Paris Energy Club

Energy, Oil and Gas Club

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A summary of remarks

Session 1: Gas

The Golden Age of Gas is a concept that needs to be analyzed carefully. In fact, there is no Golden Age of Gas in Europe: coal has been the winner in the competition for more energy. OECD European gas demand dropped by 9% in 2011, with demand lower than in 2009 (520 bcm versus 529 bcm) and EU demand dropped even more (OECD Europe includes Turkey). The "illusion" of growth created in 2010 did not last: half of the incremental rise in demand that year was related to the cold weather conditions. In a context of mild weather, a sluggish economy and high gas prices, demand for gas in OECD Europe is back to 2003 levels.

Asia's gas demand is continuing to grow rapidly and China is emerging as a major importer: soon China will be the 3rd biggest gas user in the world (behind the US and Russia). Chinese gas demand reached 130 bcm in 2011, having been growing at approximately 20% per annum for the past 3 years. China is now the largest gas consuming country in Asia. The Five Year Plan foresees that gas demand will increase to 260 bcm by 2015, which is very ambitious (230 bcm would be more realistic), with around 90 bcm to be imported (31 bcm in 2011). However a number of problems still need to be resolved: the pricing system – in terms of both level and structure; the infrastructures to be built – import, transmission and storage.

The second wave of LNG supply post-2015 (after the development of LNG in Qatar and Nigeria) is almost entirely dominated by Australia, but the USA and Canada could become challengers. Most of the new LNG is expected to come from Australia if it arrives on time… but this LNG is not going to be cheap. Only North America seems to be in a position to challenge this, with cheap unconventional gas resources.

Unconventional gas has had a profound effect on gas markets. US shale gas production rose from 20 bcm in 2005 to 140 bcm in 2010 and now accounts for over 20% of US gas production. The production of unconventional gas has been the main driver behind the 100 bcm increase in US gas output over the past 5 years. And the United States is now looking at exporting LNG when Cheniere's project (15 mtpa) moves forward. Only Cheniere has concluded long-term contracts so far; in these contracts the price is linked to the Henry Hub price plus a margin and plus transportation costs, which means uncertainty on the buyer's side. Exports from Canada to the United States have plummeted over the past 3 years. The "excess" Canadian production could be exported and export projects are ideally placed to reach the booming Asian markets.

There are likely to be limited additional exports from the Middle East before 2017. Exports from Libya have been interrupted because of the war. The same is true in Egypt, where exports to Israel have, for all intents and purposes, been stopped. Israel has discovered large offshore gas fields, which should supply the local market in the near future. The LNG project in Yemen is facing a

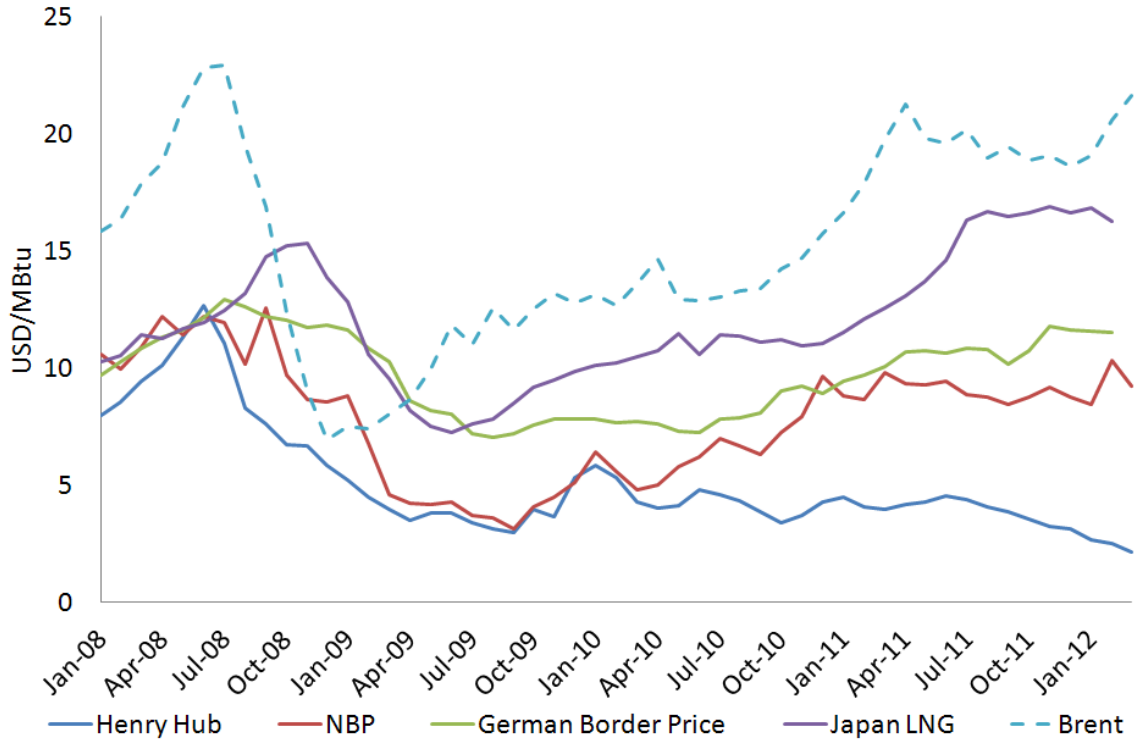
number of difficulties. In addition, domestic production increases are dedicated to domestic markets and some countries will still need to import LNG.

