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Key oil and gas issues

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" Our imagination is stretched to the utmost, not, as in fiction, to imagine things which are not really there, but just to comprehend those things which are there. "

— Richard Feynman

The Character of Physical Law (1965)

Key energy issues today

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- **Why do oil prices matter so much?** – gas and coal prices are mostly driven by oil.
- **Why are oil prices so high?** – High costs? Low spare capacity? Speculation? Politics? OPEC's output policies? Saudi finances? A bit of everything?
- **Will oil prices stay high?** It depends on Saudi financial needs, Iran's true nuclear intentions, Iraq's capacity profile, Chavismo's future, non-OPEC output growth, China's economic growth, the drive to curb CO_2 emissions, geopolitics …
- **The impact of the shale revolution** – so far it has been confined to the US; how long will it take to spread to the rest of the world?
- **Fukushima's legacy:** nuclear power has acquired a toxic reputation; guaranteed electricity prices seem to be required these days in the UK for new nuclear builds.
- **The economics of oil and energy:** can the world continue to afford expensive energy? Subsidies make it easier.
- **Geopolitics and energy:** will its decreasing dependence on imported oil and gas make the US more isolationist and, if so, what does this imply for the M. East Gulf?

Oil drives the energy price complex, except in the US

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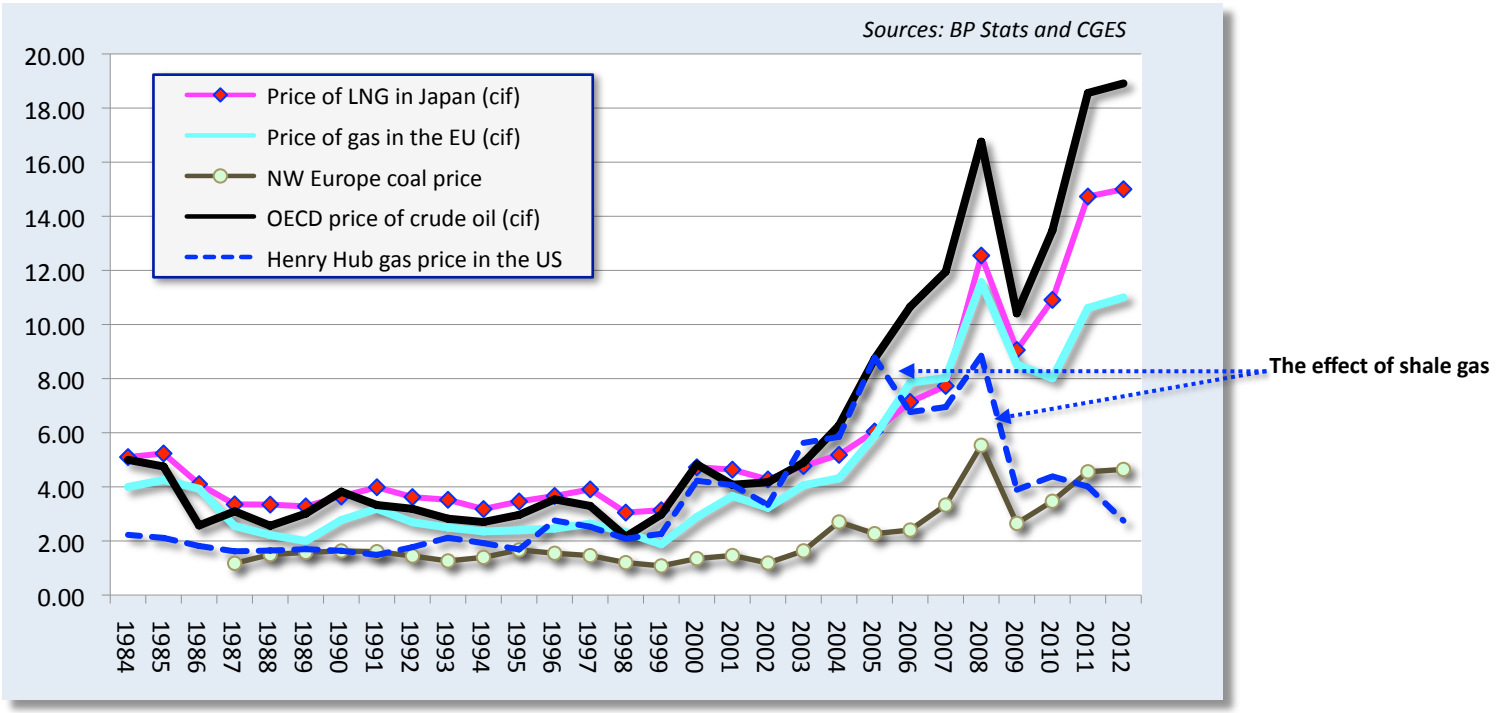
Comparable prices for oil, natural gas and coal ($/mn BTU, 1984-2012)



Natural gas and coal prices in the European Union and NW Europe have been driven by oil prices, as has the price of LNG landed in Japan. More than half the gas consumed in the EU and most Japanese LNG is bought under long-term contracts that stipulate prices linked to oil prices, hence the close relationship between oil and gas prices. This is not true of the US after 2005, when the shale gas revolution led to the de-coupling of oil and gas prices. US industry has benefitted from cheap gas, which has led to 're-shoring'.

Electricity prices in Europe versus the US

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Sources: EU energy portal, EIA and CGES

Household retail electricity prices in Europe in May 2013			
Country	**€/kWh**	**Country**	**€/kWh**
Austria	0.201	Italy	0.231
Belgium	0.226	Latvia	0.139
Bulgaria	0.088	Lithuania	0.126
Croatia	0.113	Luxembourg	0.167
Cyprus	0.272	Malta	0.170
Czech Republic	0.151	Netherlands	0.193
Denmark	0.295	Poland	0.146
Estonia	0.111	Portugal	0.203
Finland	0.157	Romania	0.107
France	0.145	Slovakia	0.173
Germany	0.265	Slovenia	0.157
Greece	0.141	Spain	0.189
Hungary	0.156	Sweden	0.204
Ireland	0.225	United Kingdom	0.171

United States	0.096

End-user industry electricity prices in Europe in May 2013			
Country	**€/kWh**	**Country**	**€/kWh**
Austria	0.093	Italy	0.167
Belgium	0.097	Latvia	0.100
Bulgaria	0.067	Lithuania	0.110
Croatia	0.081	Luxembourg	0.075
Cyprus	0.195	Malta	0.160
Czech Republic	0.098	Netherlands	0.089
Denmark	0.094	Poland	0.085
Estonia	0.077	Portugal	0.105
Finland	0.072	Romania	0.075
France	0.078	Slovakia	0.119
Germany	0.116	Slovenia	0.084
Greece	0.092	Spain	0.102
Hungary	0.104	Sweden	0.072
Ireland	0.106	United Kingdom	0.103

United States	0.052

Electricity prices in Greece for households and end-users in industry are below the European averages (€0.176/KWh and €0.101/KWh respectively), and 47% and 21% below the respective electricity prices in Germany. US industry pays much less for its electricity because it generates a lot of it using cheap gas from its extensive shale formations. This has led to the 're-shoring' back to the US of energy intensive industries manufacturing chemicals, fertilisers, glass, steel, aluminium and high-tech alloys. Note how high residential electricity prices are in Germany, where households are carrying the burden of financing the expansion of renewables; the same applies to Denmark.

The oil price in nominal and real terms

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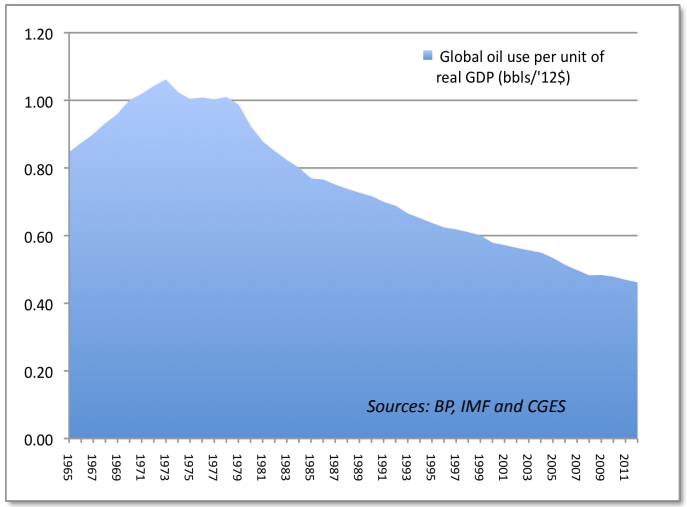
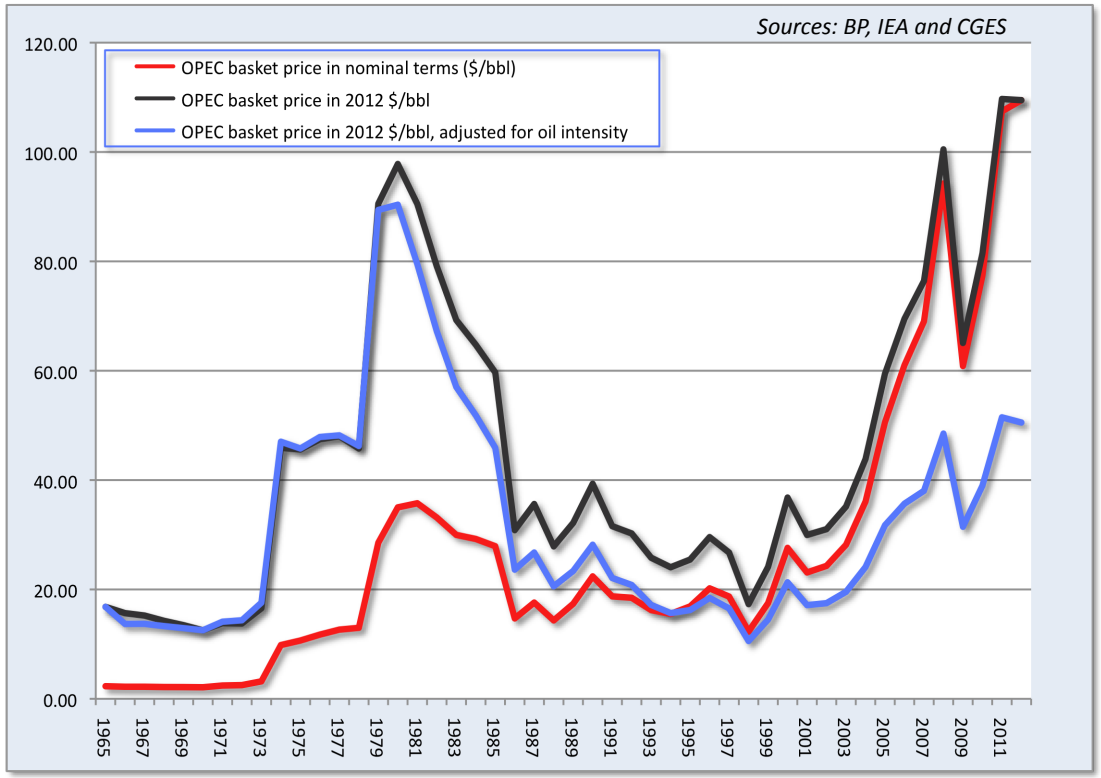
Global oil intensity — 1965 to 2012



Nominal and real oil prices — 1965 to 2012



In both nominal and real terms (in 2012 US Dollars, using the US CPI) the annual average price of oil reached peak levels in the last two years. However, the story is quite different when adjustments are made to account for the changing role of oil in the global economy. In 1965, 0.85 barrels were used per unit of world GDP in 2012 US Dollars, whereas by 2012 the world was using only 0.46 bbls (see graph on the left). When we take into account the decline in the importance of oil in world economic activity, the observed increases in the real price of oil since 1998 still look substantial, but not as intimidating as they do without adjusting for oil's declining intensity. These remarks are perhaps useful in helping us understand why global economic growth did not slow up even more than it actually did in recent years, given the surge in oil prices that the world has witnessed .

