in the United States. The demand growth could not be satisfied any more by local production which, in spite of exploration efforts, had apparently reached a peak. LNG imports will be necessary to meet demand. The American terminals of gasification, built in the 1980s and which had been little used until now, have now found their use, and there are now many projects for LNG terminals under study.

#### 1.6. *Deregulation, investments and price*

The wave of deregulation which is now taking place in the energy industry started long ago. The oil industry developed in the first half of the 20th century through the efforts of large international companies, essentially private. However, the role of the national companies from consumer countries should not be forgotten: BP (originally the Anglo Persian then Anglo Iranian Oil company) had close connections with the English State. Total, originally la Compagnie Française des Pétroles, was created under the auspices of the French State, which had a significant share of the capital. ENI and Elf were clearly companies created by the Italian and French to ensure the security of supply of the country. These companies were only privatised in the last years of the 20th century.

Control of the hydrocarbon industries in a number of consuming countries was largely reduced at the same time. In France, the last controls of petroleum products prices were removed in 1986. Prices of products, and in particular of motor fuels, are now freely determined by the companies. In 1992, in France, the law of 1928 which established a State monopoly on the activities of refining and marketing, was replaced by a new much more flexible law.

In the sectors of electricity and gas, the deregulation started in 1970s in the United States, and a little later in Europe. The rules imposed by the promoters of deregulation are more or less the same everywhere: to remove monopolies, to separate the operations of production, transport and distribution (“unbundling”), to introduce competition by allowing the entry of new actors in the production sector (where the introduction of competition is easiest) and possibly in marketing. Transport in bulk is the sector where the advantages of the monopoly are most obvious. Therefore, the recommendation is not to build new gas-lines but to allow access to the existing network (Third Party Access—TPA) to make it possible for new actors (producers, distributors, traders, ...) to distribute their gas. Deregulation of the gas sector does not raise major technical problems: gas can be stored, and there are many producers.

In the early years of deregulation, there were significant reductions in price. However, for several years now, at least in certain countries, tariffs are increasing. Moreover, deregulation leads to a weakening of the incentives to invest. One thus worries about the capacity and the operator’s will to invest in the energy sector. The International Energy Agency estimated up to \$16,000 billion of investment is necessary over the period 2000–2030 to meet the world energy requirements.

## 2. *European situation*

### 2.1. *A large consumption ...*

Europe is a very large energy consumer. The 25 countries of the EU consume approximately 1800 million toe of oil

equivalent per year, i.e. 1/6th of the world consumption, behind the United States and Asia. Two-thirds of this consumption is covered by hydrocarbons (oil: 44% and gas: 24%).

But the European Union is very dependent upon imports to meet its energy requirements: only five countries produce more than 50 million toe per year—the United Kingdom (oil and gas), Netherlands (gas), Germany (coal and nuclear power), France (nuclear power) and Poland (coal).

Oil consumption in the EU was 626 million toe in 2003.

Germany is the largest European oil consumer with 125 million toe per year and is the third largest world oil importer. Oil imports account for more than 90% in demand and around 40% of overall primary energy consumption in Germany is derived from oil. France imports almost all of the 94 Mt oil it consumes per year, Italy produces 5% of the 92 Mt oil it consumes annually and the United Kingdom produces more than its 77 Mt annual consumption.

European Union oil reserves are very low: the only country with significant reserves is the United Kingdom with 4.5 billion barrels (0.4% of world reserves). In total, European Union oil reserves are less than 1% of world oil reserves. Norway, which is not a member of EU, has much larger reserves, with 1% of world reserves. The proximity of Norway to the European Union improves the security of supply of this area. Oil production in the EU is only about 135 Mt per year (against a 626 Mt consumption). Including Norway, the European production is more than 300 Mt per year (Fig. 1).

Total gas consumption in the European Union is 363 million toe of oil equivalent per year. With approximately 16% of the total, Europe is the second largest gas consumer

in the world after the United States (Russian consumption is about the same). Consumption rose by 17% between 1995 and 2000. Gas is the energy source which is developing the fastest in Europe because of its environmental benefits (no pollutants, limited CO<sub>2</sub> emissions) and of its high yield for electricity generation.

