



Energy, Oil and Gas Club

October 26, 2011

A summary of remarks

Session 1 – Oil demand uncertainties, oil supply uncertainties

A dramatic fall in oil prices is possible as in 2008 but is much less likely because the recession will not be a surprise. A low economic growth is likely. Economic growth could be only 3% in 2011 and 2012 versus 4,2 in 2010. The demand for oil should increase by 0,7 Mbd in 2011 and 0,9 Mbd in 2012.

The economy fundamentals of OECD countries are weaker: North America will suffer from unemployment and high prices, Europe from very low growth rates, Japan from Fukushima. Non OECD countries will suffer from a weakening international environment and from internal bottlenecks.

Oil demand will decrease in Europe because of carbon constraints. There will also be less growth in Asia because of Japan. The demand growth “post Fukushima” is offset by external factors.

China will remain a key driver for oil demand. The oil demand in China should increase by around 0,5 Mbd per year (+1 Mbd in 2010). Gasoline will show a modest recovery in 2013 after 2 years of decrease

There is demand destruction in mature markets while in emerging countries (China, India), measures are taken by the governments to reduce increase in demand

The oil consumption will also be affected by fuel substitution. A greener scenario is possible. We will see more electric plug-in vehicles. Bunker fuel for ships will partly be replaced by diesel oil and LNG

Regarding oil supply there is probably less uncertainty than regarding demand. However the time frame is important. We can make forecasts for the next five years.

Global oil production capacity could be 100,6 Mbd in 2016. By the same year NGL – Natural Gas Liquids - production could increase by 40 %, unconventional oil production by 20 %. In the medium term: the increase in production will come from Brazil pre salt, Canadian oil sands, US light tight oil which offset declining production elsewhere. 20% of non-OPEC growth up to 2016 will come from non-conventional. Adding presalt and US light tight oil account for 90 % of net non-OPEC liquids growth between 2011 and 2016. Non conventional oil production is sensitive to price, environmental concerns but could give surprises. With the development of shale gas and shale oil there is in the US a lot of stranded gas flared.

What to do: GTL, export ?

Regarding OPEC production, it was badly affected by the war in Libya where production is now 0,3 Mbd but could move up 0,6 Mbd by the end of the year and 1 Mbd by the end of 2012. Installations have been badly damaged but redeveloping production should not be too difficult. It should be remembered that Libya has large reserves, probably overestimated (45 billion barrels, perhaps less). Libya was the largest OPEC producing country in the 70'S. The main concern regarding Libya is security

Production in Irak could reach 4 Mbd by the end of 2016. But strong logistical constraints exist in the South of the country

In the US tight oil production is very bullish. Downside environmental and logistical constraints will not reduce the production. The forecast production of tight oil is 1 Mbd more than expected. Fair production is expected from non-conventionnal oil in Canada. Large reserves of non conventional oil exist also in Argentina.

Coming back to economy and finances, the situation is very serious. We have to get out quickly out of the sovereign debt crisis to avoid economic problems in Europe but also in the rest of the world. If the problem of the Greek debt is not solved, there will be a huge risk with Italy. The confidence between the institutions is very bad. The forecast for growth in Belgium could be divided by 2 if the outcome of October 26 meeting (on Euro crisis) is bad

As shown by discussed figures, crude oil spare production capacity is increasing. What will be the impact on prices? The situation is strange: did we ever expect US to export Ethanol to Brazil, did we ever expect the US to export LNG. The very low price for WTI (compared to Brent) can be explained by the massive flows of Canadian Oil and Baken oil coming to Cushing. This very low WTI price means that if you can sell this oil in the Atlantic Basin prices, you make a lot of money. You can expect the differential between WTI and Brent to decrease in the future if sufficient transportation facilities are built between Cushing (production place of WTI) and the consuming areas. But people are dragging their feet to invest in pipe lines.

