

Has non-OPEC oil production peaked?

Global oil production decline rates are set to accelerate

In our view, the combination of low oil prices and a global credit crunch will prove rather damaging for the oil industry. Our analysis based on the IEA Field by Field Production database finds decline rates at an average of 4.2% per annum since 2003. Extrapolating from this sample to create a global production profile, we believe the global decline rate has averaged at least 4.5% YoY in recent years. These rates, however, could accelerate further over the next few years.

Non-OPEC crude oil production may have already peaked

Broadly, oil production decline rates are a function of investment rates and the size and age of fields. All these factors point to steeper oil output declines going forward. However, the IEA works under the assumption of oil production decline rates of 4.7% to 2015, expecting an increase in non-OPEC output to 51 million b/d over the next 7 years. In contrast, in our base case scenario we estimate output decline rates of 5%, and see non-OPEC oil production stuck in the current 49 to 50 million b/d range in the same period. Should the credit crunch push decline rates to 6%, however, non-OPEC production could decline precipitously towards 47 million b/d by 2015 from the current levels.

The commodity super-cycle is not over, just resting

In sum, assuming the ongoing recession does not turn into a multi-year event where global oil demand is pushed down structurally for the next five years, the steep decline rates in OPEC and non-OPEC countries alike could put upward pressure again on oil prices as soon as 2010 or 2011. In particular, if the low oil price, high cost of money environment persists for most of this year and next, our base case scenario for non-OPEC production could prove optimistic, exacerbating the second leg of the commodity super-cycle.

Table 1: EIA Weekly Storage Update

	Latest	Prev.	Last Year	Change
Crude Stocks	338.9	332.7	293.0	6.2
Mogas Stocks	219.9	220.0	223.9	(0.1)
Mid Dist Stocks	144.0	145.0	127.0	(1.0)
Fuel Oil Stocks	36.0	36.1	35.5	(0.0)
Crude Imports	9,708	9,866	10,056	(158.0)
Mogas Imports	1,154	1,154	1,156	-
Mid Dist Imports	264	362	277	(98.0)
Refinery Runs	14,136	14,145	14,618	(9.0)
Refinery Ut (%)	82.5	83.3	85.0	(0.8)
Nat gas stocks	2,374	2,560	2,560	(186)

Source: US Department of Energy

Note: Stocks in million bbl, Flows in 1000 b/d.



Francisco Blanch +44 20 7996 4144

Commodity Strategist
MLPF&S (UK)
francisco_blanch@ml.com

Sabine Schels 1 212 449 3259

Commodity Strategist
MLPF&S
sabine_schels@ml.com

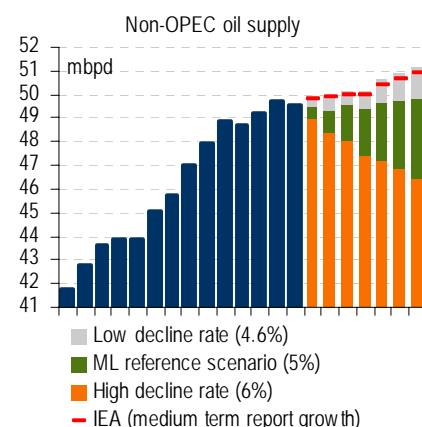
Gustavo Soares +44 20 7996 1976

Commodity Strategist
MLPF&S (UK)
gustavo_soares@ml.com

Michael Haase +44 20 7995 6104

Commodity Strategist
MLPF&S (UK)
michael_haase@ml.com

Chart 1: Non-OPEC oil supply could decline steeply over the next five years



Source: IEA, Merrill Lynch Commodity Research

Table 2: ML Commodity Price Forecasts

(\$/bbl)	1Q2009	2Q2009	3Q2009
WTI Crude Oil	43.00	45.00	51.00
Brent Crude Oil	43.00	45.00	51.00
USGC No. 2 HO	16.19	16.11	16.62
USGC RBOB Gasoline	1.17	3.64	1.66
USGC 1% Residual	-12.46	-12.79	-13.54
NWE 0.2% Gasoil	19.18	18.89	19.90
NWE Prem. Gasoline	0.12	3.84	3.71
NWE 1% Residual	-15.06	-14.80	-14.78
US Natural Gas	6.20	5.50	5.70

Source: Merrill Lynch Commodity Research Estimates

Note: products quoted in crack spreads, US nat gas in \$/MMBtu

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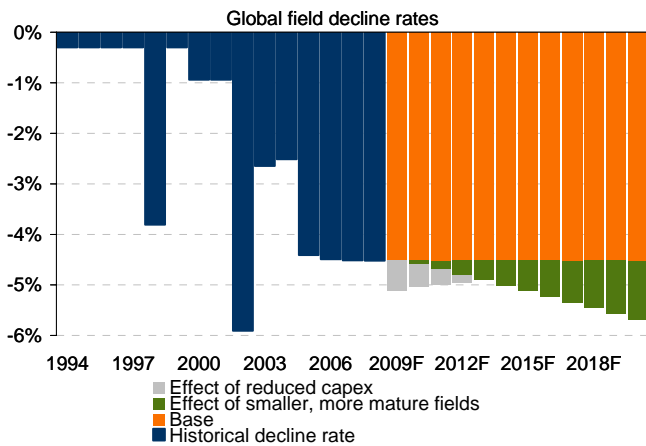
Refer to important disclosures on page 16.

Has non-OPEC oil production peaked?

Global oil production decline rates are set to accelerate

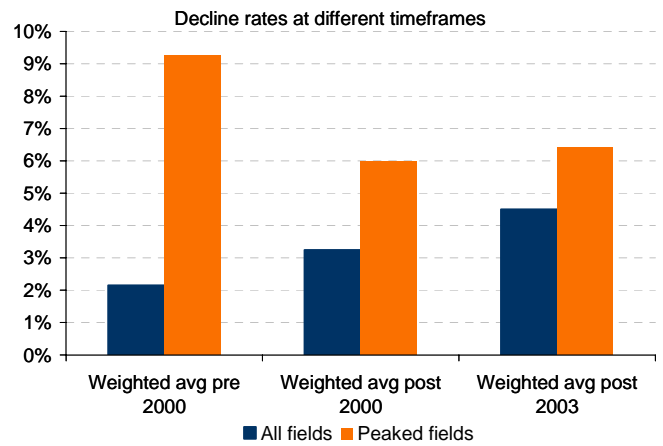
In our view, the combination of low oil prices and a global credit crunch will prove rather damaging to the oil industry. In recent reports, the International Energy Agency has suggested that the average decline rate of existing fields in production around the world amounts to about 4.1% year-on-year, with non-OPEC producers experiencing 4.7% yearly decline rates and OPEC posting 3.3% output reductions every year (Chart 2). Our most recent analysis suggests decline rates could be running at a slightly higher rate. Based on the IEA's Field by Field Production database, we find that decline rates have averaged 4.2% per annum since 2003. Extrapolating from this sample to create a global production profile, we believe the global decline rate has averaged at least 4.5% YoY in recent years. These rates, however, could accelerate further as the global credit crunch curbs investment into oil production over the next 2 years (Chart 3).