Discoveries in Israel and Cyprus are changing the picture in the Eastern Mediterranean region. Israel used to import significant quantities of gas from Egypt: (40% of its gas demand in 2010) but gas supplies from Egypt have been erratic and unreliable since early 2011**.** Two significant discoveries have been made in Israel (Tamar and Leviathan), representing 800+ bcm of gas, and there has also been a discovery in Cyprus, representing 200 bcm. However, there are still tensions with Turkey. How can this gas be exported? LNG appears to be the best option, with a potential joint LNG export plant shared between Cyprus and Israel, but not before 2017.

East Africa, the new frontier: significant discoveries have been made in both Tanzania (BG and Ophyr are working together, while Statoil is also active, with all three of these companies having made discoveries in the past 3 years) and Mozambique (ENI and Anadarko are the most active).; ENI is active in the Mamba complex with estimated gas reserves in place of over 1.1 tcm (40 tcf) and Anadarko has made several discoveries which, together, could hold some 850 bcm (30 tcf) of recoverable gas in place). East Africa is well placed to supply LNG to Asia but the first production of gas will not be before 2018 at the earliest.

The development of unconventional gas - and especially shale gas production - in the US has led to huge price differentials between North America (price around $2/MMBtu), Europe (spot price around $10/MMBtu – contracts prices a bit higher) and Asia (price around $16 – 18/MMBtu).

The evolution of prices is shown hereafter (Source: IEA)



Gas prices

In the USA, prices today are below the costs

How sustainable is the price structure and distribution (large differences between US, Europe and Asia) ? This will depend on the development of new projects. Large LNG facilities should enable arbitrage and reduce prices differentials.

The first conclusions of the discussion were: there are enough gas resources to support higher gas demand scenarios; natural gas can enhance security of supply: global resources exceed 250 years of current production; thanks to unconventional gas, gas resources are more evenly spread between regions

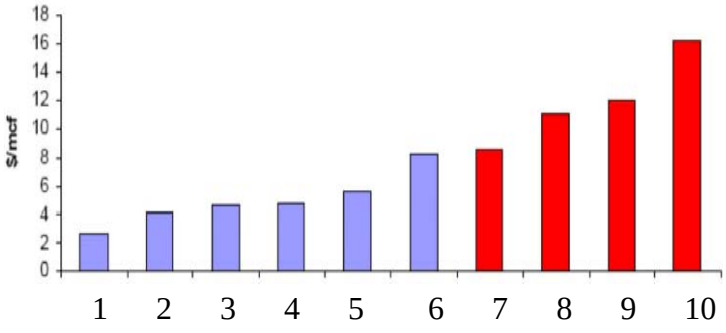
The discussion then moved to LNG and started with projects for LNG exports from the US and the competitiveness of these projects. The first observation is that there is an excess of LNG liquefaction projects: 8 in the USA plus 3 in Canada, for a total capacity of 136 Mt, which is 177% of Qatar's installed capacity. Most of these projects will probably never materialize.

