

Global

# Energy Watch

Commodities Research

## After the correction, a more bullish trajectory for oil prices

While near-term downside risk remains as the oil market negotiates the slowdown in the pace of world economic growth, we believe that the market will continue to tighten to critical levels by 2012, pushing oil prices substantially higher to restrain demand.

### We remain structurally bullish on the oil market

With world economic growth continuing to drive world oil demand growth well in excess of non-OPEC production growth, the oil market continues to draw on inventories and OPEC spare capacity in order to balance. In our view, it is only a matter of time until inventories and OPEC spare capacity will become effectively exhausted, requiring higher oil prices to restrain demand, keeping it in line with available supplies.

### We think the recent pullback provides a good entry point for long positions in crude oil

The recent pull back in oil prices brings the market back towards levels more consistent with the global economic growth story that was being priced before events in Libya and the MENA region forced the oil market into pricing a supply-shock environment. Although the growth environment is clearly slower than the one before the unrest began and downside risks remain in the near-term, we expect oil prices to move substantially higher over the next 18 months, and **are introducing a trade recommendation to be long December 2012 ICE Brent crude oil futures.**

### Events in the Middle East and North Africa are having a persistent impact, which leads us to increase our oil price targets

We expect that the ongoing loss of Libyan production and disappointing non-OPEC production will continue to tighten the oil market to critically tight levels in early 2012, with rising industry cost pressures likely to be felt this year. We are now embedding in our forecasts that Libyan production losses will lead to the effective exhaustion of OPEC spare capacity by early 2012. Consequently, **we are raising our Brent crude oil price forecast to \$115/bbl, \$120/bbl, and \$130/bbl on a 3, 6, and 12 month horizon.**

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# Hedging and trading recommendations

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## Petroleum

### Hedging recommendations

**Consumers:** With world economic growth continuing to drive oil demand growth well in excess of non-OPEC production growth, the oil market continues to draw on inventories and OPEC spare capacity in order to balance. In our view, it is only a matter of time until inventories and OPEC spare capacity will become effectively exhausted, requiring higher oil prices to restrain demand, keeping it in line with available supplies. Consequently, we believe the recent market correction provides a good opportunity for consumers to begin to hedge their forward oil exposure.

**Refiners:** Refining margins have recently shown counter-seasonal strength. However, this strength largely owes to the local weakness in WTI. As we expect the spread between WTI and Brent will narrow from current levels, we also expect product cracks to weaken. Further, we maintain that refining margins will remain under pressure owing to the large increase in refining capacity in Asia. As a result, we view any renewed rise in long-dated refinery margins in 2011 as a selling opportunity for refinery hedgers. For 2012 and beyond, we believe that crude will be the bottleneck in the system, rather than refining; this would squeeze margins from the crude side through backwardation, suggesting that refiners should also look for potential time-spread hedges.

**Producers:** While the risk-reward trade-offs for producer risk management programs have diminished with the recent market correction, additional economic disappointments could generate more downside in the near term. We recommend that producers look at option strategies to hedge against this risk. However, we expect supply-demand balances to continue to tighten to critically tight levels in 2012, with prices above recent levels by next year. Consequently, we think opportunities for producer hedging longer-term are less attractive.

### Trading recommendations

**Opening: Long ICE Brent December 2012 contracts (initial price \$105.16/bbl)**

We recommend opening a long position in the ICE Brent December 2012 contract, as we expect that the market will continue to tighten to critical levels by 2012, pushing oil prices substantially higher to restrain demand.

## Current trading recommendations

Current trades	First recommended	Initial value	Current Value	Current profit/(loss) <sup>1</sup>
<b>Opening: Long Brent crude oil</b>				
Buy December 2012 ICE Brent crude oil	May 23, 2011 - <i>Energy Watch</i>	\$105.16/bbl	---	---
<b>Long UK Natural Gas</b>				
Buy Q4 2012 ICE UK NBP Natural Gas	April 26, 2011 - <i>Natural Gas Weekly</i>	70.8 p/th	68.6 p/th	<b>(2.2 p/th)</b>
<b>Long Soybeans</b>				
Buy November 2011 CBOT Soybean	November 18, 2010 - <i>Agriculture Update</i>	\$11.60/bu	\$13.51/bu	<b>\$1.91/bu</b>
<b>Long Gold</b>				
Buy December 2011 COMEX Gold	October 11, 2010 - <i>Precious Metals</i>	\$1,364.2/toz	\$1,520.5/toz	<b>\$156.3/toz</b>

<sup>1</sup>As of close on May 23, 2011. Inclusive of all previous rolling profits/losses.

Source: Goldman Sachs Global ECS Research.