Chart 2: Global oil production decline rates have been accelerating in recent years, and could accelerate further in the next decade



Source: IEA, Merrill Lynch Commodity Research

Chart 3: More and more fields are hitting peak production levels, pushing decline rates to record highs

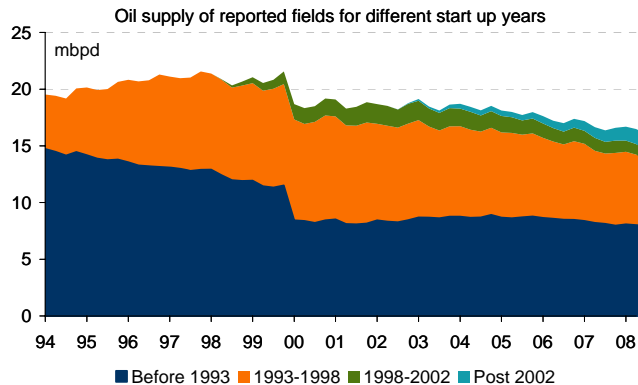


Source: Merrill Lynch Commodity Research

New oil fields are small, expensive & have a short life span

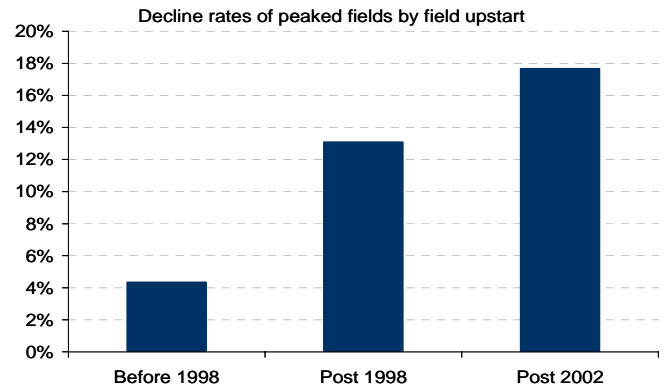
One of the factors driving up decline rates around the world is the smaller size of the new fields coming into the market. As fields brought on line prior to 1998 give way to new developments (Chart 4), the oil market will have to cope with very steep decline rates. For instance, decline rates for fields developed prior to 1998 that have reached their peak production average roughly 4%, while peaked fields developed after 2002 are experiencing declines of 18% on average (Chart 5).

Chart 4: Older fields are giving way to a growing share of new offshore developments



Source: IEA, Merrill Lynch Commodity Research

Chart 5: Recent oil field developments have a shorter life span, and tend to have steeper decline rates

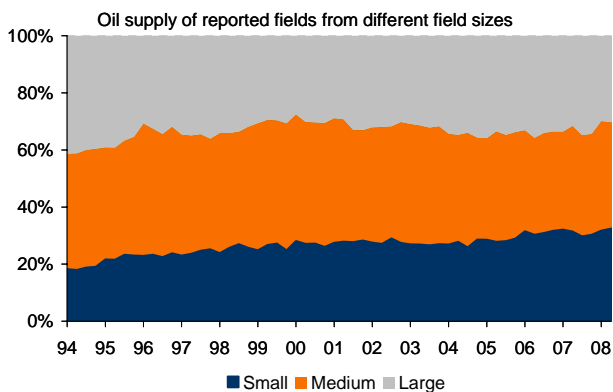


Source: Merrill Lynch Commodity Research

Small fields tend to decline faster than large fields

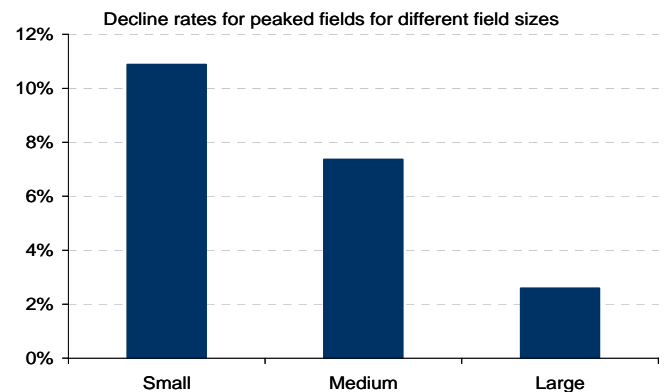
The International Energy Agency estimates that oil fields typically decline at an average of 5.1% per annum after a peak in production has been reached. Interestingly, the declines rates are inversely proportional to the size of the field, with super giants experiencing a 3.4% yearly decline, giant fields posting 6.5%, and large fields averaging 10.4%. With smaller fields becoming a growing proportion of global output (Chart 6), decline rates are probably poised to accelerate in the coming years, in our view (Chart 7).

Chart 6: A growing proportion of fields are also smaller and have smaller output...



Source: IEA, Merrill Lynch Commodity Research

Chart 7: ...increasing the risks of steeper decline rates in the coming years, in our view



Source: Merrill Lynch Commodity Research

Oil production continues to decline in Europe, North America

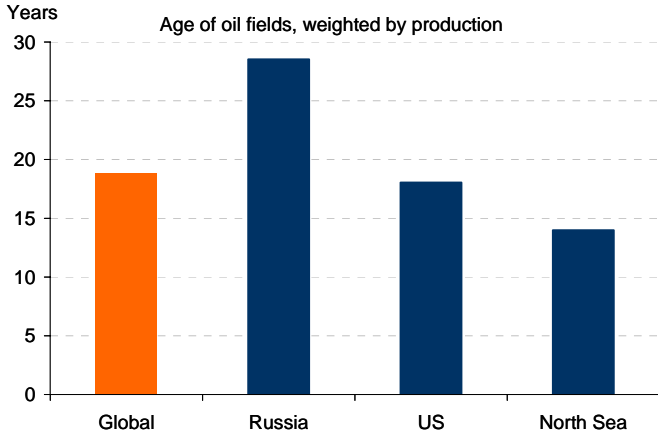
Of course, oil production declines are not new to Europe or North America. In the United States, some of the largest fields such as Prudhoe Bay or Kuparuk have been on a steady decline for more than a decade. Similarly, North Sea oil production peaked at the start of the century and has been declining rather steeply since then, with the Fortis system pumping less and less volume every year.

The world now needs to replace Saudi every 2 years

With Russian oil production set to decline by 5% this year, international oil companies face the prospects of both younger and older fields alike declining

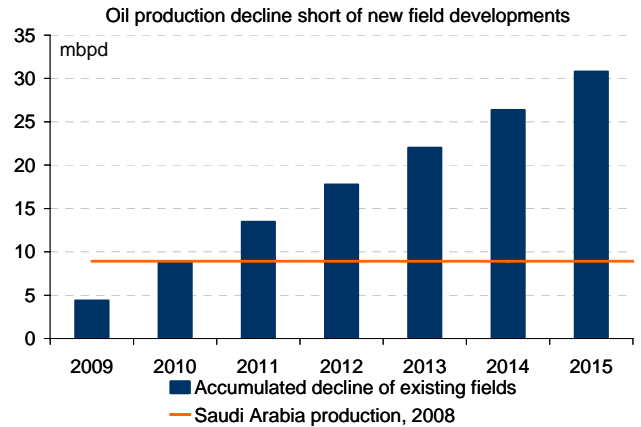
rather steeply (Chart 8). As a result of these steep decline rates, the world now needs to replace an amount of oil production equivalent to Saudi Arabia's production every two years. On our estimates, the cumulative decline of global oil production from today could amount to 30 million barrels by 2015 (Chart 9).