The impact of high oil prices on demand

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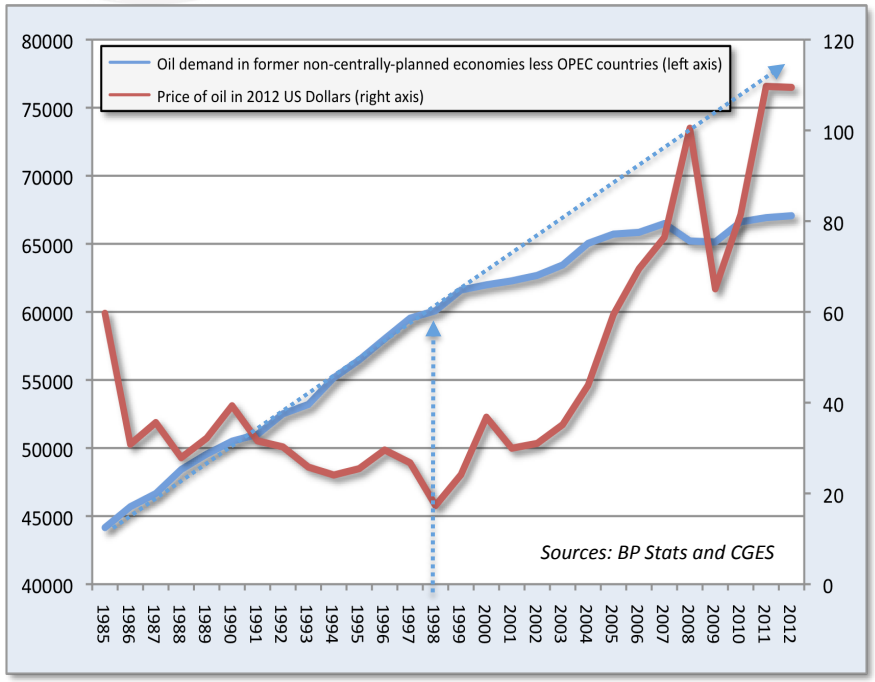
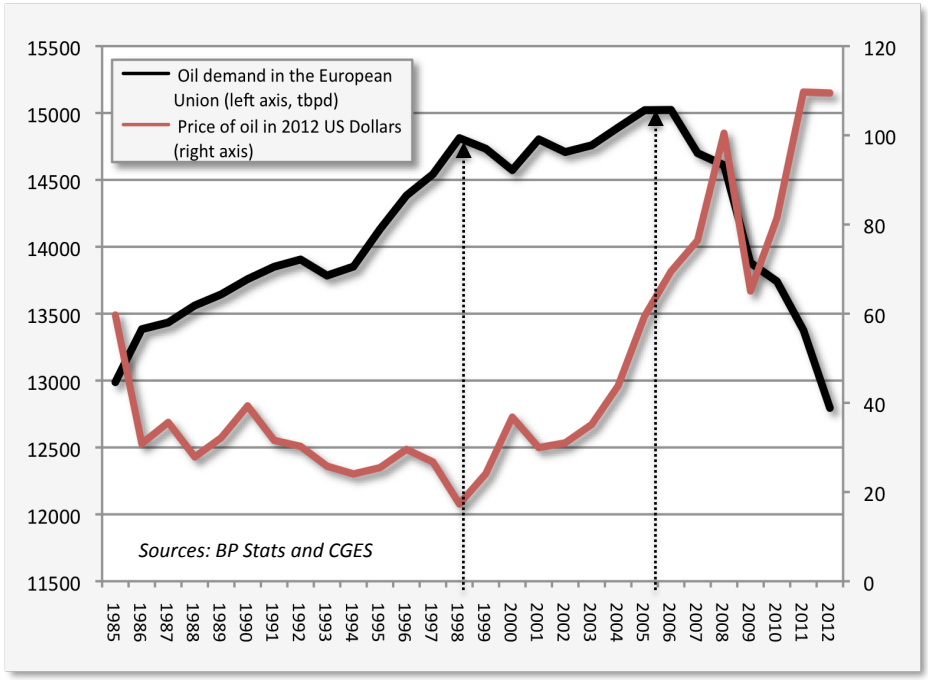
Oil demand in the former NCW without the OPEC countries (1985-2012)



Oil demand in the European Union (1985-2012)



Oil demand in the market economies is affected by rising oil prices in real terms. Between 1985 and 1998 the real price of oil declined and oil demand in the non-centrally planned economies (minus the OPEC countries) rose at a steady trend rate of growth. When the real price of oil started rising strongly after 1998, the rate of increase in the demand for oil slowed considerably, with oil consumption barely growing in the last few years. The picture in the European Union is similar until 2006, but very different thereafter due to the prolonged recession, the sovereign debt crisis in the Eurozone and the adoption of policies to reduce carbon emissions.

Fundamentals – can costs explain high oil prices?

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CGES estimates of recent fully built up costs of developing oil and gas fields

Country, field/project (Reference/Date)	Cost $/bbl
Brazil subsalt (British Gas, 2011)	**14**
Canada's oil sands – subsurface (CGES, 2012)	**< 35**
Canada's oil sands – integrated surface mining & upgrading (Canadian Oil Sands and Suncor Energy, 2011)	**49-53**
Norwegian North Sea – Avaldsnes-Aldous Major oilfield complex (First Securities 2011)	**20**
UK North Sea – Athena oilfield (Ithaka Energy, 2011)	**35**
Russia – W. Siberia chemical EOR and tight deep reservoir (Shell and Gazprom, 2012)	**30-40**
US shale gas in $/bbl oil equivalent (boe, CGES/2012)	**20-30**
US shale oil (CGES, 2012)	**30-60**

The argument has been put forward many times in recent years that the high oil prices we are experiencing are due to the high costs of developing the so-called 'marginal' barrel. The CGES' researches suggest that this is not the case, as the table indicates. The most expensive oil does not cost more than $60/bbl, while hundreds of millions of barrels of oil costing not much more than $15/bbl remain shut in.

Fundamentals – can spare oil production capacity explain prices?

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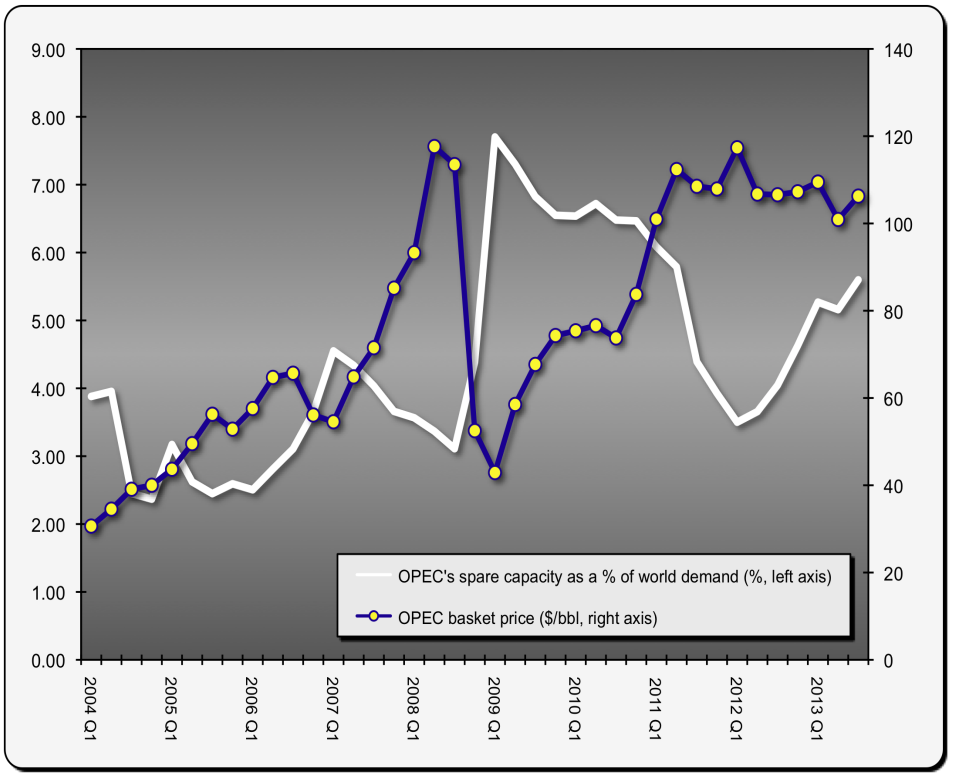
OPEC's spare capacity and the OPEC basket price



In general, OPEC's spare capacity is inversely related to the price of oil, since OPEC is the world's residual supplier of oil. However, a word of caution is needed: one must distinguish between voluntary and involuntary changes in OPEC's spare capacity. When OPEC cuts production to boost prices, spare capacity inevitably rises. The 2Q12 to 3Q13 rise in spare capacity is due [A] to EU sanctions on Iran, [B] Saudi Arabia's move to keep oil prices from weakening in early 2013 and [C] Libya's loss of output in mid-2013.