Two major challenges need to be addressed:

- Regulatory hurdles (Federal and State): export authorization from the Department of Energy (DOE) and authorization to "site, construct, and operate facilities for the liquefaction and export" from the Federal Energy Regulatory Commission (FERC). On 16 April 2012, the FERC granted the Cheniere Energy group authorization for the Sabine Pass terminal but set 2 conditions: that the construction of the 4 trains be completed within 5 years and that Sabine Pass fulfills a number of additional environmental obligations. Since approvals are on a case-by-case basis, there is a chance that strong opposition might develop for subsequent projects if evidence of an impact on the environment begins to emerge.
- Competitive economics: "bankers'" willingness to fund these projects will influence the number of projects implemented. They are largely driven by the arbitrage potential created by the disequilibrium between different pricing structures: Low-Cost Commodity Gas in North America and Oil-linked Contract Supply in Europe and Asia. A key question could be "will competition to supply the Asian market undermine the Asian price premium?" According to IEA price projections, Asian margins are partly protected by the high cost of alternative supplies (Australia).

In Russia, huge gas reserves could be developed with Europe as a target. However recent gas market trends (high supply in the US, development of production in Australia and East Africa, reduction in LNG costs) could lead to oversupply in Europe.

The costs of supplying the European market are between $2 and 17/mcf.



1. **Algeria piped gas**
2. **Qatar LNG**
3. **Algeria LNG**
4. **Nigeria LNG**
5. **Yamal piped gas**
6. **Russia LNG**
7. **US shale (base case)**
8. **Germany shale onshore (base case)**
9. **Poland shale (worst case)**
10. **Germany shale onshore (worst case)**

Gas is largely used for industry and the demand is flexible. It is possible to shift from coal to gas easily. New sources of gas are developing significantly, with changes in the geopolitics of gas. In the future, some gas from Russia could be exported in the form of LNG thanks to the melting of ice

(possibility to ship LNG from ports in Northern Russia/Siberia).
Shale gas has been a game changer. Chinese and Japanese companies are buying shale gas fields in US. The price of gas in the US is very low but shale gas remains economical because of the value of associated condensates. However it may be possible to reduce costs through better technology (drilling methods) and logistics.
Very low gas prices make the petrochemicals and fertilizer industries, as well as industry as a whole, very competitive in the US. The European industry is at a strong disadvantage. The development of cheap gas has also had an impact on the electricity market. In the US there has been a massive shift from coal to gas for electricity production. So an excess of coal production is appearing. This is good news for electricity produced from coal in Germany (because of the world decrease in coal prices).

In China, shale gas appears to offer promising potential. Regarding the market, gas could replace oil in the transportation sector. LNG could be used by trucks and ships. Large-scale programs for the use of LNG by trucks are being developed in China. These are competitive although the price of LNG is $18/MMBtu. Converting trucks to LNG leads to fuel savings of 30%. (However, truck manufacturers must be in a position to sell their trucks outside the manufacturing country). High gas prices in Asia have led to dialogue between consumers and producers in India to alleviate the price.

The development of shale gas in China can be reinforced by:

1. Easier access to land (85% of acreage owned by CNPC and Sinopec). Shale gas should be an independent mineral resource.
2. Access to pipelines.

Price reforms are based on costs. The price of gas is based on a net back system. The basis for this is the LNG price in Shanghai

Whatever the case, the future of shale gas remains highly speculative. Reserves are probably huge, with shale gas and traditional gas reserves being probably equivalent. Coal bed methane reserves are also very substantial. But we need to be cautious about both the figures and the costs. It will not be easy to duplicate what has happened in the US in other countries (need for a strong technical infrastructure, acceptability of “fracking”, etc.). Taking into account the huge gas reserves, could the price of gas become the reference price?