A little more than half of the gas consumed in Europe is for electricity production.

Three countries in Europe consume large quantities of natural gas: the United Kingdom (around 94 Mtoe in 2003), and Germany (around 94 Mtoe in 2003) and Italy (70 Mtoe in 2003). France consumes twice less natural gas than Germany.

Europe has only 3–4% of world gas reserves but is the third largest gas producer with a little more than 11% of the total world production for the year 2003, behind the United States and Russia. Gas reserves of Europe correspond to 20 years of consumption at the current rate of consumption.

The natural gas consumed in Europe comes from local sources and imports. Local sources are first the United Kingdom which produces 92.5 Mtoe per year. Then come the Netherlands (with the huge Groningen field, discovered in 1960 and which still provides most of the 52.5 Mtoe Dutch annual gas production), Germany (16 Mtoe per year), Italy and Denmark.

## 2.2. ... And a very strong dependence ...

European Union oil production covers just over 22% of local consumption. Very large quantities are imported from most of the producing areas: Russia, Middle-East, West Africa, North Africa, the North Sea and Latin America). Over the last years, imports from Russia have dramatically increased while imports from the Middle-East have dropped.

The principal suppliers are Russia (25%) and Norway (22%). Twenty-four percent of European supplies come from the Middle-East and 21% from Africa. More than 50% of European oil supplies come from OPEC countries (Saudi Arabia, Libya, Iran, ...).

While oil production in Russia reached a peak of 600 million toe in 1988, production collapsed to as low as 300 million toe in 1995, following the fall of the Soviet Union. Oil production recovered at the end of the 1990s, following the devaluation of the ruble and the improvement of the economic situation in Russia. Interestingly enough, oil consumption remained stable, partly because of improvement of the equipment using oil products (with a better efficiency), partly because Russia tried as much as possible to favor natural gas consumption to save crude oil for export. Of course, the geographical proximity of Russia played a role as it is more natural for the Middle-East to supply Asian markets.

Europe is also largely dependent on foreign sources for its supplies of natural gas: in spite of significant production, the EU only manages to satisfy about half of its gas requirement. Three countries provide most of the European imports:

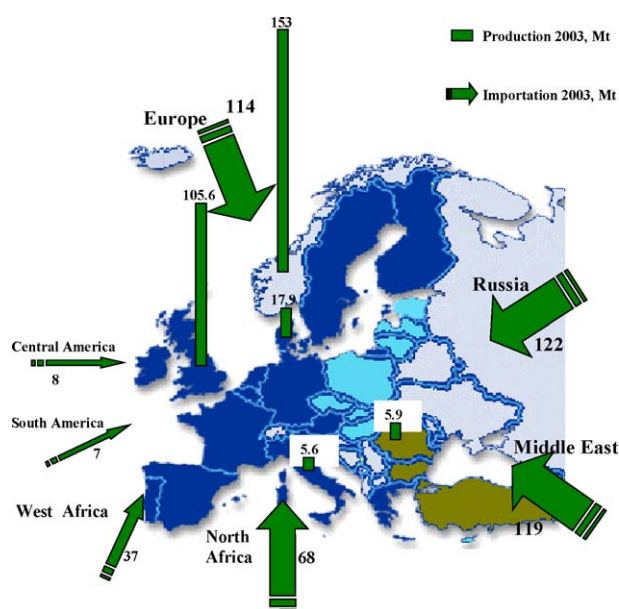


Fig. 1. European productions and oil supply.



Russia (20%), Norway (19%) and Algeria (12%). Their respective shares are forecast to increase to 38%, 34% and 23% by 2020. Supplies from Norway, a close partner to the EU, do not represent a security issue.