OPEC's output and its spare capacity

* plus Neutral Zone	Output Sep-13 mbpd	Output Oct-13 mbpd	Spare capacity mbpd	Percent of the total %
Saudi Arabia*	10.08	9.78	2.42	47
Iraq	2.81	2.99	0.46	9
Iran	2.72	2.73	0.51	10
Kuwait*	2.92	2.90	0.19	4
U.A.E.	2.79	2.77	0.09	2
Qatar	0.73	0.73	0.01	0.2
Libya	0.40	0.49	1.08	21
Algeria	1.17	1.13	0.08	2
Nigeria	2.00	2.02	0.18	3
Venezuela	2.36	2.34	0.14	3
Angola	1.70	1.72	0.04	1
Ecuador	0.52	0.52	0.01	0.1
TOTAL	30.19	30.11	5.19	100
	Global oil demand in 4Q13	92.0	5.6%	
	World output of NGLs	13.5		
	Global output of crude only	78.5	6.6%	

Saudi Arabia possesses the lion's share of global spare capacity, which confers upon it the ability to influence the price of oil through its output policy. Kuwait, Qatar and the UAE usually follow the Kingdom's lead in pricing policy. Note the difference in spare capacity as a percentage of global oil demand including and excluding natural gas liquids (NGLs). Libya's large spare capacity is temporary, as is Iraq's.

Is speculation to blame for high oil prices?

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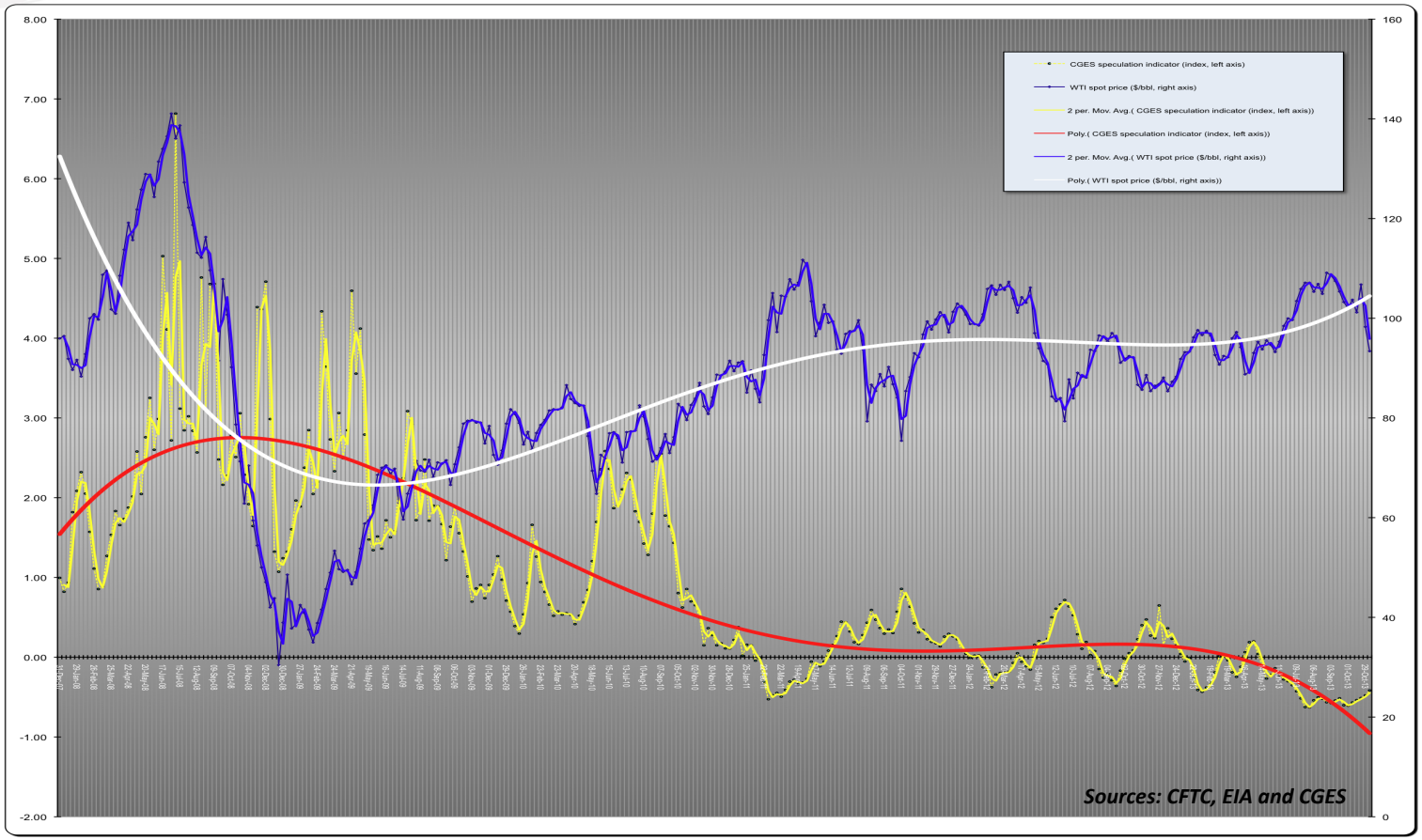
The CGES' index of speculation intensity and WTI, weekly from Dec-07 to Oct-13



The CGES' index of speculation intensity on NYMEX regarding the WTI futures contract (the yellow line) shows that speculation was at its highest from May-08 to Apr-09, through the peak and trough of WTI prices (the blue line) during that momentous period. The rise of the oil price from Sep-10 onwards and its continuation at the current high levels cannot be ascribed to the intensity of speculation, which has been at a low ebb since late 2010.

Fundamentals: incremental global oil demand and supply

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Sources: BP, IEA and CGES

DEMAND	1998-2012 Δ mbpd	SUPPLY	1998-2012 Δ mbpd
OECD	-1.75	OECD	-1.94
Non-OECD, non-OPEC	15.32	non-OECD	7.91
of which China	6.00	OPEC's NGLs	3.49
India	1.68	Processing gains	0.45
Middle East	3.57	Biofuels	1.53
OPEC	1.83	OPEC	4.00
Global demand	**15.40**	**Global supply**	**15.44**

Almost all of the world's incremental oil demand over the period 1998-2012 came from the non-OECD countries, excluding the members of OPEC, which is easily seen by observing that the decline in OECD demand is offset by the rise in OPEC's consumption. On the supply side, the fall in OECD output is matched by the increase in processing gains and biofuels, leaving non-OECD supplies (51%), OPEC's NGLs (23%) and OPEC's incremental crude output (26%) to cover incremental non-OECD, non-OPEC oil demand.

The OPEC 10's key statistics since 1998

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Sources: OPEC, IEA, EIA, Argus and CGES

Output of the OPEC 10	1998 mbpd	2012 mbpd	Incremental Δ mbpd	increase decrease %	Percentage of total %
Saudi Arabia	8.03	9.77	1.74	19.6	38
Iraq	2.11	3.00	0.89	35.2	19
Kuwait	1.80	2.91	1.11	48.0	24
UAE	2.26	2.58	0.32	13.2	7
Algeria	0.82	1.20	0.38	38.1	8
Nigeria	2.12	2.18	0.06	2.8	1
Qatar	0.66	0.74	0.08	11.4	2
Iran	3.64	3.01	-0.63	-19.0	44
Libya	1.39	1.38	-0.01	-0.7	1
Venezuela	3.13	2.34	-0.79	-29.1	55
Total	**25.96**	**29.11**	**3.15**	**11.5**	
OPEC 10 consumption	**4.01**	**6.36**	**2.35**	**46.1**	
Exports of OPEC 10	**21.95**	**22.75**	**0.80**	**3.6**	
Capacity of OPEC 10	**29.80**	**32.48**	**2.68**	**8.6**	
Spare capacity	**3.84**	**3.37**	**-0.47**	**-13.0**	

Although output in the OPEC 10 has increased by a respectable 3.2 mbpd (12%) since the oil price crash of 1998, local oil consumption in these countries increased almost four times faster (46%) during this period , causing the OPEC 10's oil exports to rise by only 0.8 mbpd, or 3.6%, at a time when global oil demand grew by 15.4 mbpd (19%).

Fundamentals: changes in the OPEC 10's capacity since 1998

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Sources: BP, IEA and CGES

	1998 mbpd	2012 mbpd	Increment Δ mbpd	increase decrease %	Percentage of total %
Saudi Arabia	10.40	12.26	1.86	16	42
Iraq	1.95	3.09	1.14	46	26
Kuwait	2.20	3.01	0.81	31	19
UAE	2.62	2.72	0.10	4	2
Algeria	0.88	1.26	0.39	37	9
Qatar	0.71	0.81	0.09	12	2
Nigeria	2.36	2.28	-0.09	-4	5
Iran	3.83	3.25	-0.58	-16	34
Libya	1.46	1.44	-0.01	-1	1
Venezuela	3.41	2.38	-1.03	-36	60
OPEC 10's capacity	**29.80**	**32.48**	**2.68**	**8.6**	
Spare capacity	**3.84**	**3.37**	**-0.47**	**-13.0**	
World oil demand	**74.40**	**89.80**	**15.40**	**18.8**	
Spare capacity as % of oil demand	5.2	3.8	-1.4	**-31.8**	

During a period when global oil demand increased by 15.4 mbpd (19%), the OPEC 10's capacity to produce oil rose by only 2.7 mbpd (9%), resulting in a substantial decrease in OPEC's spare capacity as a percentage of world oil demand. Three OPEC countries accounted for 87% of the rises in capacity, while two (Venezuela and Iran) accounted for almost all of the falls (94%). It is interesting to bear in mind that Libya and Venezuela's peak average annual production occurred in 1970, Kuwait's in 1972, Iran's in 1974, Iraq's in 1979 and Saudi Arabia's in 1980 – that is, all of the peaks came more than thirty years ago, and two occurred more than forty years in the past.

What determines oil prices?

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- There are those who believe that only **fundamentals** play a role in oil price determination: it is all about supply and demand, or more accurately, about stocks and the forward cover they provide.
- Others are of the opinion that whereas once upon a time the fundamentals held the key to oil price formation, this is not true any more. Oil price volatility has encouraged the growth of oil derivatives, catering to the needs of hedgers, and where there are hedgers there are speculators.
- Ease and cheapness of entry by investor-speculators has helped oil to become an asset play; **financial factors** must therefore be also taken into consideration. The paper markets have grown exponentially and their influence cannot be neglected.
- If this is indeed the case, one needs to find out how the fundamentals and the financial factors interact.

Oil fundamentals and financial markets

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- There are three basic **motives for holding inventories of oil** – (a) the transactions motive, based on the need to meet demand, (b) the precautionary motive and (c) the speculative motive.
- These days, with fully developed **oil futures markets**, the desire to acquire or sell oil can also be satisfied through the purchase and sale of oil futures.
- Participation in the futures market is generalised, incorporating both those who wish **to hedge** their purchases or sales of physical oil as well as those who only wish **to speculate**, having no desire to take physical delivery of the oil.
- Speculators or 'investors', have helped to transform oil from being just a physical commodity into **an asset play** as well, subject to macroeconomic considerations such as bond yields and the search for higher returns in a low-yield world, the Euro/ USD exchange rate, the quest for safe havens etc ...
- 'Investors' play a role in determining the shape of the forward curve and this in turn affects the physical spot market through **cash-and-carry hedging operations**. A *contangoed* curve encourages the holding of stocks in a glutted oil market, whereas a *backwardated* curve discourages hanging on to more inventories than necessary.