## Price actions, volatilities and forecasts

	Prices and monthly changes <sup>1</sup>			Volatilities (%) and monthly changes <sup>2</sup>				Historical Prices						Price Forecasts <sup>3</sup>		
	units	20 May	Change	Implied <sup>2</sup>	Change	Realized <sup>2</sup>	Change	4Q 09	1Q 10	2Q 10	3Q 10	4Q 10	1Q 11	3m	6m	12m
<b>Energy</b>																
WTI Crude Oil	\$/bbl	99.49	↓ -8.66	31.8	0.72	48.2	23.4	76.13	78.88	78.05	76.21	85.24	94.60	108.00	114.50	126.50
Brent Crude Oil	\$/bbl	112.39	↓ -8.94	32.1	-0.04	45.0	23.6	75.54	77.37	79.41	76.96	87.45	105.52	115.00	120.00	130.00
RBOB Gasoline	\$/gal	2.94	↓ -0.30	29.3	-1.04	50.2	32.0	1.94	2.11	2.17	2.00	2.22	2.68	2.96	2.94	3.36
USGC Heating Oil	\$/gal	2.89	↓ -0.23	28.5	-0.52	40.8	17.8	1.94	2.01	2.07	2.01	2.31	2.78	3.04	3.24	3.47
NYMEX Nat. Gas	\$/mmBtu	4.23	↓ -0.03	34.7	-0.22	40.5	9.7	4.93	4.99	4.35	4.23	3.98	4.20	3.75	4.00	4.25
UK NBP Nat. Gas	p/th	57.55	↓ -0.63	25.5	-1.43	24.6	-11.4	31.83	33.35	37.48	42.68	51.74	56.77	66.90	83.10	71.50
<b>Industrial Metals<sup>4</sup></b>																
LME Aluminum	\$/mt	2500	↓ -214	22.9	1.04	25.5	10.6	2037	2199	2122	2110	2365	2531	2700	2750	2900
LME Copper	\$/mt	9071	↓ -269	27.8	0.66	27.0	4.5	6677	7274	7042	7278	8614	9629	9300	9600	11000
LME Nickel	\$/mt	23540	↓ -1760	34.4	0.33	39.0	7.2	17593	20163	22431	21271	23619	26926	24000	24000	23000
LME Zinc	\$/mt	2151	↓ -178	32.2	0.03	31.5	1.1	2241	2307	2052	2043	2333	2414	2400	2400	2700
<b>Precious Metals</b>																
London Gold	\$/troy oz	1509	↑ 14	17.2	1.98	16.0	5.4	1099	1110	1197	1228	1370	1388	1480	1565	1690
London Silver	\$/troy oz	34.8	↓ -8.4	45.5	10.22	114.0	82.4	17.6	16.9	18.3	19.0	26.4	31.9	24.7	26.1	28.2
<b>Agriculture</b>																
CBOT Wheat	cent/bu	807	↑ 21	37.4	-2.49	54.9	17.3	522	496	467	653	707	786	800	835	835
CBOT Soybean	cent/bu	1380	↑ 38	26.5	-1.51	22.6	3.1	1002	955	957	1035	1245	1379	1400	1475	1475
CBOT Corn	cent/bu	760	↑ 11	37.4	-3.43	45.3	9.5	386	370	355	422	562	670	800	780	700
NYBOT Cotton	cent/lb	156	↓ -16	n/a	n/a	44.5	-4.2	71	76	81	87	128	179	150	125	125
NYBOT Coffee	cent/lb	259	↓ -32	n/a	n/a	26.3	-2.1	139	134	140	174	205	257	235	200	175
NYBOT Cocoa	\$/mt	2902	↓ -215	n/a	n/a	29.8	-4.9	3259	3070	2987	2863	2856	3307	2700	2700	2700
NYBOT Sugar	cent/lb	22.4	↓ -1.9	32.6	-5.14	48.4	19.4	23.6	24.4	15.5	20.2	29.0	30.5	25.0	20.0	20.0
CME Live Cattle	cent/lb	105.0	↓ -14.3	n/a	n/a	18.6	2.5	83.6	90.5	93.7	95.0	100.5	111.2	95.0	115.0	120.0
CME Lean Hog	cent/lb	92.0	↓ -10.1	n/a	n/a	17.2	-9.4	57.8	69.7	81.9	79.7	71.2	86.2	95.0	105.0	95.0

<sup>1</sup> Monthly change is difference of close on last business day and close a month ago.

<sup>2</sup> Monthly volatility change is difference of average volatility over the past month and that of the prior month (3-mo ATM implied volatility, 1-mo realized volatility).

<sup>3</sup> Price forecasts refer to prompt contract price forecasts in 3-, 6-, and 12-months time.

<sup>4</sup> Based on LME three month prices.

Source: Goldman Sachs Global ECS Research.