The discussion then turned to the Forum of Gas Exporting Countries. The importance of this Forum is debatable. While some countries are seeking robust prices, others are more interested in the development of a liquid and efficient market. In the MENA region, the issues raised by the Arab Spring are primarily jobs, jobs, and jobs. So the development of gas consumption is a priority compared to exports. The Forum was created as part of a long-term policy, taking advantage of low CO_2 emissions. But the actions implemented have been limited, with all countries competing for the same market.

To conclude this session on gas, we need to remain cautious about unconventional gas resource estimates. The development of shale gas in China cannot be taken for granted. The development of unconventional gases in the US is closely related to the specific characteristics of US industry. Gas inroads in the transportation sector could create links between the oil and the gas markets.

Session 2: Acceptability of energy

The question of whether energy is becoming more or less acceptable has a paradoxical answer.
Evidently energy is acceptable because energy use per capita is increasing in most countries and has done so for many years, and is expected to continue doing so. On the other hand the energy

industries face continuing rejection from NGOs, journalists and other critics on matters such as environmental damage, global warming, unsustainability, interference with the rights of indigenous people, exploitation of market advantages, etc. These concerns become reflected in regulations and interventions by government, either in the place where they occur, or in the home country of the company involved.

The paradox can be resolved quite simply since energy as such is a scientific and theoretical concept, not a commodity. The Dutch planning bureau used to have a rather useful concept word "energiedraer" or energy carrier. This emphasised the fact that energy is brought into use through fuels and through appliances which converted energy into work, heat, light etc.

However that "carrier" is becoming less acceptable and that this is what government and industry have to deal with. If this diagnosis is right, it is important to make the distinction so that correcting the problem for energy can be addressed by correcting the problems of the carriers which cause them, rather than by excluding the benefits of energy.

For example oil production in many developing countries involves the destruction of habitats and in some places the displacing of indigenous peoples whose rights to the land and what lies below it may not be well established. Enforcing the claims of the government and through it of the oil company may involve strong measures which affect the normal human rights of the people concerned–in countries which do not always have good records for human rights in general .

These problems can be corrected to some extent from outside by codes of conduct for the developing companies. These may be reinforced by conditions attached by international agencies such as the World Bank, or by private banks who subscribe to sets of principles and in some cases by "voluntary" codes of conduct, such as the Global Compact, the UN Principles for Responsible Investment and the Equator principles. The World Bank, International Finance Corporation, EBRD and European Investment Bank and regional Development Banks also have relevant criteria for their investment.

The first line of defence should of course be the government of the host country and its behaviour. In many countries these governments tolerate or connivee at problem situations and this raises another set of questions which taint foreign energy companies energy along with carriers: that is the problem of the misuse of government revenues in these countries and the question of corruption in granting of licences and other benefits. Once again these are being addressed through external processes, such as the Dodd-Franks act and Foreign Corrupt Practices Act in the USA.

It is clearly in the interests of the oil and gas industry that these problems are dealt with fairly convincing way but the short-term interests of particular developers could be adversely affected and their protests become associated with the position of the industry.

Then there is the set of problems in the area of the industry's own operations, drilling (with the risk of disasters like Macondo), shipping with risk of oil spills, and emissions of all kinds from refineries, transportation and retail sites. To provide an even playing field for competition there is clearly a case for regulation if self-regulation fails and the industry knows very well that in such matters details are very important to achieve a practical but effective result.

The problem of the level playing field is especially acute when governments mandate, under pressure from advocacy lobbies and various interests, the substitution of a "low carbon "energy carrier for oil or gas. Mandates are seldom designed as a result of purely economic analysis. Close examination may show either that the substitute does not offer an economic strategy or does not in fact significantly reduce greenhouse gas emissions. For those industries also, there is the problem of

distinguishing between the energy and what brings it into use.
Once again the problem is that in helping address the problem the underlying idea of the benefits of energy becomes obscured by the unacceptable consequences of bringing it to the consumer.
The important thing is to separate as far as we can in analysis and debate the problems of energy and the problems of the fuels which deliver it, the apparatus to consume it, and the use of that apparatus. To adapt a controversial argument from the gun lobby: gasoline does not pollute, driving does. The real problem the energy industries is that reducing the problems caused by the carriers may increase the total cost of using energy and as a result demand for it will be reduced either via simple economics, or by finding new technologies which will avoid the use of energy while preserving its benefit to the consumer. We will have to pay more attention not just to energy prices but to the cost of using it.