Chart 8: The world now faces the prospects of both younger and older fields declining rather steeply



Source: Merrill Lynch Commodity Research

Chart 9: To sustain current production levels, we need to replace the equivalent of Saudi output every two years

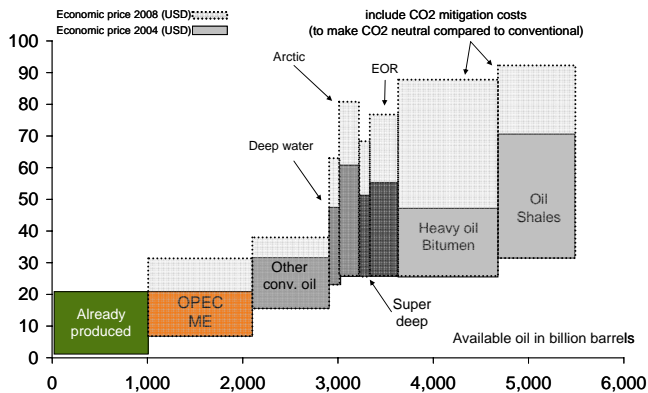


Source: IEA, Merrill Lynch Commodity Research

Incremental non-OPEC production does not come cheap

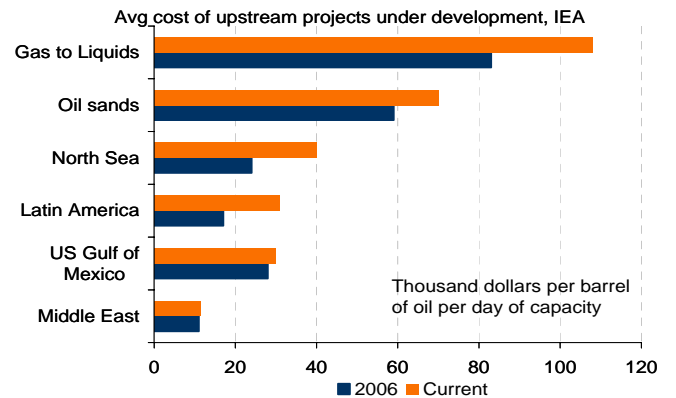
In our most recent weekly entitled "Does the oil market need Canadian sands?" (GEW 27 Jan 2009), we argued that a sustained long dated WTI crude oil price below \$70/bbl would continue to put Canadian oil sand projects at risk (Chart 10). In fact, over \$200 billion worth of investment has been either cancelled or postponed in Canada as a result of the oil price collapse and the lack of financing available. Still, after the recent increases in development costs for upstream projects (Chart 11), we will likely see a moderation in costs over the next 2/3 years.

Chart 10: The world has used up 1trn barrels and there are still 4.5trn barrels to go in the ground, but non-OPEC oil does not come cheap



Source: Merrill Lynch Commodity Research

Chart 11: Upstream development costs have increased with labour, well casing and specialist drilling services



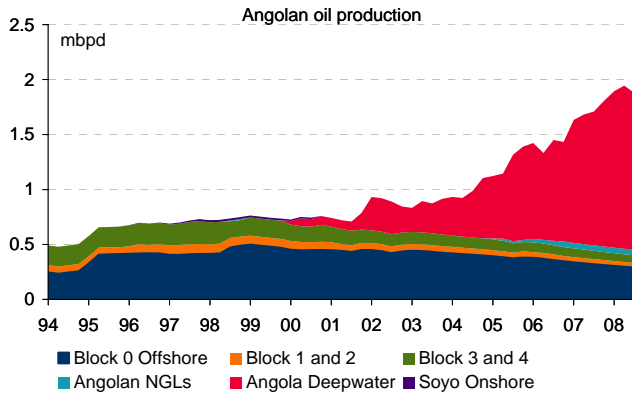
Source: IEA, Merrill Lynch Commodity Research

Investment in deepwater could take a hit going forward

While Canadian oil sands are already experiencing cutbacks in investments, deep and ultra deep projects will also likely require prices above the current spot levels to break even. Angola is perhaps one of the most successful examples of a

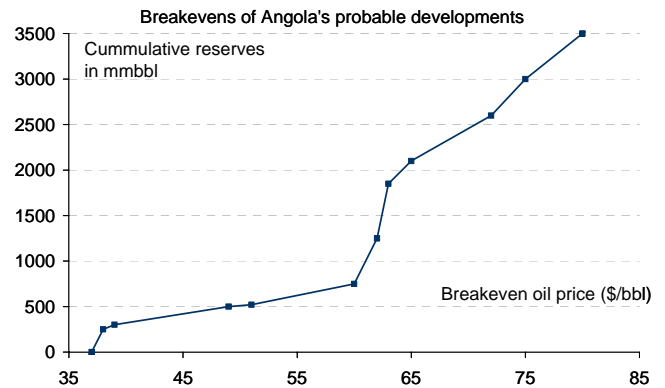
production scale up on the back of deepwater projects (Chart 12). With a lower oil price, high costs and the lack of credit availability, further developments could be in danger. Wood Mackenzie calculates that 85% of Angola's oil reserves require a long term oil price of US\$60/bbl to provide a 15% yield to investors (Chart 13). Thus, the combination of a low oil price and a high cost of money could severely diminish medium-term supply prospects in Angola and elsewhere.

Chart 12: Angolan oil supply has increased rapidly in recent years, despite the steep declines in older fields



Source: IEA, Merrill Lynch Commodity Research

Chart 13: Approximately 85% of Angola's oil reserves, predominantly deep water, will provide less than 15% IRR to investors at \$60/bbl



Source: Wood Mackenzie GEM, Merrill Lynch Commodity Research

Note: For 15% IRR

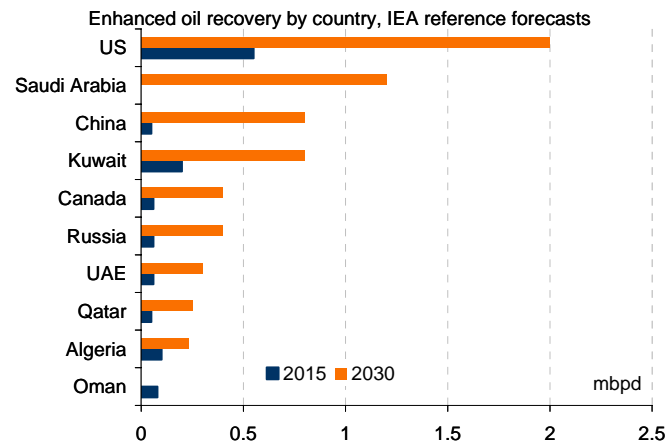
Enhanced oil recovery requires more regular investment

An additional factor that will come back to haunt the oil market is the fact that enhanced oil recovery techniques require a substantial amount of ongoing investment. Again, the International Energy Agency estimates that fields would decline by an additional 2.3% in the absence of investment in enhanced oil recovery (EOR) and other ongoing production improvement techniques. Thus, the reduction in capital expenditure arising from the credit crunch could easily force decline rates higher over the next 5 years, particularly if the planned expenditures in EOR are pushed back (Chart 14).

OPEC's market share will likely increase from here...

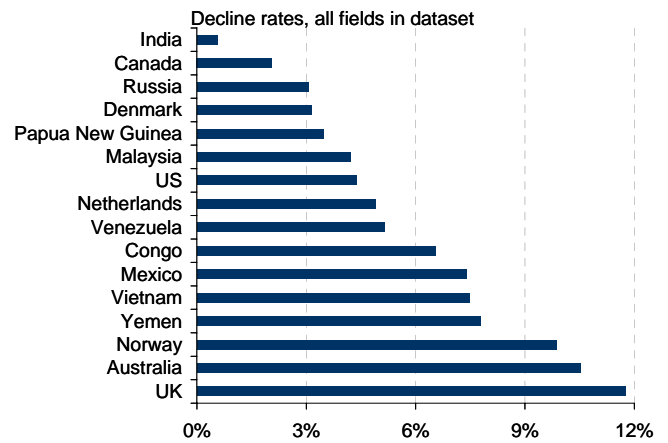
As a result of the reduction in capital expenditures and the limited access to reservoirs, OPEC's market share will likely increase going forward. Oil production decline rates in non-OPEC countries are particularly steep, with the United Kingdom and Australia leading the pack (Chart 15). In our view, the credit crunch will only further exacerbate the decline rates.