Fundamentals/Financials and spot price determination

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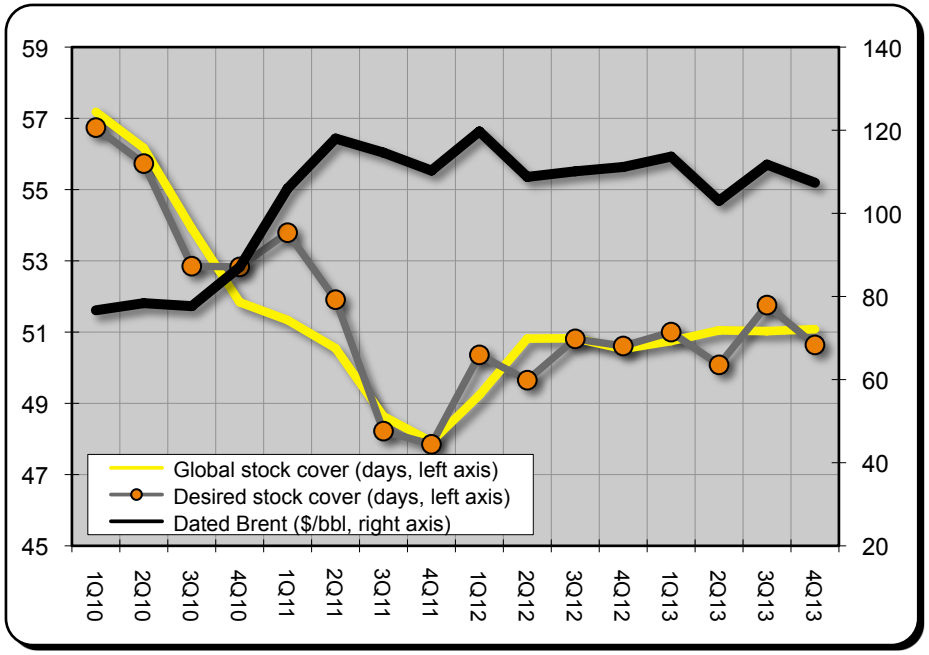
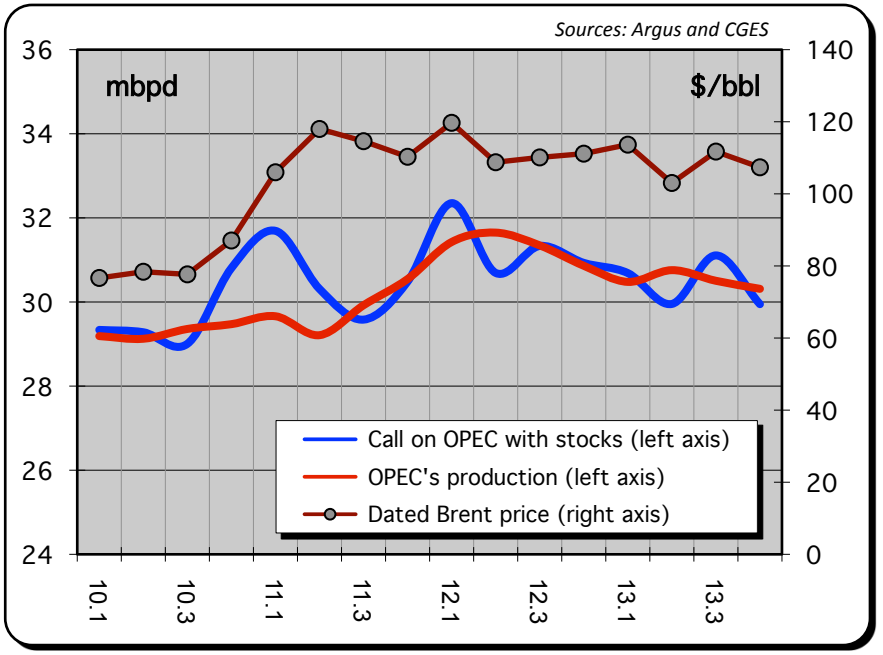
Inventory disequilibrium drives spot prices



Translating 'desired' stocks into the call on OPEC oil



Spot oil prices are determined by the discrepancy between the oil inventories people want to hold and the stocks they actually hold, both measured in terms of days' worth of forward cover. Since OPEC is the world's residual supplier, the amount of oil needed in order to have 'X' number of days of forward cover in stock (see the left-hand graph) can be translated into the need for a certain amount of oil from OPEC, known as the ***'call on OPEC with stocks'*** (see the right-hand graph). The surge in desired stocks in 1Q11 and 1Q12, ramified into the following quarter, was due to the Libyan revolution and the EU's ban on Iranian imports respectively, while the increase in 3Q13 was due to the deposition of President Morsi in Egypt and oil-related strikes in Libya. Please bear in mind, however, that desired stocks are also influenced by the shape of the forward curve, which is where financial considerations enter the equation (the cost of carry versus the convenience yield).

Contango and backwardation in the ICE Brent futures market

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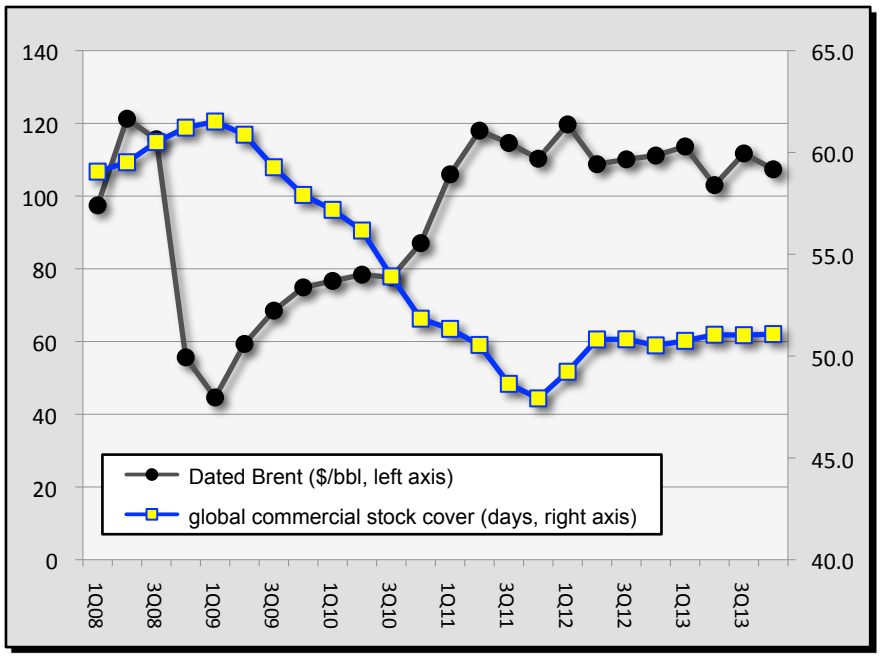
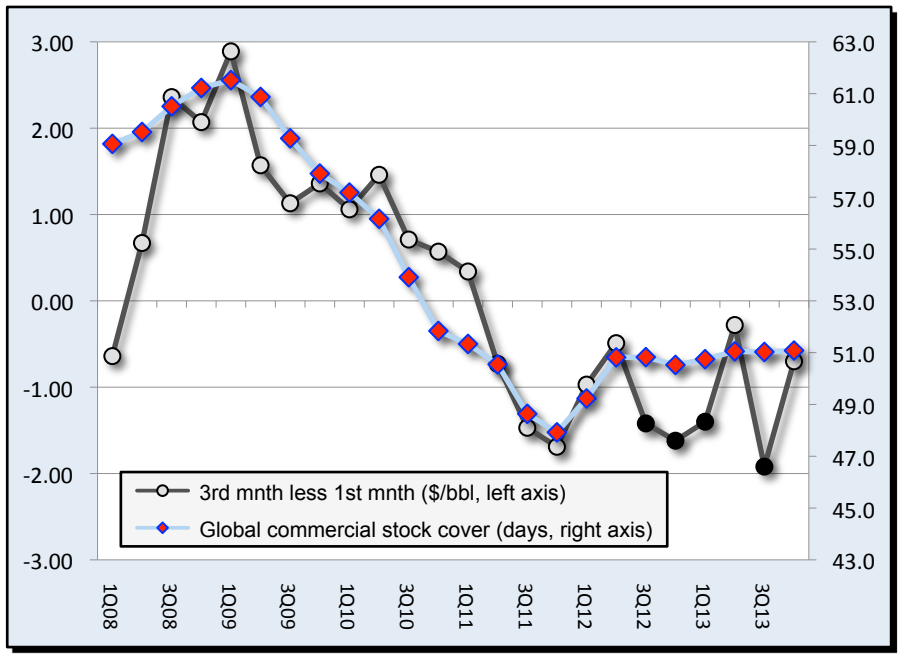
Global commercial inventory cover, Dated Brent and the forward curve (quarterly, 1Q08 – 4Q13)

Sources: ICE and CGES





In general, the higher the level of oil inventory cover the wider the **contango**, should the market be in contango, and the narrower the **backwardation**, if the market is backwardated. Most of the time the 3rd-month versus 1st-month spread in the Brent futures market is positively correlated with the level of commercial inventory cover. Occasionally the relationship breaks down, as it seems to have done between 3Q12 and 1Q13, and in 3Q13, when the front month acquired a premium seemingly unjustified by the fundamentals. This premium is likely to have been due to market concerns about disruptions to oil supplies [Iran and sanctions in 2012, turmoil in Egypt this summer and then strikes in Libya that crippled Libyan oil production]. However, the market's backwardation seems finally to be moving in the right direction in 4Q13, in view of the current level of global commercial stock cover, suggesting that an unjustified [by the fundamentals] front-month premium can be lost as quickly as it was gained.