According to a study conducted in ten European countries (Belgium, France, Germany, Hungary, Italy, the Netherlands, Poland, Slovakia, Spain, and the UK), most countries are concerned with three major energy issues in the field of electricity:

- The cost of electricity
- Energy reliance
- Reducing greenhouse gas emission

Lack of competition, electricity production capacities, the safety of nuclear installations (not applicable, of course, in some countries) is less important. Interestingly enough, power cuts are not a concern, probably because of the limited number of incidents.

In all countries, more than 50% of the population thinks that renewable energy can be profitable (up to 85/86% in Hungary and Italy). The proportion of the population who believes that the nuclear industry can be profitable is still higher.

The proportion of the population who thinks that most energy requirements can be met by renewable energy strongly depends on the country: from 24% in France to 84% in Hungary. This percentage is close to or more than 50% in the Netherlands and in Germany.

In countries such as Italy and Germany there is both opposition to nuclear energy and the opinion that renewable energy could meet most of the energy demand, while in countries like France, Belgium, Poland, Spain, Slovakia and the UK, the opinion is reversed.

In all countries nuclear energy is viewed as an asset for energy independence but with major drawbacks: waste and accident risks. However a large proportion of the population has no definitive position regarding nuclear phase-out. In Italy there was a lack of belief in leaders and the implementation of nuclear plants was rejected.

In all countries, opinion leaders are more in favor of nuclear energy use than the population as a whole. In France the percentage of the population in favor of nuclear energy has slightly increased since March 2011 (Fukushima accident).

The time dimension is important. Germany is moving away from nuclear power. How does one explain to the French population that Germany can do it but we are not doing it? It is necessary to make public opinion understand that all jobs are important and that industry is not the bad guy. However companies cannot speak out, because they will be regarded as speaking for themselves. It is important to have key people in charge of communication. The willingness to accept oil production depends on the country. Oil is more acceptable in Kuwait (lakes, fire, etc.) than in the US (Macondo). It is increasingly difficult to convince people of the “beauty” of energy. People will go to Google to check what you say. Nobody (not even a Nobel Prize winner) is trusted nowadays.

Regarding financial transparency for the mining and oil & gas sectors, EITI – Extractive Industries Transparency Initiative - provides a comprehensive framework which has already been implemented for several countries, and which is on the way to be extended to other producing countries. The oil companies are strongly in favor of the pattern and objectives of EITI (reduce poverty and improve governance in producing countries), while the Dodd Franck Bill and the draft EU regulations provide a compulsory and burdensome framework, applicable only to listed companies. There is a problem of transparency. We need to know transactions, volumes, prices. Statistical organizations that collect data can have difficulties in making them public.

The problem of CO2 content of crude, products is an interesting one (in fact CO2 emitted when we burn oil or oil products). It is difficult to know where the molecule is coming from. Inquiries are possible in Canada, not in Venezuela. And we should of course recall that 85 % of CO2 emissions are coming from the use of the product.

The US "acceptability" of energy is specific and original. In the US, the objective is: jobs, jobs, jobs. This is much more important than climate change, even if most of the administration is "green" (DOE, EPA). Public opinion is primarily concerned with local issues. Lobbying is very important. But lack of expertise is a very important challenge. Lobbying is carried out by young people without experience and knowledge, with a frequent turnover. If a new president is elected in November, it is likely that the approach to managing energy issues will continue, but with a greater orientation towards oil (instead of renewable energies).

Is it democracy if we just follow public opinion? Is transparency "stupid", not because it is not desirable, but because it is not possible? Nowadays it is difficult to persuade the population. We have to find the right experts to give the explanations. In France, after the presidential election, if a new president emerges, there should be a debate. This debate should deal with three important points:

- We are in Europe
- Climate change is a reality (so Factor 4)
- Significant economic constraints

The session ended with a presentation and discussion of the gas leak from the Elgin platform. The two options for stopping the leakage (injection of heavy mud, drilling of two relief wells) were presented. Note: since the meeting, the leak has been stopped.