Chart 14: Until recently, market participants were planning to expand spending in EOR



Source: IEA, Merrill Lynch Commodity Research

Chart 15: Oil production decline rates are already rather steep across a broad range of non-OPEC countries



Source: Merrill Lynch Commodity Research

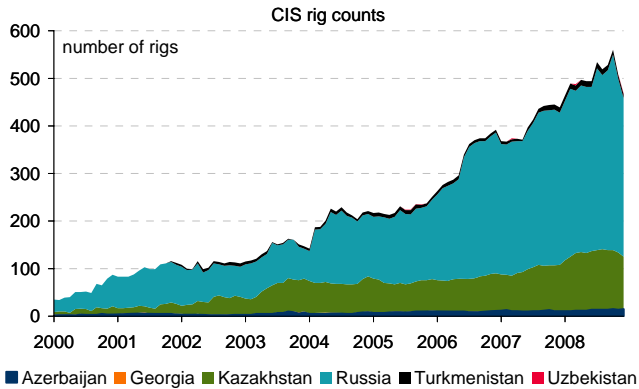
...although some OPEC countries are struggling to maintain investment

While OPEC's market share will likely increase over the next 10 years, a number of members are already experiencing the credit crunch at home. As revenues have collapsed, Ecuador and Venezuela are seeing reductions in capex in their respective oil sectors 25%+, a material amount in real terms despite the marked drop in the price of oil services. For instance, Helmerich, an oil services company, recently ceased operations of two rigs in Venezuela due to unpaid services, and will likely shut down another 9 in the coming months. On the other hand, Saudi Arabia, the UAE and Kuwait are only cutting back expenditures about 10-20%, an immaterial amount in real terms. Similarly, African OPEC members, including Angola and Nigeria, are not cutting back expenditure materially in real terms either.

As financing dries up, investment in energy will slow down

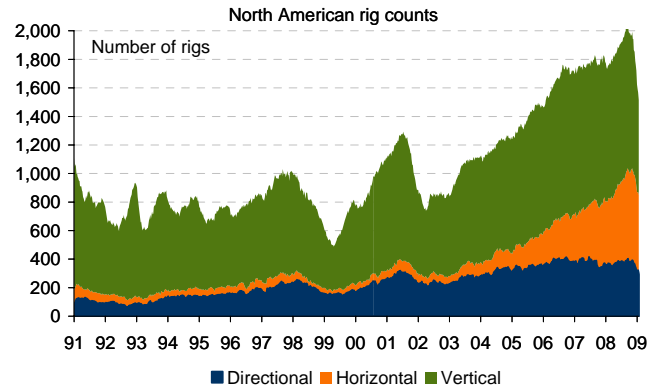
An additional factor that will surely start to impact hydrocarbon output in various parts of the world is the imminent reduction in rig counts across a broad range of regions. Rig counts in the CIS have already started to come down very quickly (Chart 16), while North American rig counts are also being cut back in recent months (Chart 17). These reductions in rig counts will likely continue throughout the year, putting additional downward pressure on global oil output in 2010 and beyond.

Chart 16: Rig counts have already started to come down in the Commonwealth of Independent States



Source: Merrill Lynch

Chart 17: North American rig counts are also being cut back in recent months

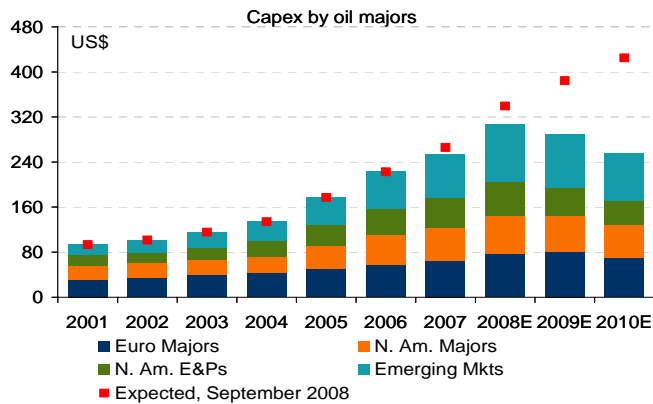


Source: Brook Hunt, Merrill Lynch Commodity Research

Majors set to cut back capex, pushing decline rates higher

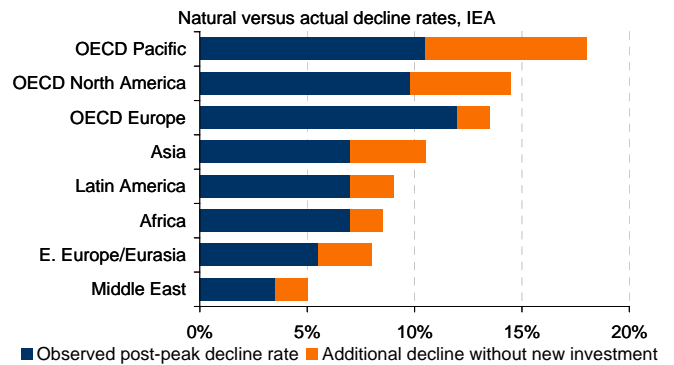
In the last four months, capital expenditure by oil majors has been cut back dramatically relative to expectations. On our estimates, the majors have reduced their capital expenditure plans for 2010 from \$425 billion last September to \$255 billion at present (Chart 18). Of course, part of the decline has to do with a reduction in costs following the oil price collapse, but oil companies are also cutting costs in real terms. With a reduction in expenditures, decline rates will surely accelerate (Chart 19).

Chart 18: Despite the reductions in equipment and service costs, oil majors are increasingly cutting back capital expenditure in real terms



Source: Merrill Lynch

Chart 19: Without new investments in the oil sector, decline rates could be at least 2% higher



Source: IEA, Merrill Lynch Commodity Research

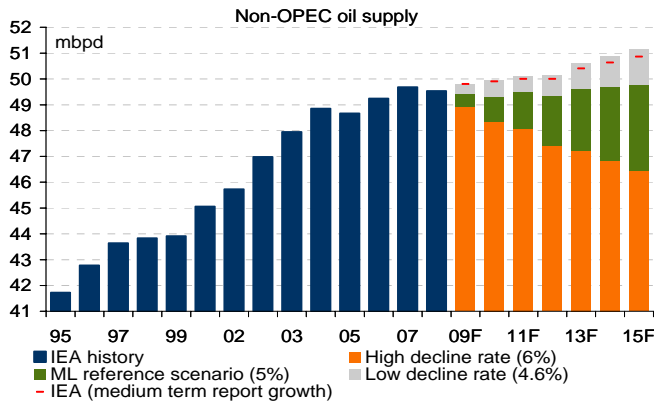
Non-OPEC production may have already peaked

Broadly, oil production decline rates are a function of the size and age of the fields and the investment rates. What do we conclude after looking at this broad range of factors affecting decline rates? The IEA expects a 1 million b/d increase in non-OPEC output to 51 million b/d by 2015. The underlying assumption in production decline rates used by the Agency for the next seven years is 4.7%. In contrast, in our base case scenario we see non-OPEC oil production pretty much stuck in the current 49 to 50 million b/d range until 2015 (Chart 20), assuming production decline rates of 5%. Should production decline rates accelerate to 6%, however, non-OPEC production could decline precipitously towards 47 million b/d by 2015 from the current levels.

The commodity super-cycle is not over, just resting

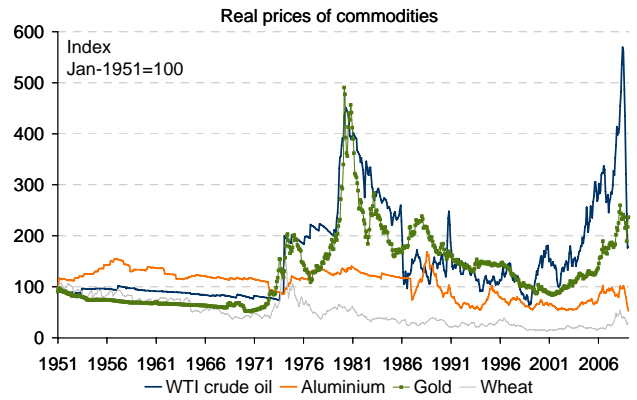
Thus, assuming the ongoing recession does not turn into a multi-year event where global oil demand is pushed down structurally for the next five years, the steep decline rates in OPEC and non-OPEC countries alike could put upward pressure again on oil prices as soon as 2010 or 2011. In particular, if the low oil price, high cost of money environment continues for most of this year and next, our base case scenario for non-OPEC production could prove optimistic, exacerbating the second leg of the commodity super-cycle (Chart 21).