The impact of a decade of high oil prices has still to be determined. What would happen with oil prices down to the level of the 70's. Oil prices remain high despite poor economic conditions. This has a huge impact on development of alternative fuels. However, prices can be lower because of lower marginal cost of crude production and of lower cost of energy savings.

The breakeven price for tight oil produced from the Baken area (North Dakota) is 45 to 60 dollars. The crude oil in this area happens to be transported by rail and trucks.

So the US market is well supplied. So more barrels from West Africa and the North

Sea are now available to Asia. A possible scenario is a firm oil market in the next years (fair demand). US economy will recover more quickly than the other economies and we still recently had a strong developing world. However large improvements in energy efficiency should prevent oil prices to going very high

In the 70's we experienced ten years of high prices followed by many years of low prices. The recovery was very slow: up to 2003 nobody believed in high prices. Now (2011) prices could decrease from 100 to 50! This would lead to a better situation for importing countries. Producing countries would not be worried if oil prices decreased. They are preparing themselves to worse time

There is a large natural gas production but also a large need for gas in the Middle East. Kuwait is short of gas and is importing LNG. Abu Dhabi has large reserves of acid gas. The cost of desulfurization is 7 to 8 \$ MMBTU. Despite the cost there is a big need for the gas from Abu Dhabi, in Abu Dhabi and in Saudi Arabia for instance. Saudi Arabia is burning crude oil to make electricity. The price of gas is very low in the US (\$4/MMBTU or around \$25/boe) but much higher in Asia. The low price of gas in the US is influencing prices in Europe. Production cost of LNG in Australia is high and puts a floor on the price of gas. This difference between prices on the various markets makes possible the export of LNG from the US.

US prices are low but could reveal unstable. Too much land is rented for too short periods. China got beautiful contracts from Australia (\$ 3/MMBTU), Indonesia (\$4/MMBTU). New supplies are at \$11/MMBTU. There are discussions between Russia and China for imports of gas in China from Siberia but the price asked for by Russia looks too high to China. Russia could have lost the game. Will there be more gas from Turkmenistan...?

Regarding the development of the gas market, in Europe there was huge gas destruction because of the very high costs. In China the growth could be lower. But India, Indonesia experience large increases in the demand. And developing countries need growth

On the political side, what is the impact of the Arab Spring on prices? The key question for Saudi Arabia is: what can we do to create activity, to create jobs. There is a strong pressure to keep prices high. This is necessary to meet the needs of the population. The question in the last OPEC meeting was: should we increase supplies ? (To reduce prices and favor world economic recovery). Today the situation is different: if you cut supplies you have cohesion and this is necessary to avoid social troubles. And the minimum price required by most producing countries to balance their budget is probably in the \$80/100 range.

The next OPEC meeting will be very important. However since it will be held under Iran presidency, flexibility will be limited and another meeting will be necessary very soon.

The consequence of US shale gas increased production was strongly felt in Qatar. The production of liquids associated with shale gas has a decisive impact on the economics of shale gas production. The profitability of shale gas production is very often ensured by the sales of the associated liquids.

The situation in GCC countries requires money. But the situation requires not only money but also vision. GCC could be extended to Jordan, Morocco (not serious), Egypt. Lower oil prices would reduce the pressure in the Gulf from Iran. One reason for Saudi Arabia not to be reluctant to lower prices

In Algeria there is a risk of revolution, especially if the price of oil is low. It is difficult to predict what will happen. A good direction could be the Tunisian one. Algeria is in revolution since 1988. There is a strong demand for democracy; elections ... The 90's years were very difficult for the population. You can open the press and see that people are asking for everything. Radical Islamism was a real risk in Algeria 20 years ago. With more than 100 \$/b, the government has a lot of money to cool the situation. The question is: what will be the situation in Algeria after Bouteflika ?