Russian and Norwegian imports are made entirely by gas pipeline. The first Algerian deliveries, in 1965, were done by LNG. A very significant share is now done by sub-sea pipelines: one of these pipelines crosses Tunisia and the Mediterranean before arriving in Sicily and crosses the Messina Strait before reaching mainland Italy. The other gas pipeline crosses Morocco, the Gibraltar Strait, and then enters Spain. These pipelines give a better supply safety and the cost of gas coming by lines to Europe is lower than by LNG. However, increased demand will make necessary imports from more distant and expensive sources. Thus, new exporters are already sending natural gas to the EU: Nigeria and Qatar. In the medium term, imports from South America (Trinidad and Venezuela), Angola and other countries of the Middle-East will probably also be required.

### 2.3. Dependence, in spite of many efforts, will continue to grow ...

European Union external global energy dependence has significantly evolved over the last 40 years. Energy savings, the development of oil production in the North Sea, the use of nuclear power and the development of renewable energies have made it possible to reduce this overall dependence from 97% in 1973 to 55% in 2000 for the 15 member countries. Nevertheless, and rather paradoxically, the EU will shortly be confronted with the limits of these changes. The scope for additional energy savings is probably limited except if dramatic changes are made in the traditional way of life:

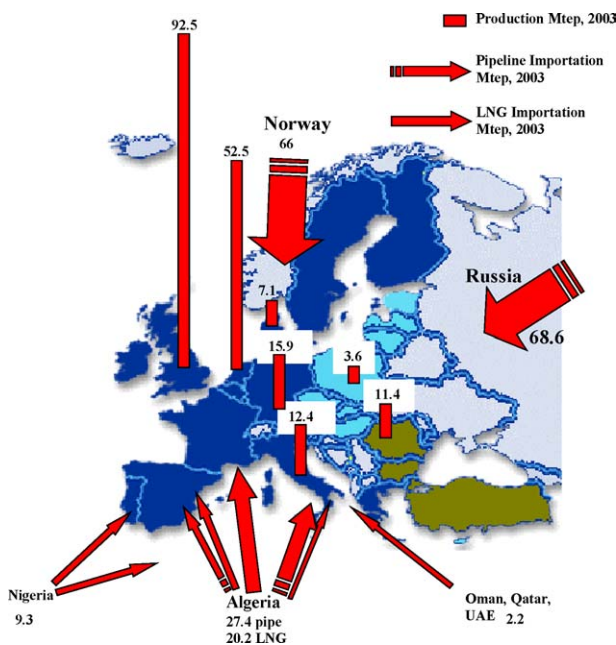


Fig. 2. European productions and gas supply.

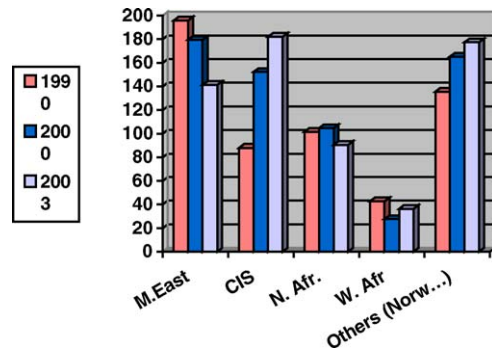


Fig. 3. Evolution of oil imports towards Europe (Mt).

drastic reduction of vehicles fuel consumption, equipment of houses and building with solar or other renewable sources of energy ...

Thus, EU oil dependence could increase from 78% in 2003 to 85% in 2010, even reaching 90% by 2020. This increased reliance on imported oil will contribute to a change in European's geostrategic visions. Following the diversification in the 1970s and 1980s, there should indeed be in the next years "a return to the Middle-East", i.e. an increased dependence on oil supplies from the Middle-East.

From 49% in 2003, gas dependence is forecast to reach 66% by 2010 and 70% by 2030. Natural gas imports from Russia and Algeria – which both have large reserves – will probably still increase, but the imports from the Middle-East will largely develop. The addition of new members to the EU exacerbates this situation, since the demand growth for gas, although low in absolute value, is at a higher rate than in the original EU 15 members. In addition, for historical reasons, their gas supply comes primarily from Russia. Gas demand in the UE of the 25 could thus increase by 46% between 2000 and 2010 as against 34% for the original EU 15 members (Fig. 2).