Chart 20: Due to low investment and accelerating decline rates, non-OPEC oil supply could decline very steeply over the next five years



Source: IEA, Merrill Lynch Commodity Research

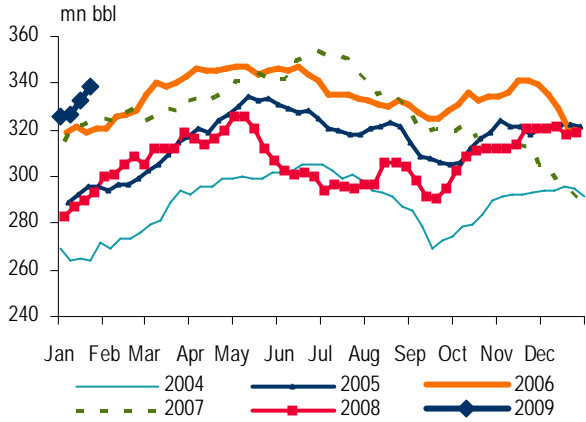
Chart 21: Commodity prices experienced a phenomenal rally in real terms, but the super-cycle is not over yet



Source: Bloomberg, Merrill Lynch Commodity Research

Petroleum - US

Chart 22: US crude oil stocks



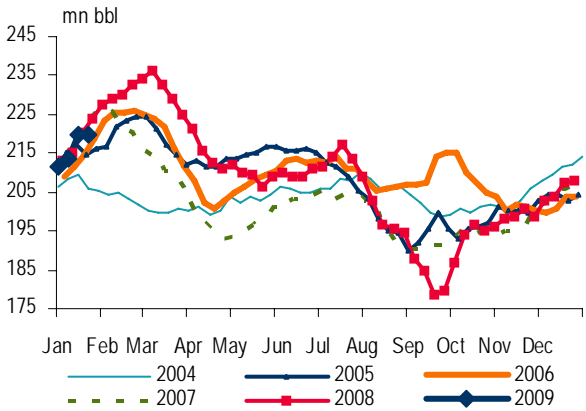
Source: US Department of Energy

Chart 23: WTI crude oil price



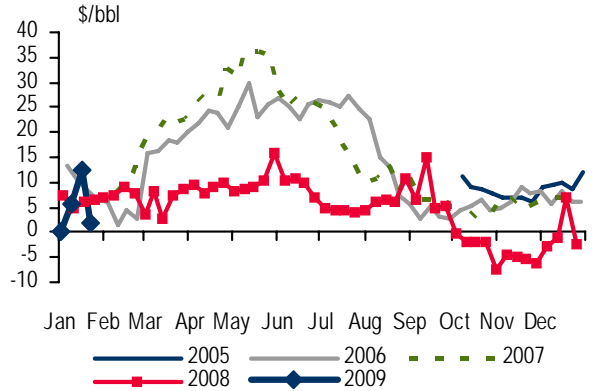
Source: NYMEX, Bloomberg

Chart 24: US gasoline stocks



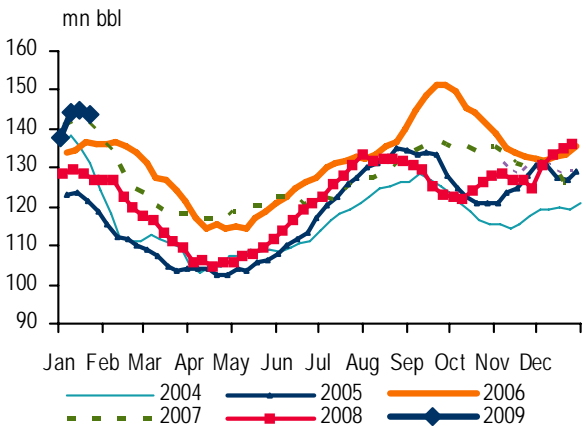
Source: US Department of Energy

Chart 25: US RBOB cracks



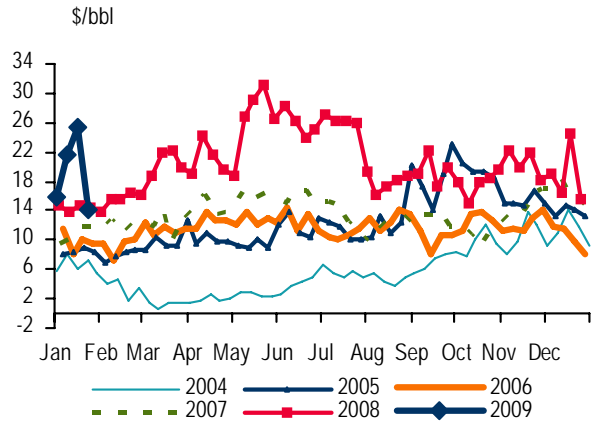
Source: NYMEX, Reuters

Chart 26: US distillate oil stocks



Source: US Department of Energy

Chart 27: US distillate oil cracks



Source: NYMEX, Reuters

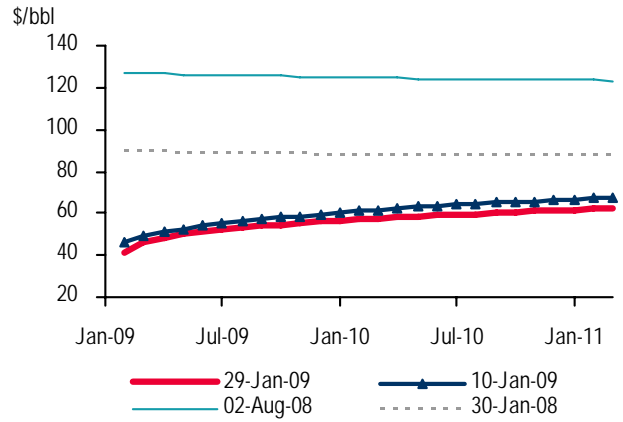
Petroleum - US & Europe