Asia could take all of Middle East Oil. Western countries are marginalized in the Middle East. China could become the marginal market (decrease of US imports, increase of China imports)

Iran, Venezuela need very high prices. Iran: in 2009 50 \$ out of 100 were for gasoline imports. This was reduced because of rationing and of decrease of subsidies. GCC, Algeria can be satisfied with lower prices. Saudi Arabia has a \$20 billion defense budget. There was a tentative to increase domestic prices. This is difficult in the framework of the Arab Spring. In Russia, the budget is based on 60, the government expects 80.

Changes occurred in the petrochemical industry. The availability of low cost ethane, as a consequence of the development of shale gas with large associated gas quantities has changed the picture. The market is still developing but people just getting out of the poverty line do not require the same quantity and the same quality of plastics as people in developed countries

As a conclusion, the question is: what will be the influence of Islam in the Arab countries? The possible evolution is very difficult to get. There is no aggiornamento in the Islamic world. The influence of Islam will increase because people are frustrated, religion and culture will protect their identity. There is clearly not enough studies on Islam (compared to the situation in the XX th century - Maxime Rodinson)

Session 2 – Energy Markets – How do they work ?

The WTI spot price is indexed to NYMEX WTI futures. When buying or selling physical WTI at Cushing, Oklahoma, refineries use front month NYMEX prices except during the final days of a contract when the “role” value is taken into account for continuity reasons. The LLS (Louisiana Light Sweet, is developing as a reference crude for waterborne grades imported by US refiners, but it lacks a deep forward market or futures market for hedging

The Dated Brent Spot price derives indirectly from ICE (International Commodities Exchange) Brent futures. The reference is BFOE (Brent, Forties, Oseberg, Ekofisk) a basket of crudes of which the lowest value is taken on a daily basis and designated as Dated Brent. The first crude used as a reference was Brent but when the production of Brent declined the production of neighboring crudes (Ninian ...) was added to the production of Brent to make a large enough production. Oseberg, Ekofisk and Forties were added for the same reasons.

The DME (Dubai Mercantile Exchange) trades a mix of Dubai and Oman since the production of Dubai is now very limited.

The TOCOM market in Tokyo negotiates a Middle East crude oil contract (Yen based monthly average of Dubai and Oman). This market is not very liquid and is not a reference outside Japan.

There is a strong link between physical market and forward market. Futures are standardized financial contracts for crude or products trade in a clearing house for future months from 1 to 7 years in the future. They ensure market liquidity and greater transparency in price formation.

Spot prices reflect prompt physical market. Future prices are the successive values of futures contracts at forward expiry months. These values are not forecasts but a view of price risk that actors are willing to take against prompt prices levels

In 2011, world trading volume for physical (crude + products) was 84.5 million barrels per day. Global futures trading was 20 times the physical volume (this ratio increased from 6 in 2004-05). 75% of the trading is on crude. OTC (Over the Counter – not controlled) trade volume is estimated to be around once or twice the futures trading volumes, more than doubling the overall volume of transactions on the paper market.

There is a number of key differences between OTC and Futures contracts

A futures contract is an exchange-traded contract between buyer and seller. The buyer has to take delivery, and the seller has to provide delivery. Some futures contracts are cash-settled with no physical delivery possible

Futures contracts specify fixed amount of commodity, predetermined pricing basis, and specified delivery location. Futures contracts are traded exclusively on regulated

exchanges and are settled daily based on market value. Futures markets result from very rigid elaboration, and are meant for mass use. It is hard to build liquidity if the contracts are not adequately adapted to general needs. There were many failures in the creation of new futures contracts because lack of liquidity discourages participation. As a consequence there is a few broad contracts, but with large volumes traded on a daily basis_. Futures markets have a cost (margin calls). Futures markets are entirely opaque regarding the positions and activity of players.