Since it is not possible for the EU to be self-sufficient in hydrocarbons, it will have to develop an overall and coherent policy towards producing areas, in particular by establishing physical bonds and solid political relations with North Africa and Russia.

### 2.4. ... And rises stakes for hydrocarbons supply

#### 2.4.1. Programmed end of the North Sea

Norway, although not a member of the EU, is a very reliable partner and a safe source of hydrocarbons. The decline of the mature fields of production will be the source of an increasing European dependence on the other suppliers. As an example, the United Kingdom recently became a net importer of natural gas (Figs. 3 and 4).

The EU thus soon will have to follow a coordinated and more active policy of diversification of its supply sources to limit this new dependence on the Arabian/Persian. In Africa, the European Union will have to compete with American and Chinese interests for oil supplies.

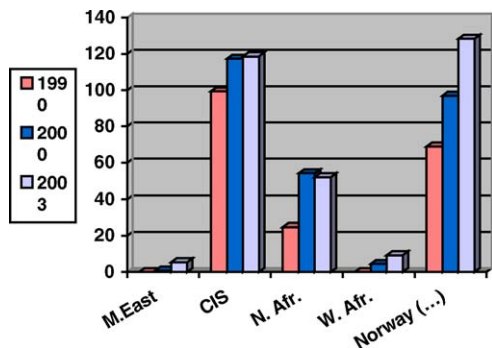


Fig. 4. Evolution of gas imports towards Europe (Mtoe).

#### 2.4.2. The Russian unknown factor

Russian zone has the closest hydrocarbon reserves to the European continent (Fig. 5). Russia and the European Union are natural energy partners. Some figures illustrate their interdependence: in 1999, 63% of Russian gas exports were for the European Union, representing 20% of the overall EU. For oil, these percentages were, respectively, 53% and 25%. The European Union and Russia have, moreover, a mutual interest in developing the continent's energy sufficiency. However, if Russia is financially heavily dependent on its hydrocarbons exports to Europe, some concerns emerged recently about the Russian government policy. If Russia wants to limit the intervention of foreign oil and gas companies, possibility of the diversification of export routes

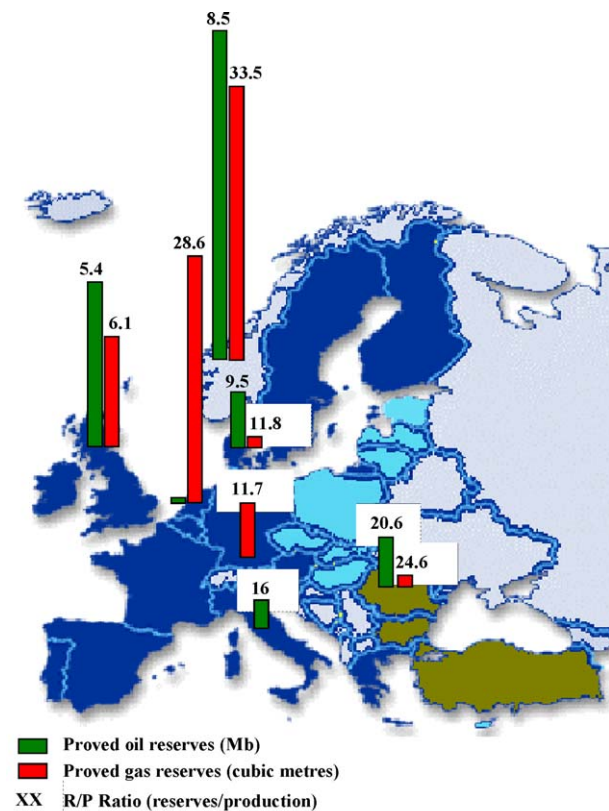


Fig. 5. Europe oil and gas reserves, 2004.