Chart 28: WTI implied volatility



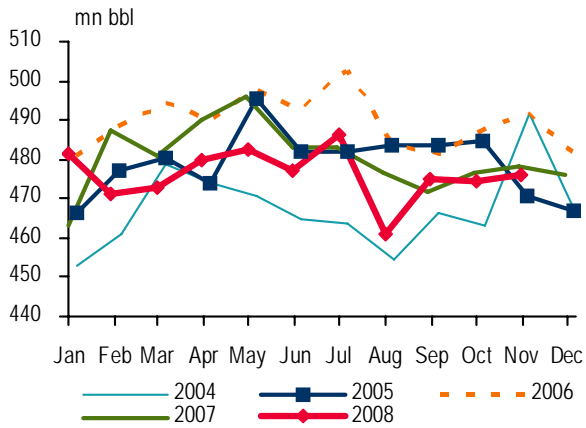
Source: NYMEX, Bloomberg

Chart 29: WTI Term Structure



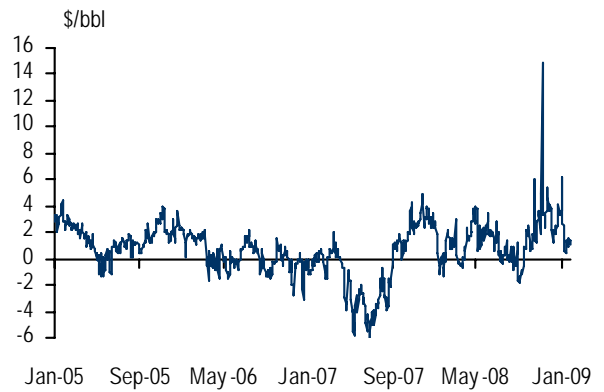
Source: NYMEX, Reuters

Chart 30: European crude oil stocks



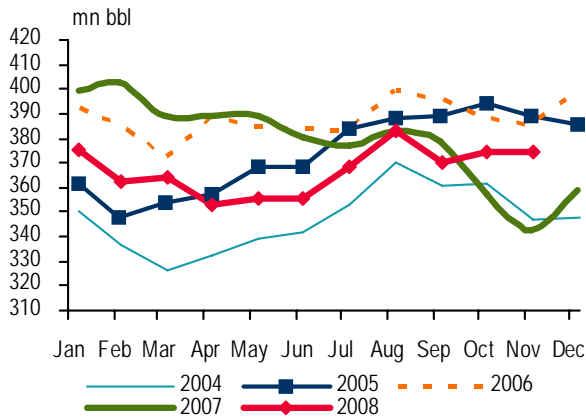
Source: Euroil

Chart 31: Brent - WTI crude spread



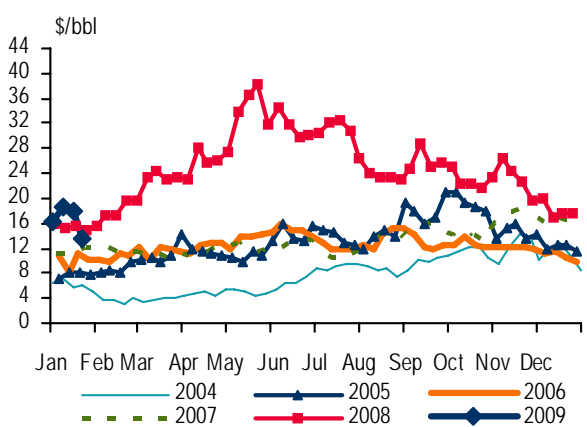
Source: IPE, Bloomberg

Chart 32: European distillate stocks



Source: Euroil

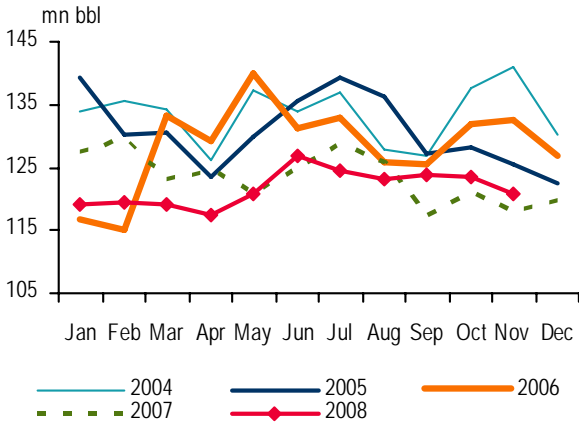
Chart 33: IPE gasoil cracks



Source: Reuters

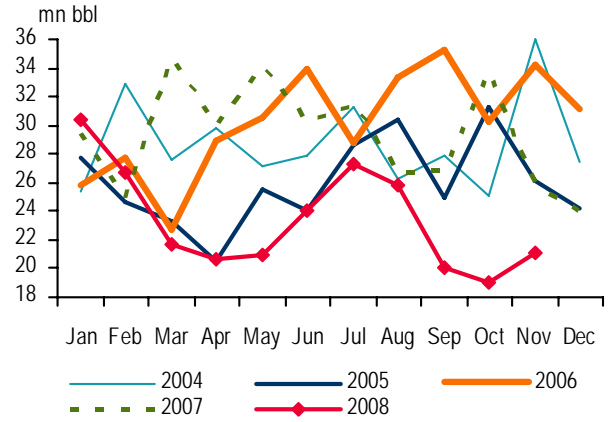
Petroleum - Asia

Chart 34: Japanese crude oil stocks



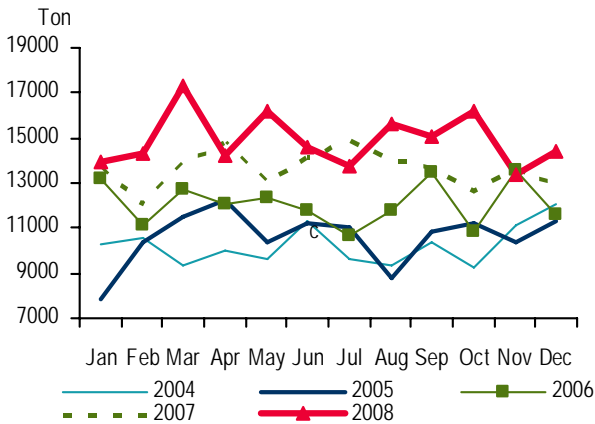
Source: International Energy Agency

Chart 35: South Korean crude oil stocks



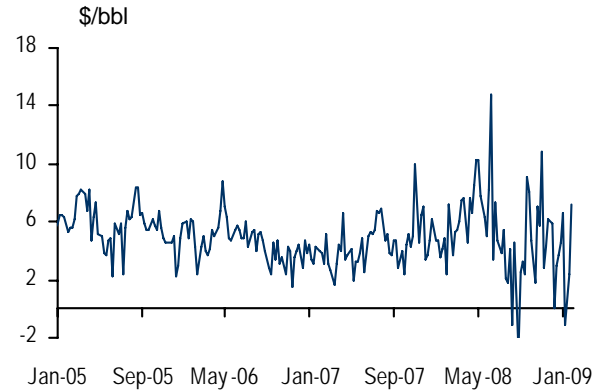
Source: International Energy Agency

Chart 36: China crude oil imports



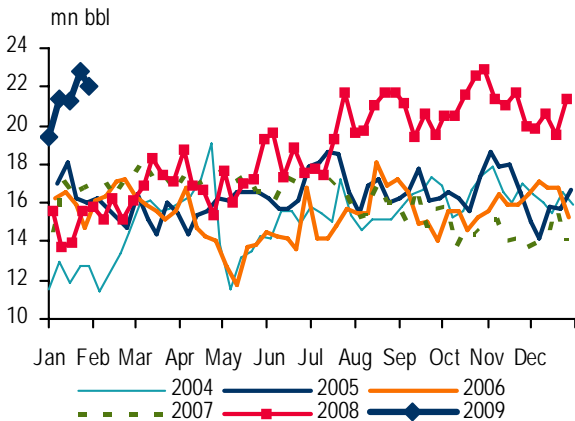
Source: Reuters

Chart 37: Brent - Dubai crude oil spread (1-month contract)