OTC contracts are customized contracts that are derivatives of physical or futures contracts traditionally traded off-exchange. An OTC contract is an agreement between buyer and seller involving cash-settlement with no physical delivery possible. Swaps are the commonest form of OTC. OTC instruments are not free, they have a cost. OTC instruments are specific to key market segments – many contracts providing a granular approach to pricing. They allow more informed market arbitraging and hedging and provide a view for physical traders of the forward arbitrage values. OTC products are for professionals and not for retail investors. They require a strong knowledge of the markets (underlying price indices). The development is strongly influenced by the activity of the banks which provide liquidity by servicing hedging deals for physical clients. These contracts are often traded through brokers, providing some visibility of activity and actors in the market. They however do not attain the liquidity of full blown futures contracts. Depending upon the number of actors in the market, the OTC contract can develop substantially generating significant liquidity and potentially attracting speculative actors.

High crude prices stimulated land-locked crude production in US & Canada. Canadian production growth was largely anticipated. 2009 price collapse was caused by long term investment program adjustments, but short-term Alberta crude and bitumen production continues rising, from 1.9 Mbd in 2007/08 to 2.2 Mbd in 2012. US production growth was reversely largely unanticipated. It resulted from development of North Dakota Wilston Basin tight oil plays (Bakken) & Eagleford, Texas : +250 kbd since 2007, reached 370 kbd in 2011. From 2010 to 2012 growth trend is +100 kbd per year

The widening spread between WTI and Brent reflects marginal export cost to move crude to PADDs 1&3 plus general market dynamic pressuring weakest players. LLS has become purchasing reference for imports. NYMEX WTI is no longer viable as a tool to hedge. US refiners can't hedge crude use using NYMEX. Is it a permanent problem? No ... will resolve itself in time. New export pipeline capacity will reduce and stabilize WTI discount to international market. However it will take several years (not before 2014 at the earliest)

Which is dominant: physical prices or future prices? Futures are dominant. They determine price levels in physical markets via a complicated use of OTC instruments defining market structures (time spreads). Futures are far more important than OTC markets in determining price levels or price volatility.

Are financial prices related or not to physical prices? Yes and no. Futures prices are driven by many factors including by market expectations about the evolution of the

supply/demand demand balance in both short and long term

Is WTI still of use? Yes if you have a refinery in Chicago or anywhere else in PADD 2 or Western Canada

Is Brent reliable? Yes, but needs more oversight to avoid incoherencies between Platts and ICE.

Broker-based OTC markets provide a level of information to market players that not screen-based trading system will ever be able to provide. They provide information on niche market trends.

The level of activity is greater on the first 3 months (30 %). 20 % on next 3 months. 50 % on the rest. The fundamentals reimpose themselves at the end. TOCOM trades in Yen on Oman+Dubai. Dubai production is only 100 000 b/d but supports a very active forward market. Brent remains the reference crude. It is the only crude (with the addition of Forties, Oseberg, Ekofisk) having enough liquidity. APEC often switches to Brent

There is a strong backwardation on ICE. Spot price is \$110/b versus future price (2016) \$ 90/b. People being less pessimistic regarding production, leads to backwardation

The only data available to analyze causality are coming from CFTC. Volatility : is the very large volume of futures + OTC contracts increasing or decreasing the volatility? It is probably neutral.

Physical trading remains important. If Saudi Arabia allowed its crude to be resold, it would create a huge market. There is a contradiction in the behavior of the producing countries which complaining about the Brent market but do not the creation of a market with their crude

Volatility is inevitable. Some producing countries are hedging their positions. Producing and consuming countries have opposite interests. They could hedge respectively.

Session 3 Current issues

3.1 Environment – Climate Change

After Fukushima, in Japan two committees were set up about environment and security issues. A New regulation Act was decided at the end of August. Up to recently, the energy policy in Japan was decided by a small group of people around MITI. After Fukushima there is more energy democracy: people, organizations, committees look at energy issues

An interesting exercise was carried out: what will be the energy sources for electricity generation. The result was Gas 35+, Coal 20+, Oil 10+, renewable energy from 10 to 35

Regarding Durban, the COP meeting brings political prestige to South Africa as Chairperson and to Durban, which hopes to show its capacity to stage a carbon-neutral international event. It will be preceded by an amass rally of religious groups to pray for success and an attempt to remove “street kids” from view.