## After the correction, a more bullish trajectory for oil prices

We remain structurally bullish on the oil market. With world economic growth continuing to drive world oil demand growth well in excess of non-OPEC production growth, the oil market continues to draw on inventories and OPEC spare capacity in order to balance. In our view, it is only a matter of time until inventories and OPEC spare capacity will become effectively exhausted, requiring higher oil prices to restrain demand, keeping it in line with available supplies.

While it is simply a matter of time, however, timing does remain critical. This was evident in the recent market correction, which has brought crude oil prices down \$15/bbl from the April highs. As we argued in April, concerns over the potential for further crude oil supply disruptions in the Middle East and North Africa pushed prices ahead of near-term fundamentals, leaving the market vulnerable to a substantial correction (see our Energy Weekly: *Prices return to Spring 2008 levels but fundamentals not there yet*. April 12, 2011). When signs that the higher oil prices were likely slowing economic and oil demand growth became more evident in May, it also became apparent that the market had been too focused on further oil supply shocks following the loss of Libyan crude oil production and not concerned enough about the potential for these high prices to slow economic and oil demand growth, leading to a sharp correction similar to the one experienced in May 2010 (see Exhibits 1 and 2).

**Exhibit 1: Brent crude oil prices sold off sharply in May, much like in May of 2010...**

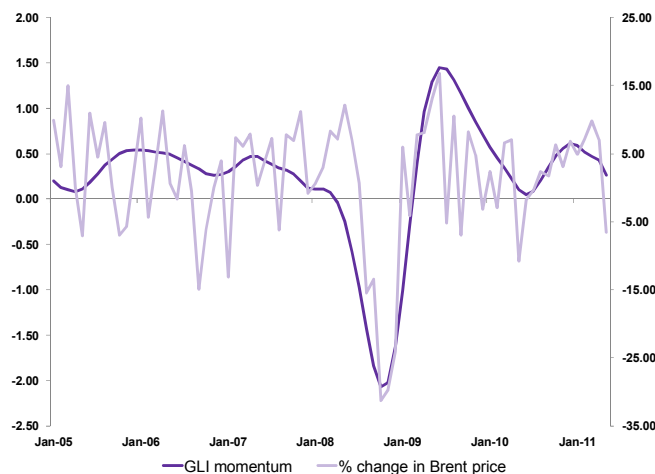
\$/bbl (left axis: 2011; right axis: 2010)



Source: ICE and GS Global ECS Research.

**Exhibit 2: ... the sell-off was triggered in part by signs that the economy is moving to slower, but sustained growth**

%, GLI (left axis); Brent (right axis)



Source: ICE and GS Global ECS Research.

### Time to re-establish long positions: We are introducing a trade recommendation to be long December 2012 Brent crude oil futures

The recent pull back in oil prices brings the market back toward levels more consistent with the global economic growth story that was being priced before events in Libya and the MENA region forced the oil market into the pricing of a supply-shock environment. Although the growth environment is clearly slower than before the unrest in the Middle East and North Africa began and downside risks remain in the near-term, our conviction and confidence that oil prices will rise substantially over the next 18 months is heightened,

given that the oil market is being driven by the anticipation of continuing demand growth against forward supply constraints, rather than concerns over transient supply shocks. Consequently, we believe that it is time to re-establish long oil positions and are introducing a trade recommendation to be **long December 2012 ICE Brent crude oil futures** (initial value \$105.16/bbl).

We are recommending a position in December 2012 Brent crude oil futures in order to capture the sharp rise in oil prices that we anticipate when effective OPEC spare capacity becomes exhausted next year, with the longer-dated position also minimizing exposure to near-term downside cyclical risks to oil prices in what will likely remain a volatile market.

While the \$10/bbl risk premium that we had associated with concerns over the potential for further supply shocks in the Middle East and North Africa has come out of the market with the recent pullback, oil market positioning continues to reflect the view that the forward supply-demand balance will be extremely tight. As the market negotiates the current slowdown in the pace of world economic growth, the potential for a loss of confidence in the sustainability of the economic recovery by the oil market presents a downside risk to oil prices. Among the potential triggers for a loss of confidence are the ongoing concerns over sovereign debt in Europe, the contraction in Japanese economic activity, and the end of the second round of quantitative easing in the United States.

However, we expect that near-term downside from these risks would be largely felt in the front of the forward curve while longer-dated prices are likely to receive support from rising industry cost pressures.

#### **Events in the Middle East and North Africa are having a persistent impact, which leads us to increase our oil price targets**

Although world economic growth is likely to be slower than initially anticipated, the events in the Middle East and North Africa, and Libya in particular, continue to exert a substantial upward influence on oil prices through a variety of channels.