Growth in the WTI crude oil futures market

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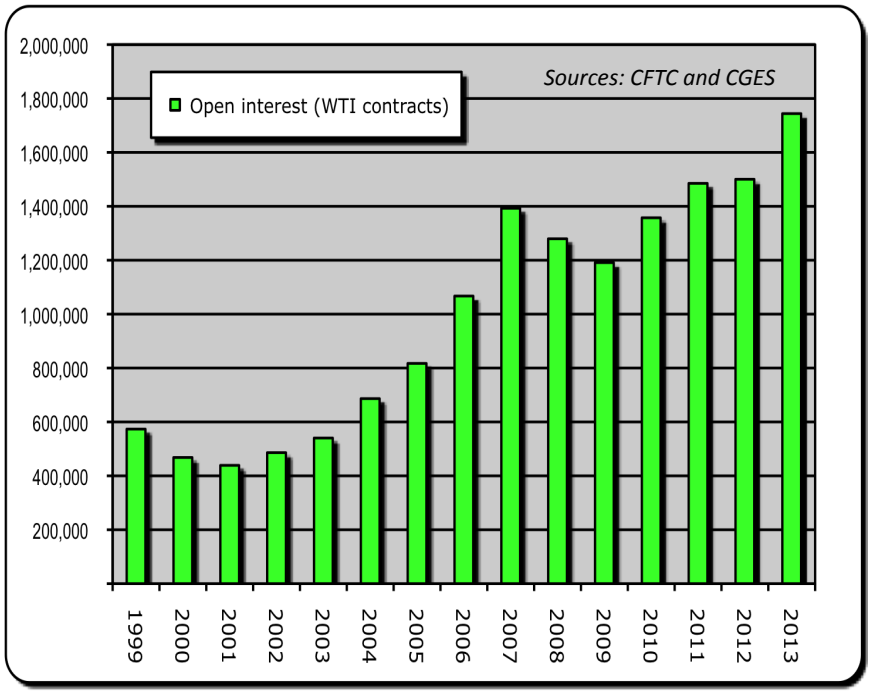
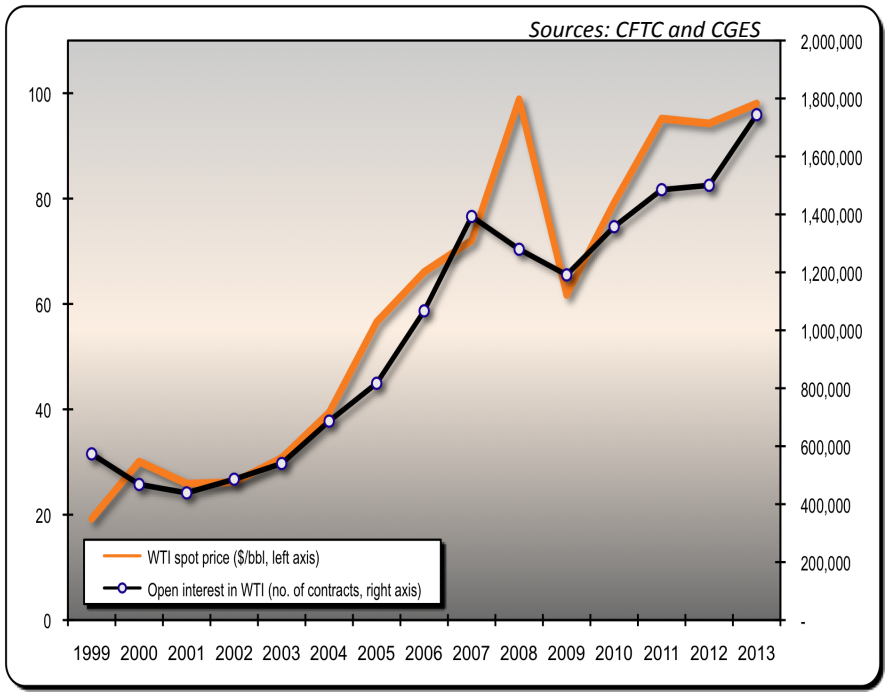
Crude oil futures at NYMEX



WTI and open interest at NYMEX



At 1.74 million outstanding contracts on average thus far in 2013, representing 1.74 billion barrels of oil, NYMEX's WTI crude oil contract (along with ICE's Brent contract) helps to determine the price at which most of the world's oil is bought and sold. Growth in crude oil open interest on NYMEX has been spectacular, rising more than fourfold since 2001. This is not surprising, since the price of WTI has also risen spectacularly since then, increasing the value of the oil that needs to be hedged. Most of the open interest refers to the first two months, but holdings further out along the forward curve have been rising, as has spreading by the large scale speculators. The hedgers are usually net short and the speculators are therefore net long.

Financial factors – oil and the US' cheap money policy

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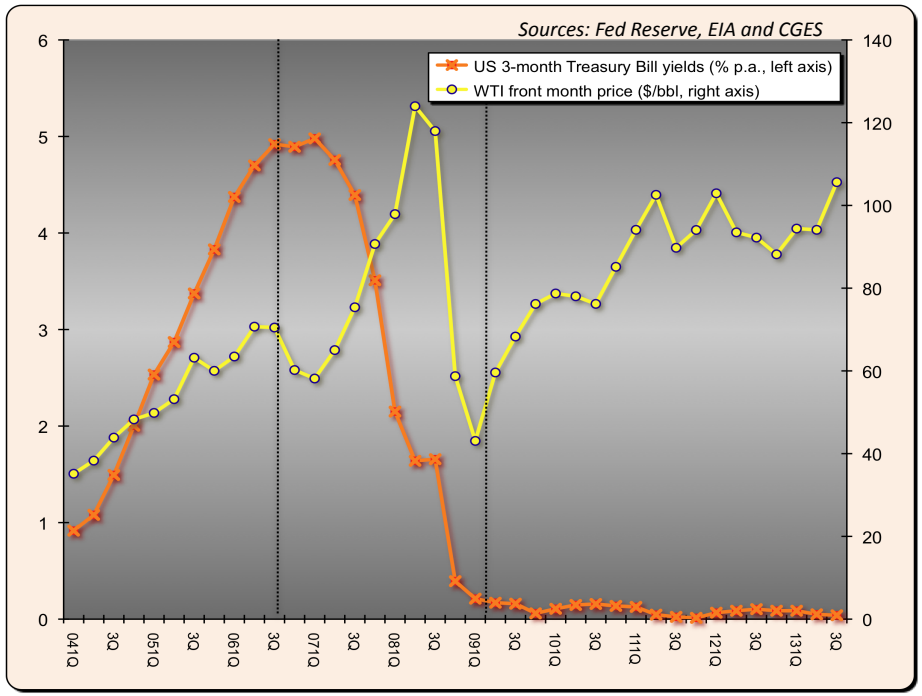
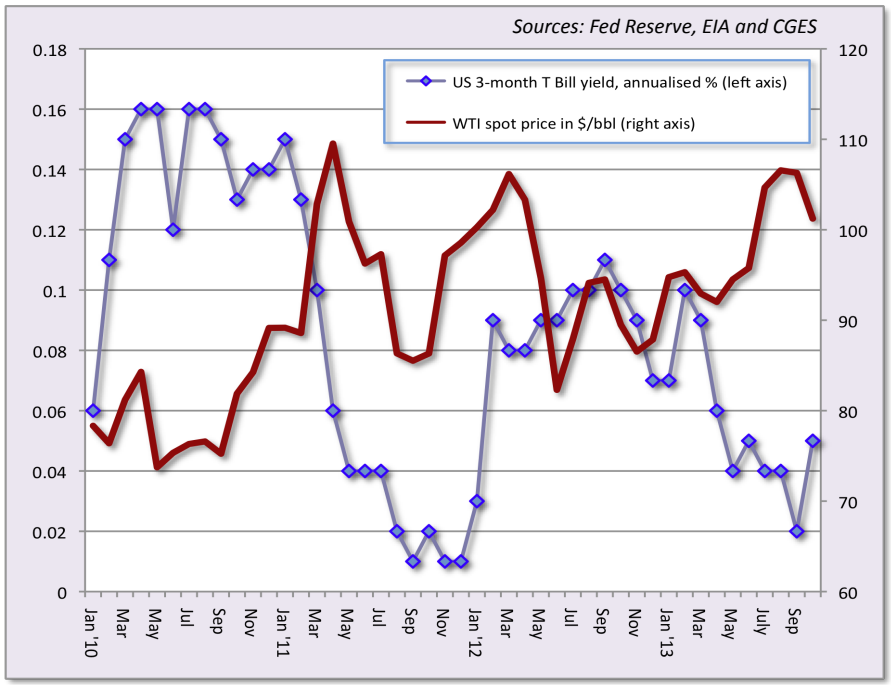
US 3-month Treasury Bill yields and the WTI spot price (quarterly, 1Q04 – 3Q13)



US 3-month TB yields and the WTI spot price (monthly, Jan-10 to Oct-13)



Until the third quarter of 2006 the US 3-month TB yield and the price of oil were heading in the same direction, reflecting in part the strength of the US economy. Thereafter, as economic growth started to weaken Ben Bernanke's Fed began to pursue a cheap money policy, which became an ultra-cheap policy from 4Q08 onwards as the US entered a deep recession that lasted a year. Since then the Fed has continued with its cheap money policy, which has played some part in raising and keeping oil prices high.

Juxtaposing annualised US 3-month Treasury Bill yields with the spot price of WTI on a monthly basis presents a more granular picture, but one can still discern an inverse relationship between the two. Relatively high 3-month Treasury Bill yields are associated with lower oil prices and vice versa. Since the beginning of 2013, T-bill yields have dropped once again to ultra-low levels, helping to explain in part why the price of WTI has risen since then. However, there was a sharp switchback from September to October and the oil price dropped heavily – a coincidence, perhaps?

The outlook for oil in 2014

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Incremental oil demand, supply and call on OPEC	2011	2012	2013	2014
	mbpd	mbpd	mbpd	mbpd
Oil demand	**0.66**	**1.04**	**1.08**	**1.14**
less non-OPEC supply	**0.21**	**0.37**	**1.30**	**1.63**
less OPEC's NGLs equals	**0.46**	**0.40**	**0.27**	**0.19**
Call on OPEC (zero stockchange)	**-0.01**	**0.27**	**-0.49**	**-0.68**
less previous year's stockchange	**-1.14**	**-0.58**	**0.63**	**0.31**
equals need for OPEC oil	**1.13**	**0.85**	**-1.12**	**-0.99**
Change in OPEC's output	**0.55**	**1.49**	**-0.81**	**-0.51**
Global stockchange	**-0.58**	**0.63**	**0.31**	**0.48**
% change in Dated Brent	**40**	**0**	**-3**	**-4**

- The price of oil remained high in 2013 largely because of unforeseen supply disruptions and tension in the oil market due to multiple crises in the Middle East and North Africa (the MENA region). The latest manifestation of this is the recent heavy loss of Libyan output due to strikes.
- The need for OPEC oil declined substantially in 2013 due to a large increase (1.3 mbpd) in non-OPEC supplies; had it not been for disruptions in Libya's production and exports, and the Saudis' caution, oil prices would have been much lower.
- Next year, the increment in non-OPEC supplies is likely to be even greater (1.63 mbpd), requiring a 1-mbpd cut in OPEC's output to keep prices from falling heavily. However, on present indications a year-on-year OPEC production drop of only 0.5 mbpd is likely, hence the predicted 4% weakening of Brent in 2014.
- The recent agreement between Iran and the P5+1 powers raises the prospect of a complete lifting of sanctions by next June. This means that there is a possibility that 0.9 mbpd of Iranian crude will return to the market, perhaps with 1 mbpd of Libyan crude; another 0.5 mbpd of extra capacity is also likely from Iraq and Venezuela. A severe glut is, therefore, on the cards.