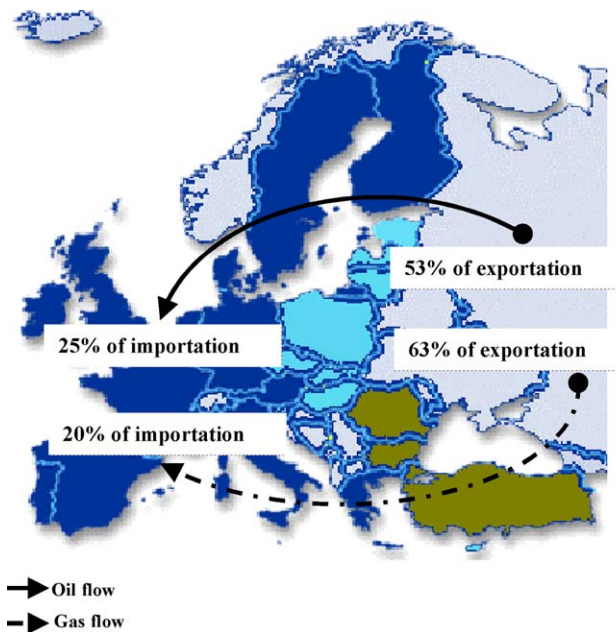


Fig. 6. Europe–Russia interdependence on hydrocarbons.

is improved and less hydrocarbons could be made available for Europe. Such a risk is limited but should not be fully eliminated. The Yukos affair has made it less likely for Russian reserves to be opened to international interests (Fig. 6).

Russian–European relations are indeed an area of confrontation between powers. This makes this zone a potential source of conflict of major interests and Russia a supplier at risk. It should be noted that American interests are never far away, as the financial support received by the partisans of the “orange revolution” in Ukraine shows.

Russia still seeks its strategic place and its allies for the future: increasing its energy exports to China, Japan and Korea is a possibility for Russia. Taking into account the importance of Russian supplies for Europe, the EU must find some kind of partnership with Russia which satisfies not only the European ambitions but also avoids frustrating Russia in its quest for influence.

#### 2.4.3. Security of supply

Security of supply issues for oil and gas are different. Oil is mostly transported by ship: a cargo loaded in Ras Tanura can be directed to any destination. For natural gas, even if LNG is developing fast thanks to the liquefaction transportation and regasification costs reduction, most of international trade is made by gas pipelines. This is of course more rigid and makes the consumer entirely dependent on the supplier who controls the “tap”.

However, the increase in hydrocarbon imports will make necessary the creation of additional transport facilities. The deregulation in progress in the gas sector is supposed to facilitate these developments. The introduction of competition through “Third Party Access” rules associated with the

privatisation of some companies is supposed, according to the European Commission, to increase the economic efficiency and to reduce prices to the consumer.

The pipelines that transport Russian gas from northern Siberia to Europe cross several countries, including Ukraine, which is in a position either to take gas for its local consumption and negotiate a low price or to stop the gas flow. That is why, Russia is developing a project of a gas pipeline under the Baltic in order to bypass Ukraine. In parallel, the beginning of the Algerian upstream sector for gas opening (BP) as well as the signature of partnerships between Gazprom and companies like ENI and Shell are encouraging signs for the possibility of seeing the necessary investments being made. Nevertheless, gas connections between Finland, the Scandinavian countries, Germany and the Baltic States, and between Greece, Italy and Turkey are still missing.

Close association of Turkey to the European Union would allow, through the realization of a common market and a common defense, an increased security of hydrocarbons supplies. Major pipelines coming from both the Caspian and

the Middle-East go through Turkish territory, especially the Bakou–Tbilissi–Ceyhan (BTC) which has recently been completed.

### 3. Conclusion

First, oil and gas will remain the major energy sources in the European Union. Their respective share will even increase in both absolute and relative term for the next 20 years at least.

Secondly, the EU will import more and more of its oil and gas consumption, i.e. it will be more dependant on foreign sources and thus, its supplies will be more exposed to risk.

Third, in this respect, it becomes urgent to take action in order to ensure the security of European hydrocarbons supplies. This can be reached through demand control and an increased transparency on the market, but also by diversifying supply sources and improving the European capacity to secure sea routes.