The Durban COP of the UNFCCC should be seen in the context of three simultaneous tracks of climate change policy.

The first track is the UN negotiating process:

- *Will there be new commitments for developed countries when phase 1 of the Kyoto protocol ends in 2012?* At most, Durban may agree a timetable for negotiating new commitment. At least, there will be a fudge (“political commitment”) with a formal review of Kyoto’s future in 2013-15. Extension is demanded by developing countries, and supported by the EU (because it would leave their own targets less isolated), but Russia, Japan and Canada do not want to continue, so the fig leaf for Europe’s ” leadership" would shrink. For any phase two, problems with “hot air” carry-forwards and LULUCF (Land Use Change and Forestry) need to be addressed. In any case, it is almost impossible to foresee new commitments being formulated in time to replace those which expire at the end of 2012
- *Will there be a road map for negotiating a new agreement, which would place binding commitments in the form of "pledge and review” – not quantified emission reductions – on all major emitters?* The principle of this was agreed in the Copenhagen Accord including the US, China, and other BRICS. Without the roadmap the EU has said it will not make Kyoto commitments beyond 2020. If there is progress towards such an agreement discussed at Cancun in 2010) it remains an issues whether broader agreement should be anchored in the Kyoto Protocol (preferred by the developing countries because of obligations on developed countries), or the more flexible UNFCCC (the Rio Convention) or an entirely new treaty.
- There is consensus on *operationalizing some Cancun Outcomes*. The Green Climate Fund represents a centerpiece of such proposals for Durban. Developing countries demand a prompt start for the Fund through its early and initial capitalization.
- At a preparatory meeting in October Ministers stressed the fact that *equal priority must be given to adaptation and mitigation* as adaptation is a key priority for many Developing Countries, particularly Small Island Developing States, Least Developed Countries and Africa

There is a second track as major emitting countries voluntarily adopt policies which will have the effect of reducing GHG emission. For example:

- The Obama Administration committed the US to greenhouse gas reduction objectives in the Copenhagen Accord of 2009. The Supreme Court held in 2010 that the EPA could regulate for greenhouse gas emissions, without new legislation. The US National Highway Traffic Safety Administration (NHTS),

the Environmental Protection Agency (EPA) in 2010 agreed a national fuel economy programme which will achieve a *national fuel economy standard for the US of 35.5 mpg by 2015* (was 2020), contributing to both national security and climate change objectives.

- *The 2011 EU White Paper on Transport: foresees the possibility of peak demand for oil for transport* in the EU as a result of policies aimed at CO₂ reduction. The Impact Assessment accompanying the white paper translates its objectives into four scenarios for energy use in the transport sector. In Scenario 1, with the least change in policy, Oil demand in the transport sector (road, air, and other modes) reaches a rough plateau between now and 2020 and would then begin a slow decline: With aggressive policies demand would fall about 20% by 2030.
- *In China*, the 12th 5-year plan aims to reduce the energy intensity of the economy by 16% and carbon intensity by 17%, to achieve the 40-45 % reduction (compared to 2005) pledged in the Copenhagen accord. This is reflected in new priorities for energy efficiency –related industries, new, non-fossil energy and clean energy vehicles.

Finally, there is a **third, “real world” business track** in which companies are increasingly committed to invest for low carbon future strategies on the assumption that, whatever the international negotiations or national detailed policies, there is an unstoppable trend towards policies, which move towards low-carbon economy growth. These engage a much wider set of industries than the traditional energy suppliers: vehicles, control equipment for industrial processes and domestic and commercial energy consumption, efficient buildings and materials, as well as new fuels and “renewable” sources of electricity generation. Prices and demand will help: electricity consumers in Europe face a double whammy of prices: input prices for traditional primary fuels are 3-5 times their pre-2005 averages, and the cost of renewables targets imposed by the EU puts up the generation and distribution costs for electricity itself. What destroys the market for fuels and electricity creates the markets for energy-avoiding hardware and software.