Saudi Arabia as a swing producer

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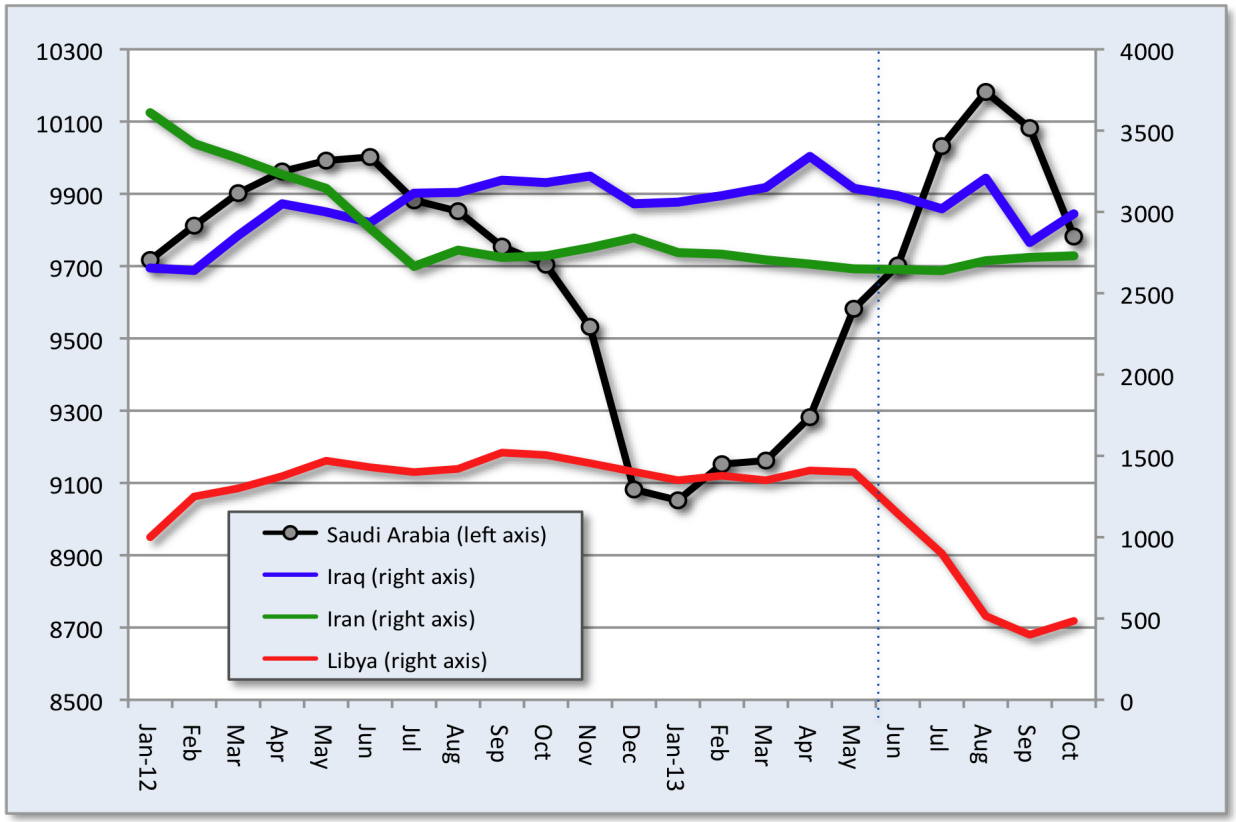
Saudi Arabia, Iraq, Iran and Libya (Jan-12 to Oct-13 in tbpd, CGES estimates)



Saudi Arabia is always on the look-out for any significant involuntary changes in the output of its OPEC partners, which the Kingdom generally tries to counteract by raising or reducing its own production accordingly. When from Jun-13 onwards Libyan output started to decline rapidly, Saudi Arabia ramped up its production further, pushing it to the highest levels seen since 1981. However, a note of caution is needed when interpreting this move, because Saudi output usually rises significantly in the summer months for seasonal reasons, making it difficult to work out how much of the Saudi production increase actually fed into the international market; moreover, Saudi oil is heavier and sourer than Libyan oil, with ramifications for the product market, especially in the Mediterranean.

The minimum oil price needed by Saudi Arabia in 2013

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Saudi Arabia's budgets

Sources: SAMA, MEES and CGES

	2012 $ billion	2013 $ billion
General expenditure	170.6	185.5
Debt interest	2.5	1.2
Capital expenditure	54.4	60.6
Total expenditure	**227.5**	**247.3**
Non-oil income	18.0	18.5
Investment income	9.0	9.5
Oil revenues* [CGES est.]	303.4	288.8
Total income	**330.4**	**316.8**
Surplus/(Deficit)	**102.9**	**69.5**

Notes:

1. *Saudi Arabia's 'oil revenues' include $36bn of net revenues from NGL exports in 2012 and $41bn in 2013.*
2. *Saudi oil production averaged 9.8 mbpd in 2012 and is expected to average 9.6 mbpd in 2013.*

Price needed in …

2009 = $64

2010 = $74

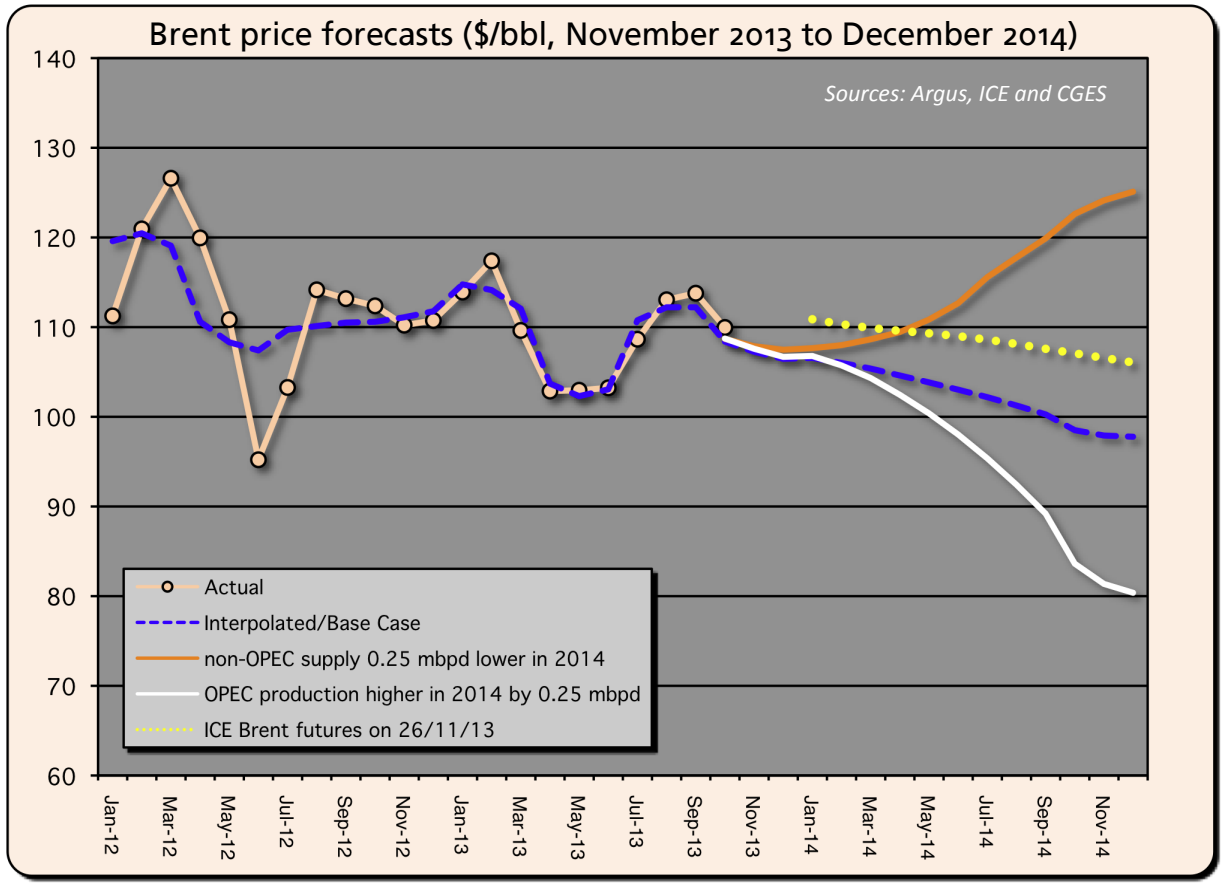
2011 = $85

2012 = $90

2013 = $86

- With Saudi output at 9.6 mbpd (the expected 2013 average), the minimum OPEC basket price required to cover Saudi general expenditure less non-oil and investment income is $61/bbl.
- To cover general and capital expenditure plus debt interest (less other Saudi income) the price needed is $81/bbl; including a contingency reserve of $10bn raises the price to $86/bbl. We expect the OPEC basket price to average around $104/bbl this year.

CGES Brent price forecasts for 2013 and 2014



Our base case price projections are well below the November 26th Brent forward curve from Jan-14 through to the end of next year. For Brent to stay above $100/bbl, OPEC's production needs to average around 30 mbpd in 2014; if OPEC's output exceeds 30 mbpd (by, say, 0.25 mbpd), prices will be much weaker than in the base case, requiring substantial OPEC output cuts to keep oil prices above the $100/bbl level. On the other hand, if non-OPEC oil supplies do not grow as expected (lower than the base case by 0.25 mbpd) and OPEC does not produce more than 30 mbpd, Brent would exceed $120/bbl by next September.