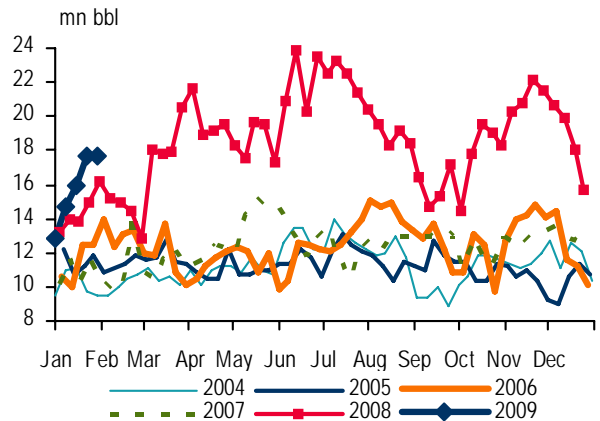
Source: Reuters

Chart 38: Singapore light & mid distillate stocks



Source: Reuters

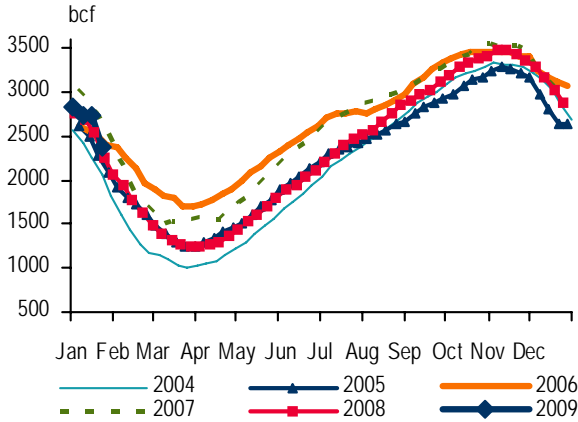
Chart 39: Singapore residual stocks



Source: Reuters

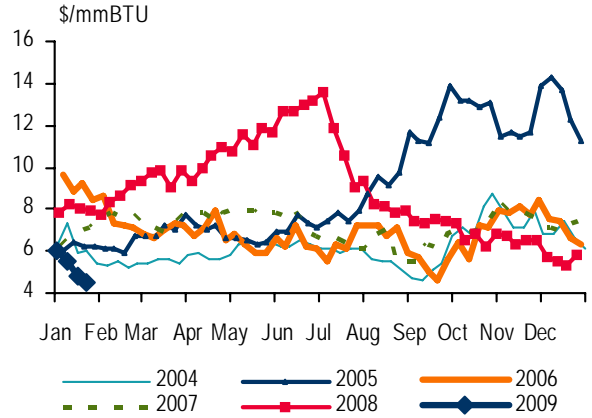
Gas & Power - US

Chart 40: US natural gas stocks



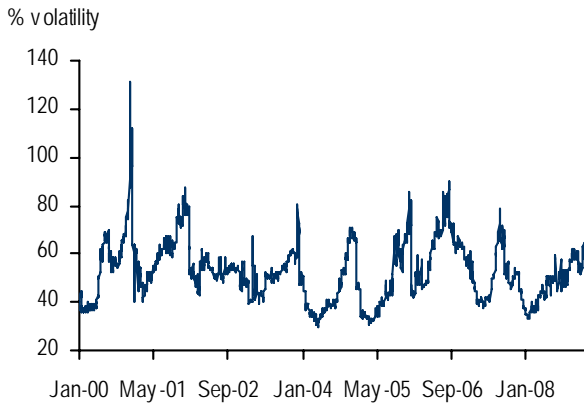
Source: US Department of Energy

Chart 41: US natural gas price



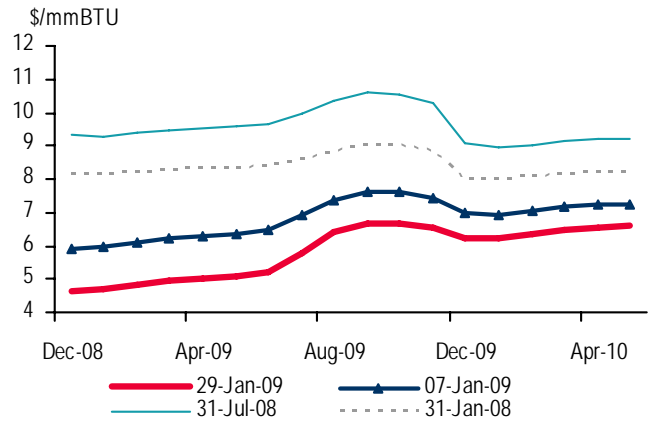
Source: NYMEX, Reuters

Chart 42: US natural gas implied volatility



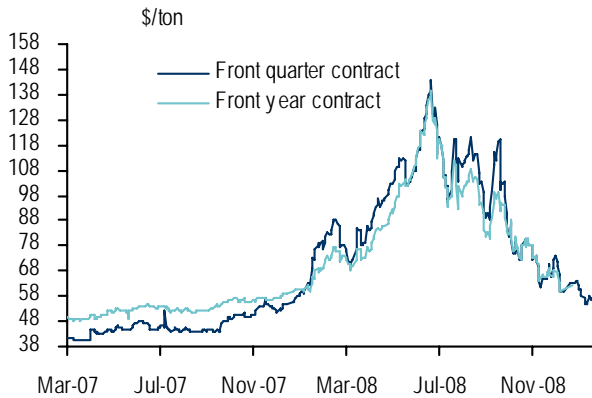
Source: NYMEX, Bloomberg

Chart 43: US natural gas term structure



Source: NYMEX, Reuters

Chart 44: US NYMEX forward coal prices



Source: NYMEX, Reuters

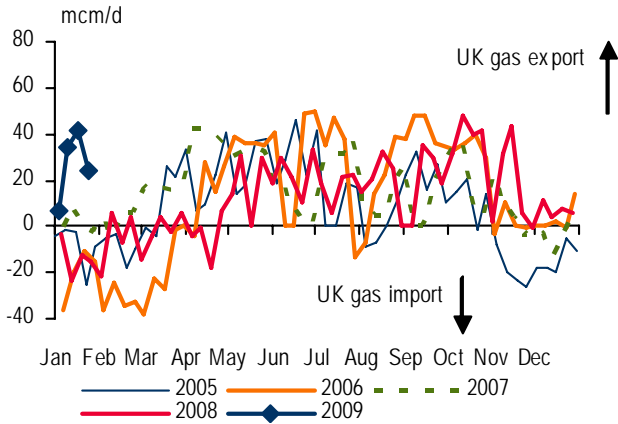
Chart 45: US spot PJM power prices



Source: NYMEX, Reuters

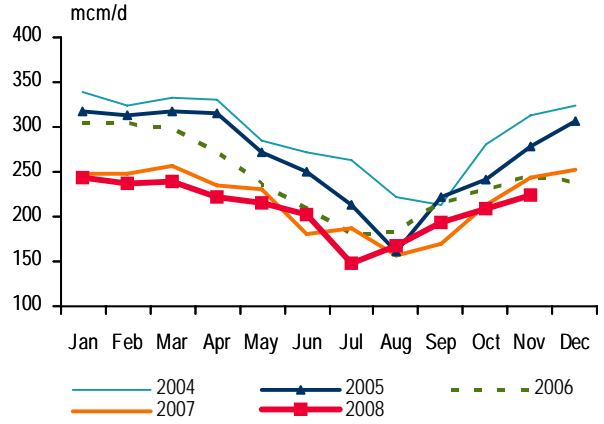
Gas & Power - Europe

Chart 46: UK Interconnector gas flows



Source: UK Interconnector Flows

Chart 47: UK gross gas production



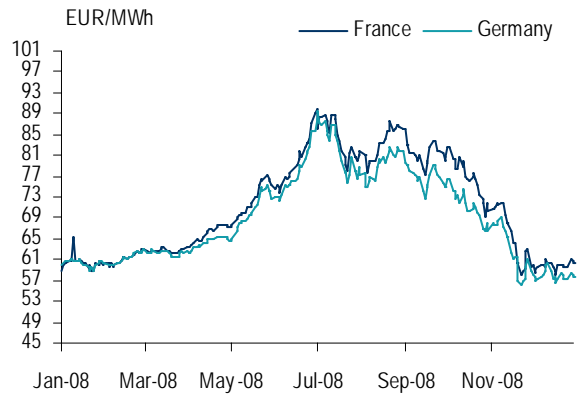
Source: UK Department of Trade and Industry