In conclusion: After Durban there will probably still be the three track race of UN negotiations to extending Kyoto restriction or formalize the Copenhagen pledge approach, national policies, and business responses. Meanwhile, the arena is getting hotter.

EU wants Kyoto commitment to be continued. The other countries also. US and China stands for the Copenhagen agreement. In the US a new set of carbon emission and fuel efficiency standards has been enforced. Australia has ambitious targets. The EU objectives in 2020 are: 20 reduction of GHG emissions/20 improvement in energy efficiency/20 % share of renewable energies in the global energy mix. There is in general a political desire to do something about carbon emissions, independent

of Durban. Anyway there is a reduction in oil demand in US and EU.

Equal attention should be given to adaptation and to mitigation

Renewable : the consumer is subsidizing renewable energies which make carbon cheaper

Durban : zero emission event. SA government calculating CO2 emissions from travel to get money from the participants

Countries concerned with flooding are tapping the drums

3.2 The energy mix

Global energy outlooks: it is necessary to transform the supply side. We have tended to overestimate oil demand, whatever the price of oil. No outlook points to a dramatic phase out. All outlooks focus on emerging trends

The production of oil and gas increased by 38 Mboed since 2000 of which 18 Mboed oil and liquids. The breakdown is as follows: MENA 11,9 - Europe 9,6 - North America 5,2- South America 2,9 - Asia 4,7 - SS Africa 2,3

For the energy mix, the key word is uncertainty. There will be no major technology breakthroughs for the next 20 years. Flexibility should be one of the major drivers of energy policy. The best scenario is the scenario which allows to switch to another scenario if the situation changes

Consequences:

- Energy efficiency has to increase everywhere
- The share of electricity will increase dramatically
- Grid investment is key
- The share of renewable will increase sharply
- We have moved from the peak oil theory to peak money theory : a lot of photovoltaic but in countries where it is not necessary to subsidize
- Not too much offshore wind energy
- More gas
- Even with gas we will need CCS
- What about nuclear? The share of nuclear will increase in emerging countries. Not a lot of new units in the US (competition from cheap gas), neither in Europe. Possibility of extensions.
- A lot of investments are needed (35 T\$ over 20 years). But uncertainty is a big threat

The importance of technological progress is stressed. There is a large impact of Information Technology on power generation. Gas is probably the solution for Japan and for Germany.

Two years ago companies were asking for guidelines in term of environment from the governments. This is no more the case now. Short term is more important

With more technology and more investments we can get more energy. Example : one well with fracking is 40 – 50 % more efficient in one year because of change in the chemicals injected. The modifications can be obtained just with computer software. The climate change is no more a priority. Greens are more strongly against nuclear energy. The German government did not discuss with the other European governments the reduction of nuclear industry. In France no possibility to close a refinery despite the fact that it reduces CO2 emissions

There is a lack of confidence among the population on the possibility to deal with the climate change issue. Why the Germans are switching to offshore wind instead of gas for electricity generation while 51 % of electricity generation is coming from coal. You need to ask 6 times a question about the reason for a decision before you get the right answer

Fukushima : 30 000 persons were killed by the tsunami why only a few people will die from the consequences of the accident. There was no massive release of emissions from the plant. In Japan the nuclear accident is mainly a man made accident compared to the tsunami which is a natural accident. Energy democracy will be a new important thing

We need to convince the government to do something. In France there was a change in the population behavior: people do not trust technology (nuclear, shale gas ..) People still want to combat climate change. They want energy clean and cheap. Governments everywhere are very weak. They cannot impose their solutions.