Key US oil statistics

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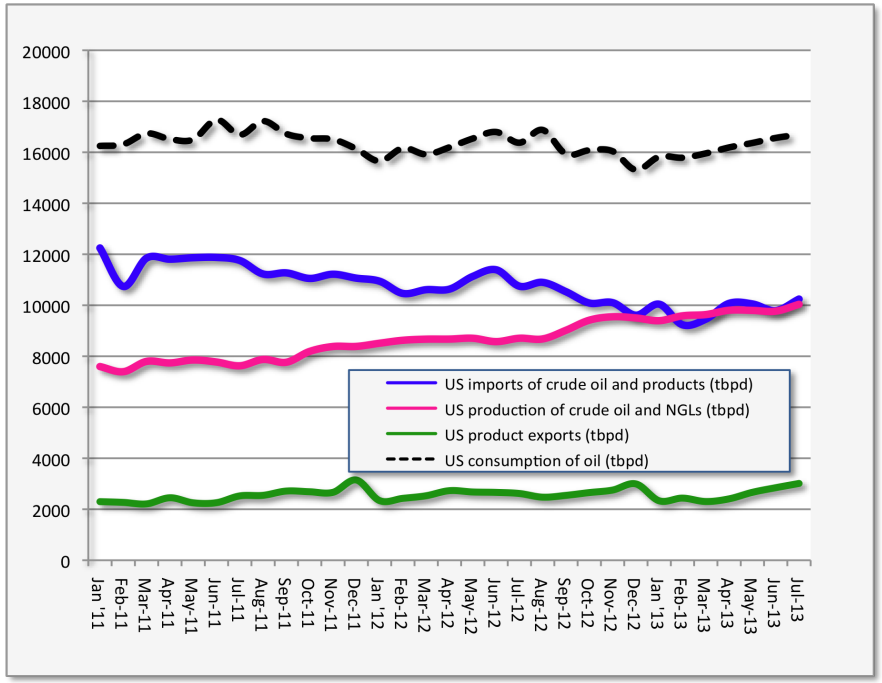
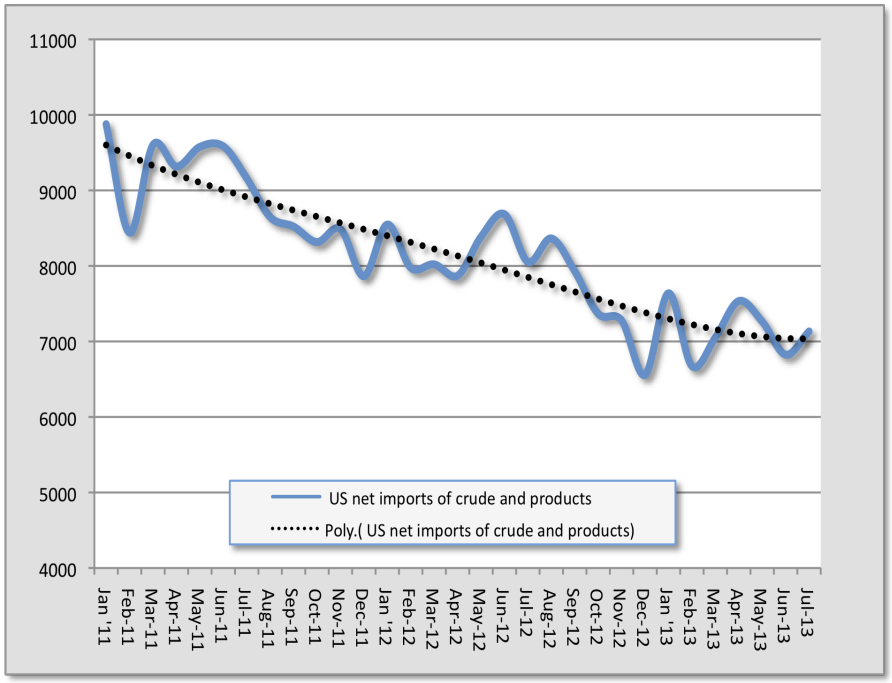
US oil production, consumption, imports, exports and net imports from January '11 to July '13 (in tbpd)

Sources: EIA and CGES





Much has been made of the significant decline in the US' oil imports due to the surge in US shale oil production, even to the extent of predicting that the US' imports of oil will be negligible by 2020. However, although the drop in the US' net imports of crude and products between Jan-11 and Jul-13 has indeed been impressive (down by 3 mbpd, see figure on the right), there is a long way still to go before net US oil imports fall to zero.

US natural gas — the overlooked role of demand

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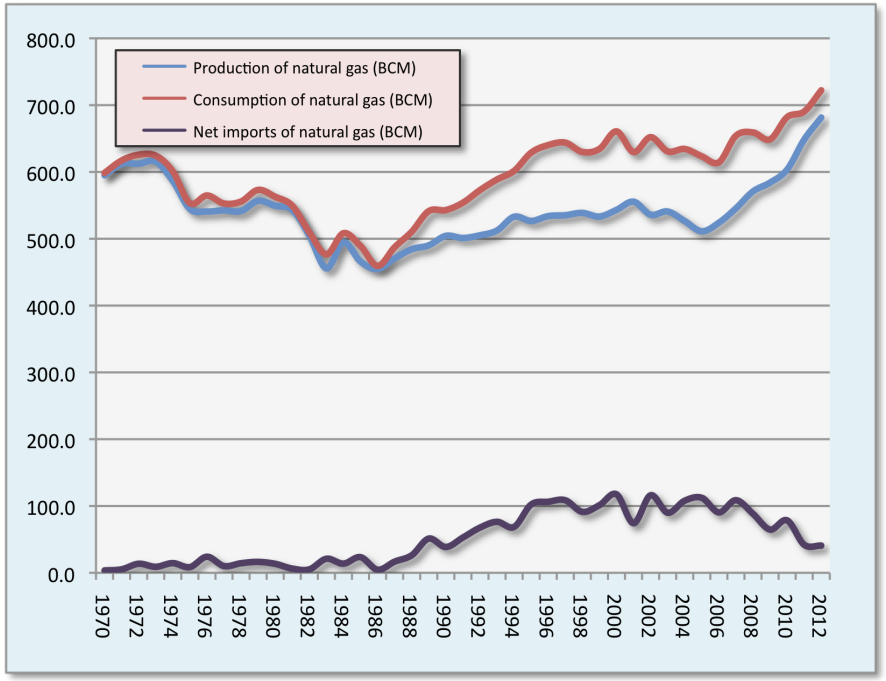
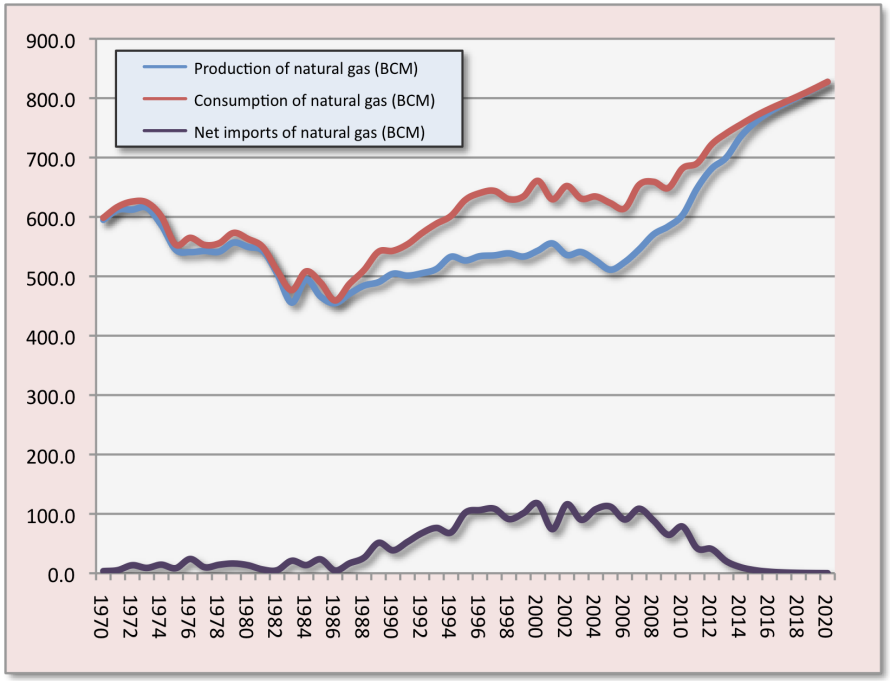
US production, consumption and net imports of natural gas (in BCM) : 1970-2012 and projections to 2020

Sources: EIA and CGES





The key narrative regarding natural gas in the US has been the surge in gas production due to the fracking revolution. With no export facilities available (as yet), the dramatic increase in gas output since 2005 led to much lower gas prices and a halving of net natural gas imports. Prices would have been even lower had the consumption of natural gas in the US not taken off (with a delay) as a result of lower gas prices in real terms. US natural gas demand's long-run price sensitivity — at 0.23, based on the CGES' econometric work — is relatively high compared with oil demand's price elasticity. US gas demand is projected to rise by 2.7% a year, based on gas prices rising by 2% p.a. in real terms and real GDP growing by 2.3% a year; with gas production expected to increase by 4.4% per annum, net US gas imports drop to zero by 2020. If real gas prices are assumed to increase by 5% a year, then there will be too much supply chasing demand and gas prices will decline; if real gas prices fall by 5% per annum, then there will be too little gas to export.

Changes in CO_2 emissions from 1990 to 2012

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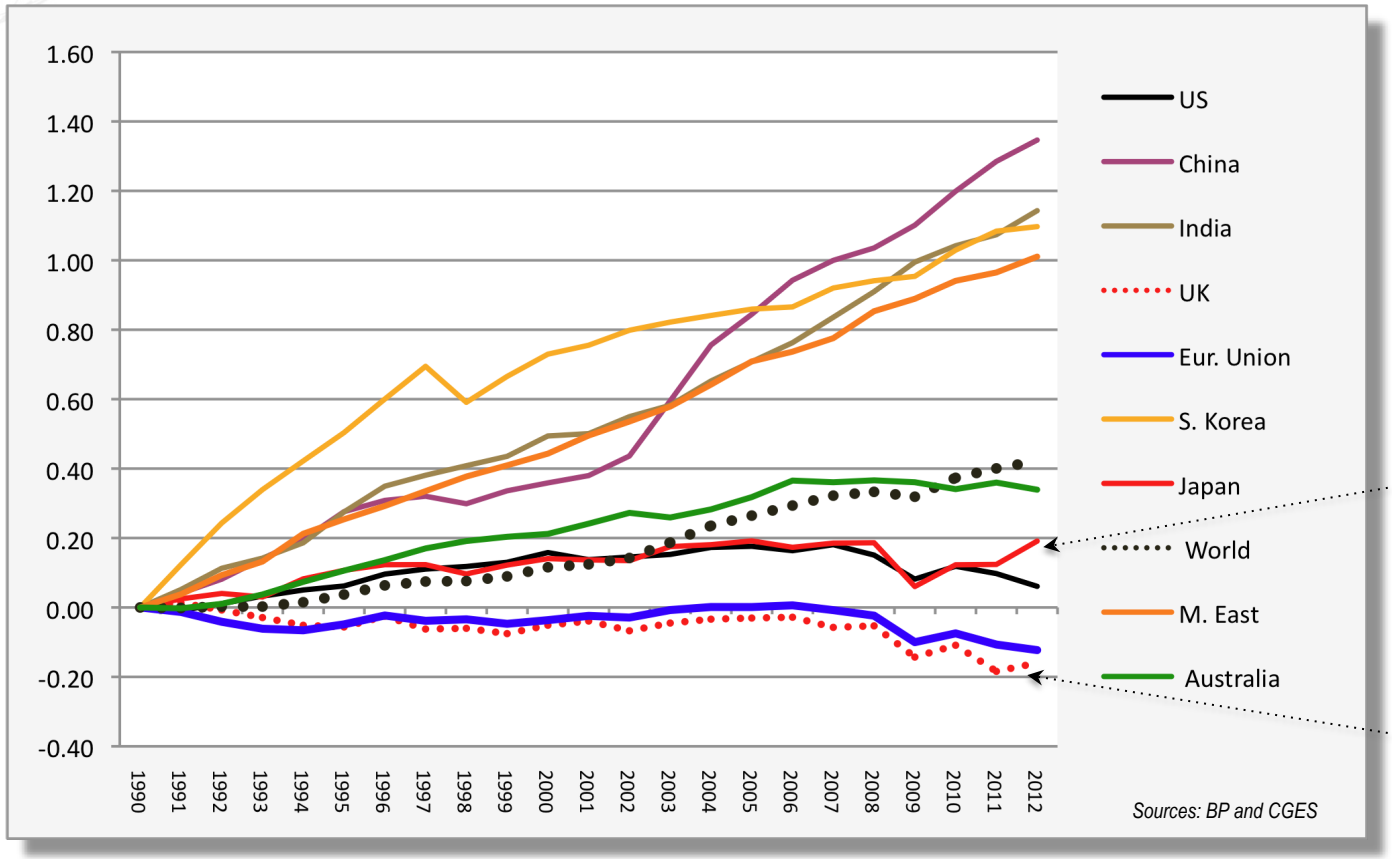
The vertical axis refers to the % change in emissions from the base year; e.g., +0.4 represents a 40% increase and +1 a 100% rise (i.e. a doubling).