Session 3: Current issues

The discussion started with an overall review of the energy situation.
The situation for oil remains problematic. Despite significant discoveries in some countries (Brazil, for example), from 2009 to 2011, only 15 Gb of oil have been discovered each year compared to yearly consumption of 30 Gb. Most of the discoveries are in deep offshore areas. The huge number of publications on oil sands and extra heavy oil should not hide this reality.
Regarding natural gas, the US consumption is 600 bcm, of which 150 bcm is tight gas, 50 bcm is coal bed methane and 150 bcm is shale gas. The potential for development of unconventional gas in other countries is still questionable. Coal still offers significantly potential because of the huge resources and consequently, the low price.
Regarding nuclear energy, China is the leader with 26 plants under construction out of 62 worldwide. But nuclear electricity will only meet a small fraction of the demand for electricity in the country because of the size of the demand. Russia is looking at the European market for the construction of nuclear plants and 4 plants are under construction in Kaliningrad to export electricity to Europe.

China is also a leader in the field of renewable energies and, more generally, low-carbon energy. When it comes to renewable, the strategies of the major companies differ: BP has sold a solar energy subsidiary while Total has bought one.

With respect to the oil market, there have been oil production cuts in Libya, Syria and Yemen. The Iran conflict and the progressive embargo on oil exports from Iran by European countries has reduced oil production in Iran. The result of all this is a possible significant reduction in production/export. There could be a further tightening of the market in July if nothing changes in Iran. However statements by military authorities (in Israel and the US) that Iran is not an immediate threat to world security have relieved tensions and the oil price is falling again. The objective of Saudi Arabia is probably an oil price of between $80 and 100per barrel. Long-term issues are important… and difficult to predict. In 1976 we predicted that OPEC exports would need to be 40 Mbd in 1985 to meet world demand but when 1985 came, it emerged that we only actually needed 14 Mbd (from OPEC). A lot of demand has been eroded by the increase in price.
Regarding the present situation in Saudi Arabia, a think tank is looking carefully at the development of solar energy and at the price of gasoline. The low price of gasoline in Saudi Arabia at present is a strong incentive to a growth in consumption.

In Iran, a significant share of the population supports the idea that Iran should continue its uranium enrichment program, and should even have nuclear weapons. However there is probably less consensus around nuclear issues now than there was a year ago. Pressures on Iran have not been very effective. The population is increasingly disenchanted with the current situation. However the government has succeeded in cutting gasoline demand (by price adjustments: there is a fixed allocation of gasoline at a low price to each consumer but the rest of the market is at international prices). Some businesses have been forced to turn to diesel. But can the other price reforms be postponed for 10 years?

The probability of an accident is increasing. Regarding the gas situation, a lot of gas needs to be reinjected in oil fields to maintain pressure and production. So there is a – limited – lack of gas on the market (the deficit can easily be imported from Turkmenistan).

Regarding the economic situation of other countries in the Middle-East, four of them (Saudi Arabia, Kuwait, Qatar, United Arab Emirates) retain a “3A” rating, while all the others have been demoted. It is difficult to unlock more oil from Oman (too costly in terms of energy consumption).

The Arab spring has had significant consequences but the short-term impact is limited while the long-term effects will be felt well beyond the energy sector.

Oil prices are influenced by successive periods of history: low prices (post war – still colonial); increasing prices (rise of OPEC, Kissinger period, need for security of supply in developed countries and need for “oil for internal development” in developing countries in the 80s, followed by stagnation in the 90s, and, finally, an increase fuelled by high demand from emerging countries.

Once again, the discussion turned to the question of speculation and its potential impact on oil prices. According to some participants, there is no evidence that speculation has any impact. Speculators do not influence prices. Blaming speculation is a way of denying responsibility.

Will an oil bill of more than 5% hurt the economy in the US or in China? It should be noted that in 2008 the increase in gasoline price led to a reduction in credit. Even if the US were to become less reliant on imports it would still remain involved in Middle-Eastern affairs.

This was the conclusion of the meeting