Chart 48: UK National Balancing Point (NBP) day ahead



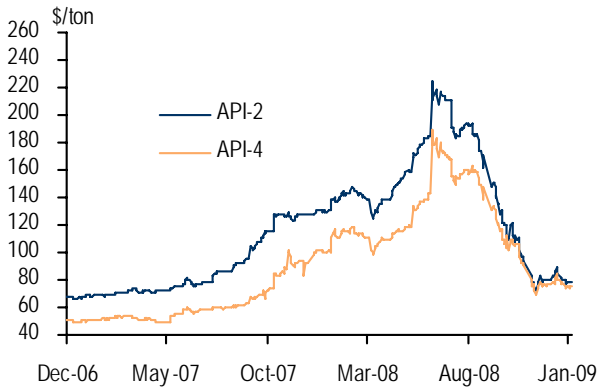
Source: Bloomberg

Chart 49: Germany and France CAL09 Baseload



Source: Reuters

Chart 50: TFS API2 coal in Rotterdam



Source: Reuters

Chart 51: European CO2 Emissions Price 2008



Source: Reuters

Table 3: Global Commodity Research Publications - Past Topics*

Date	Publication	Title
26-Jan-09	Global Energy Weekly	Does the oil market need Canadian sands?
21-Jan-09	Commodity Derivatives Insights	WTI vol term structure to flatten as the market stabilizes
19-Jan-09	Global Energy Weekly	Cold weather and supply cuts hit the European gas market
12-Jan-09	Global Energy Weekly	Global power demand to languish in 2009
05-Jan-09	Commodity Portfolio Monthly	Energy, base metals push down commodities in December
30-Dec-08	Year Ahead Conference Call	2009 Commodity Outlook
19-Dec-08	Global Energy Weekly	Our best ideas for 1H2009
16-Dec-08	Commodity Strategist	2009 Commodity Outlook
12-Dec-08	Commodity Derivatives Insights	Index rebalancing should create opportunities in early January
05-Dec-08	Global Energy Weekly	Will long dated oil prices hold up at \$80/bbl?
01-Dec-08	Commodity Portfolio Monthly	In November commodities fell again as the economy faltered
26-Nov-08	Energy Strategist	2009 Energy Market Outlook
21-Nov-08	Global Energy Weekly	Back to basics: energy and the business cycle
14-Nov-08	Global Energy Weekly	The storm is not over for global coal
07-Nov-08	Global Energy Weekly	A race to the bottom for petroleum product demand
03-Nov-08	Commodity Portfolio Monthly	Commodities post worst ever monthly return in October
31-Oct-08	Global Energy Weekly	Too much domestic gas in the US
24-Oct-08	Global Energy Weekly	Oil contango to widen as stocks build
21-Oct-08	Commodity Derivatives Insights	Fat tails in the options market signal more downside to oil
17-Oct-08	Global Energy Weekly	Will OPEC cut for real?
13-Oct-08	Metals Strategist	Turn your lead into gold
02-Oct-08	Commodity Portfolio Monthly	Economic downturn hits commodities in September
01-Oct-08	Global Energy Weekly	Oil to drop next year, but the super-cycle is not over
24-Sep-08	Global Energy Weekly	Credit crunch & energy crunch: the same market failure?
15-Sep-08	Global Energy Weekly	Get ready to offload your gasoline tank
08-Sep-08	Global Energy Weekly	Cyclical slowdown, but no hard landing... Yet
29-Aug-08	Global Energy Weekly	Kyoto moving to centre stage for European carbon
19-Aug-08	Metals Update	Weak auto sales do not spell the end for lead
18-Aug-08	Global Energy Weekly	The WTI-Brent conundrum
11-Aug-08	Global Energy Weekly	A new paradigm for US nat gas
04-Aug-08	Global Energy Weekly	Can the EM consumer save the oil market?
01-Aug-08	Commodity Portfolio Monthly	Energy and grains drag down commodity returns in July
30-Jul-08	Metals Update	Rising energy costs squeezing base metals industry margins
28-Jul-08	Commodity Derivatives Insights	A brave new world of high volatility and rising correlation
25-Jul-08	Global Energy Weekly	Closing the regional arbitrage in the European markets
14-Jul-08	Global Energy Weekly	Still upside pressure on coal
09-Jul-08	Physical Metals Exchange	Rocky road ahead for metals
07-Jul-08	Energy Strategist	Global energy outlook for 2H2008 and beyond
01-Jul-08	Commodity Portfolio Monthly	Commodities outpace all other asset classes in 1H2008
27-Jun-08	Global Energy Weekly	Gearing up for a shift into diesel
23-Jun-08	Commodity Derivatives Insights	Oil volatility remains high across the curve
17-Jun-08	Global Energy Weekly	Are speculators driving commodity prices higher?
16-Jun-08	Metals Update	Upward pressure on platinum prices to continue unabated

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Table 3: Global Commodity Research Publications - Past Topics*

Date	Publication	Title
09-Jun-08	Global Energy Weekly	The elusive quest for oil demand destruction
06-Jun-08	Global Energy Weekly	Biofuels driving global oil supply growth
02-Jun-08	Commodity Portfolio Monthly	Crude oil drives commodity returns in May
23-May-08	Global Energy Weekly	Despite the spike, we don't see a crude oil problem... Yet
19-May-08	Global Energy Weekly	US nat gas desperately chasing oil this summer
16-May-08	Commodity Derivatives Insights	Oil volatility surges across the curve on growing uncertainty
09-May-08	Global Energy Weekly	As oil rises, so will UK nat gas
02-May-08	Global Energy Weekly	Heavy crude can't keep up
01-May-08	Commodity Portfolio Monthly	Commodities again outperform other asset classes in April
01-May-08	Metals Update	Supply issues to galvanise zinc into action
25-Apr-08	Global Energy Weekly	US coal fires up
21-Apr-08	Commodity Derivatives Insights	Supply concerns translating into higher volatility
18-Apr-08	Global Energy Weekly	Russia's oil sector hits a wall
11-Apr-08	Global Energy Weekly	Can the US attract energy from abroad?
07-Apr-08	Physical Metal Exchange	Metals hit a sweet spot
04-Apr-08	Global Energy Weekly	Where did the winter premium in US nat gas go?
01-Apr-08	Commodity Portfolio Monthly	Commodities experience a modest pullback in March
28-Mar-08	Global Energy Weekly	Mind the refining gap in global distillates
18-Mar-08	Metals Update	Risks outweigh rewards in the copper market
17-Mar-08	Commodity Derivatives Insights	Volatility is contagious
17-Mar-08	Global Energy Weekly	Revising up our oil forecast
07-Mar-08	Global Energy Weekly	CO2: Like a box of chocolates
06-Mar-08	Global Commodity Paper #7	Commodity Volatility: a primer
04-Mar-08	Commodity Portfolio Monthly	Commodities outperformed equities and bonds in February
29-Feb-08	Global Energy Weekly	1997 in reverse
25-Feb-08	Global Energy Weekly	Global power, LNG bottlenecks to lift US nat gas prices
15-Feb-08	Global Energy Weekly	Oil remains the energy source of last resort
15-Feb-08	Physical Metal Exchange	Metals stuck between a rock and a hard place
13-Feb-08	Metals Update	China's power outage tightens metal markets
12-Feb-08	Commodity Strategist	Commodities face the good, the bad and the ugly
02-Feb-08	Commodity Portfolio Monthly	Commodities post mild returns in January after a stellar 2007
01-Feb-08	Global Energy Weekly	Harsh winter leaves China cold and hungry
01-Feb-08	Commodity Derivatives Insights	Options strategies for an uncertain macro outlook
25-Jan-08	Global Energy Weekly	A recession won't kill US oil demand
18-Jan-08	Global Energy Weekly	Asia's jet set to outpace Europe and US
11-Jan-08	Global Energy Weekly	Energy appetite in emerging markets to support coal prices

Source: ML Commodity Research

*Please contact us if you would like to receive copies of any of the above

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