The UK's CO_2 emissions in 2012 were 16% lower than the base level, while the EU's as a whole were 12% lower and the US' 6% higher, as were Japan's (19% higher).

The sharp rise in Japan's emissions in 2012 was due to more oil- and gas-based power generation after the Fukushima nuclear disaster.

The UK's rise in emissions in 2012 was due to more coal-based power generation before the planned decommissioning of certain coal-fired power stations.

1990 is the base year for implementation of the December 1997 Kyoto protocol. The Annex I (industrialised) countries promised in Kyoto to reduce their collective emissions of greenhouse gases by 5.2% on average over the years 2008-12 versus the base year of 1990. Under the protocol, the EU's pledged cut is 8%, the US' is 7%, Japan's and Canada's is 6%; there is no cut for Russia and an 8% increase for Australia. The US has signed but not ratified the treaty; Canada withdrew in December 2011. The EU in its wisdom has decided unilaterally to cut emissions by 20% by 2020; not to be outdone, the UK has mandated an 80% reduction by 2050!

Can the world continue to afford expensive oil?

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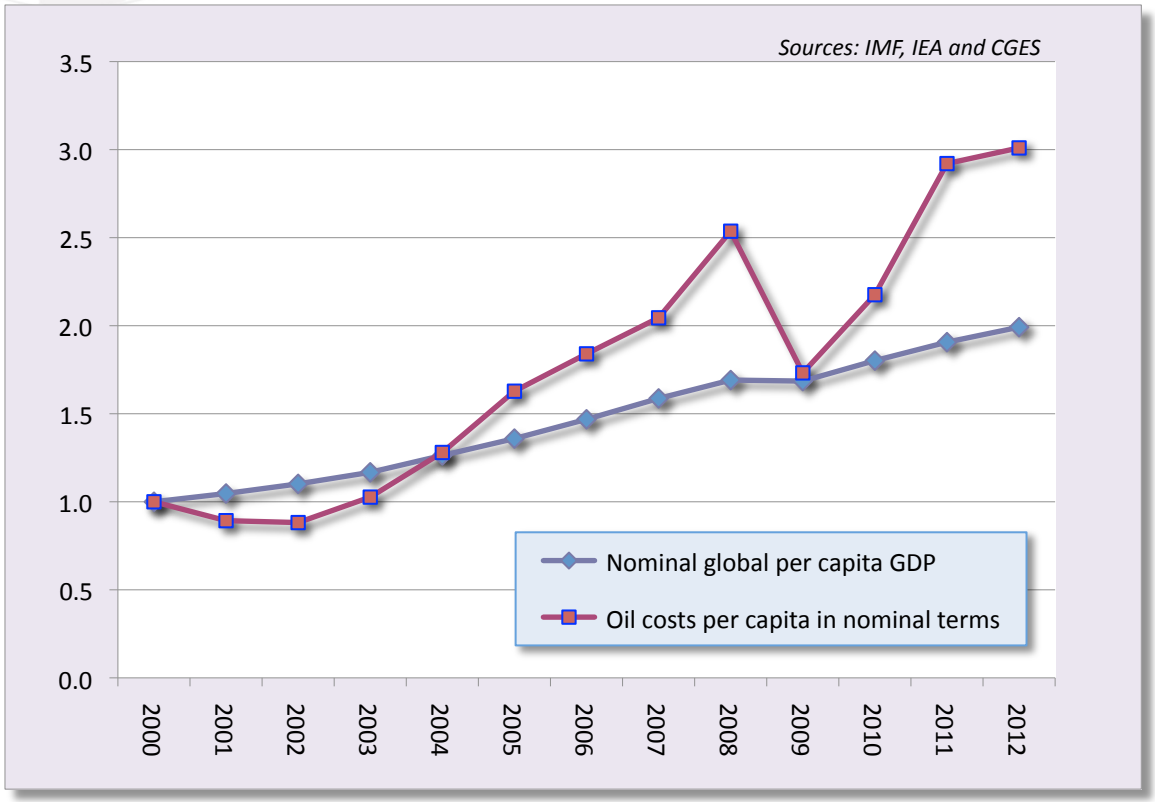
Indices of nominal global GDP and oil costs per head (2000=1.0)



Global GDP per capita doubled during the last twelve years, whereas oil costs per head trebled over the same period. Our measure of oil costs include transportation, refining, and distribution & marketing costs, plus taxes. In many parts of the developing world subsidies help to reduce the impact of rising oil costs (see the table on the right), but as you can imagine these subsidies are a huge drain on the public finances.

The following example of recent gasoline prices shows the distorting effect of subsidies

	$ per US gallon
Venezuela	0.06
Saudi Arabia	0.45
Kuwait	0.81
Egypt	1.14
UAE	1.77
Iran	2.15
Nigeria	2.34
Malaysia	2.36
Mexico	3.22
United States	3.29

Concluding remarks

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- Brent will average $102/bbl next year, if OPEC's output is held at 30 mbpd, but this will be difficult, given a likely increase in Libyan and Iranian production at some stage.
- Rising non-OPEC production, a relatively weak global economic recovery (*Consensus Economics* predicts growth of 3.1% for 2014), more oil from Iraq, Venezuela, Libya and – if all goes well – Iran, will test OPEC and Saudi Arabia's resolve at some stage early next year.
- One must remember, however, that oil is considered an asset play as well, which brings macroeconomic factors into consideration, like the value of the US Dollar, quantitative easing and when it will end, fiscal policy and – last, but by no means least – investor sentiment (what Keynes called *'animal spirits'*).
- Considering the longer term, the world has ample supplies of cheap oil, but whether it will eventually use all of them is a moot point, given OPEC's desire to keep prices high and environmental pressures to reduce oil consumption.
- In the meantime, we shall continue to have to cope with a dysfunctional oil market, in which prices are kept high by overspending oil producing states while oil demand stumbles along and the poor everywhere are denied cheaper energy.

The CGES' Oil Market analysis

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The CGES produces a number of reports offering crude oil and product market analysis

The ***Global Oil Insight*** package, which includes …

- Weekly Outlook
- Oil Market Prospects with Price Forecasts
- Industry Watch
- Monthly Comment
- Bi-monthly Focus

The ***Monthly Oil Report***

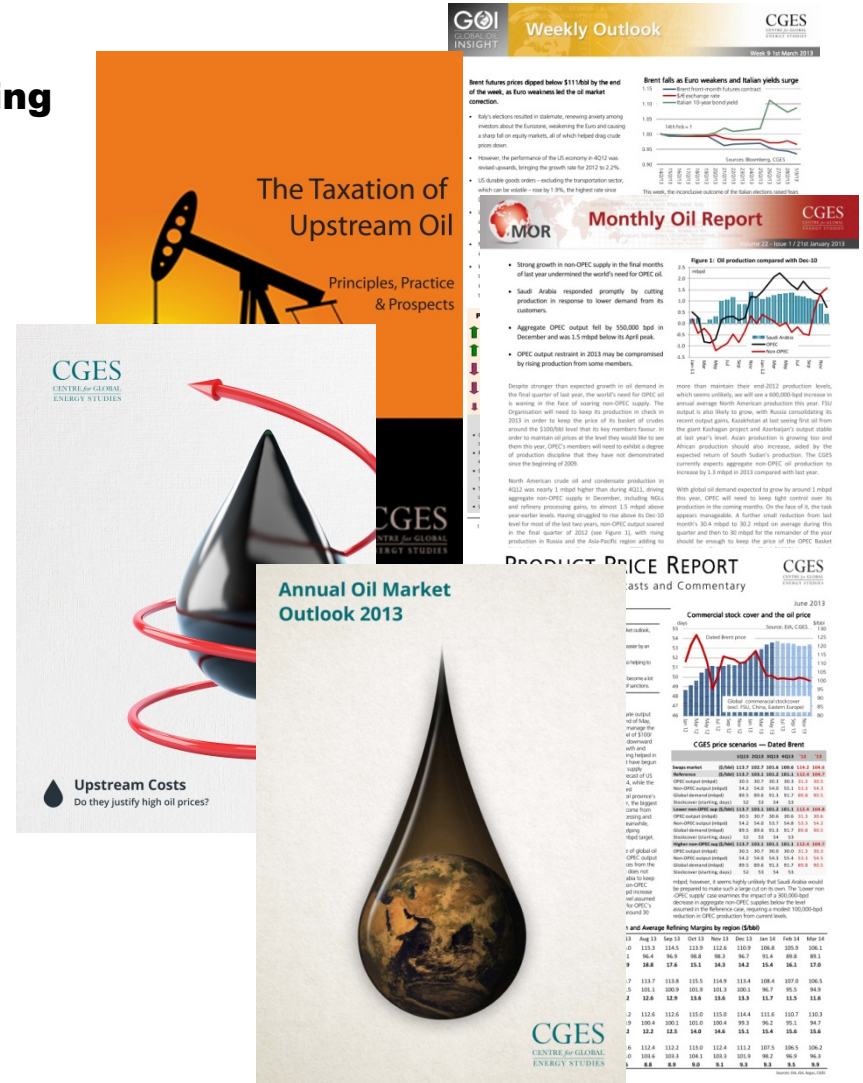
- Monthly crude oil market analysis and price forecasts

The ***Product Price Report***

- Monthly oil product market analysis and price forecasts

The ***Annual Oil Market Outlook 2013***

- Annual review and forecasts of oil market fundamentals



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