- The ongoing loss of Libyan crude oil production has pulled forward anticipated physical shortages in the oil market by reducing effective OPEC spare capacity and increasing the pressure on non-OPEC production to compensate.
- Unrest within the MENA region has led to rising industry cost pressures through increased social spending requirements, increased operational risk, and loss of crude oil production in countries such as Yemen.
- The increasing pressure on non-OPEC production as effective OPEC spare capacity declines is beginning to put upward pressure on industry costs and leading to more disappointments in non-OPEC production growth as the strain increases.

On net, we expect that the ongoing loss of Libyan crude oil production and disappointing non-OPEC production will continue to tighten the oil market to critically tight levels in early 2012, with rising industry cost pressures likely to be felt this year. We are now embedding in our forecasts higher industry costs and that Libyan production losses will lead to the effective exhaustion of OPEC spare capacity by early 2012. This raises our year-end Brent crude oil price forecast to \$120/bbl from \$105/bbl, our 12-month forecast to \$130/bbl from \$107/bbl and our end-2012 forecast to \$140/bbl from \$120/bbl. While an early return of Libyan oil remains a downside risk to these forecasts, we believe such a return would be logistically constrained and staggered over time, mitigating and spreading out the downside pressures on prices.

Further while we expect effective OPEC spare capacity to become exhausted in 2012, with the supply-demand balance becoming increasingly tight in 2011, we expect that the market environment will be increasingly characterized by:

- Rising industry cost pressures that are reflected in higher long-dated crude oil prices as supply-side infrastructure becomes increasingly strained.
- Oil prices moving higher and becoming more volatile as the market prices to restrain demand, with prices eventually becoming disconnected from industry costs as the marginal barrel supplied becomes a barrel not consumed.
- Increasing volatility as inventory cover and OPEC spare capacity reach critically low levels.
- Increasing risks to economic growth, as high oil prices force oil demand growth in line with oil supply growth.

Net, with industry cost pressures increasing and higher prices increasingly being required to restrain demand this year, **we are raising our Brent crude oil price forecast to \$115/bbl, \$120/bbl, and \$130/bbl on a 3, 6, and 12 month horizon.**

**The early return of OPEC spare capacity slowed the draw on world oil inventories, but the ongoing loss of Libyan production is reducing the time to a critically tight market.**

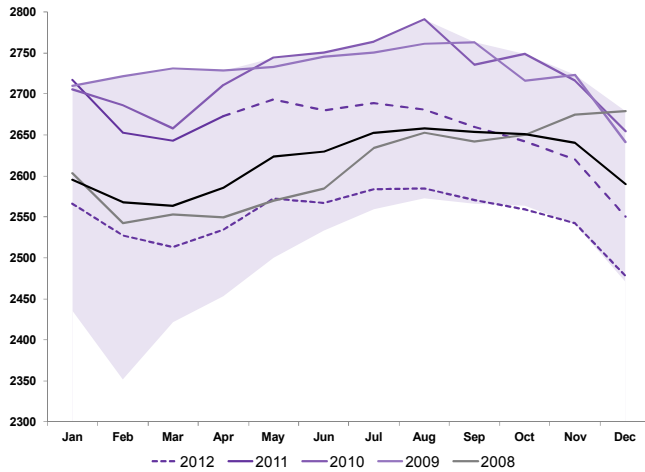
In our last Energy Watch, we argued that this year the oil market would move through a two stage cyclical recovery toward higher oil prices. The first stage would be the drawdown of world oil inventories toward more normal levels and the second stage the drawdown of OPEC spare capacity (see Energy Watch: 2011-2012 Outlook: *The road to a structural bull market in oil*, published December 1, 2010). What we had expected to be a more gradual process, driven by rising oil demand created by the ongoing economic recovery, however, has been a much swifter one, driven by the loss of Libyan crude oil supplies and disappointing non-OPEC production. In terms of timing, the result has been that OPEC spare capacity has begun to draw down faster than expected, but this has slowed the draw on world oil inventories.

World oil inventories (OECD inventories plus floating storage) drew substantially in 2010, with the world oil market in a seasonally-adjusted deficit of 660 thousand b/d from May through December. However, as we have highlighted before, the inventory drawdown slowed significantly in 4Q10 as OPEC ramped up production. By 1Q11, the seasonally-adjusted deficit had turned into a surplus of 660 thousand b/d and inventories built counter-seasonally (see Exhibit 3). World oil inventories have risen 33 million barrels since the end of last year while inventories typically draw by 38 million barrels. It is important to notice that even the shortfall of 1.5 million b/d of Libyan production didn't stop this shift in trend. Initially, and particularly in January, the shift from a deficit to surplus was driven by higher OPEC output. Although this increase in OPEC production was more than offset by the loss of Libyan crude oil production, world oil inventory draws remained in check as high prices restrained demand.

Interestingly, while the shortfall in Libyan production reduced effective OPEC capacity by 1.5 million b/d, the seasonal slowdown in demand, which was exacerbated by the effect of higher prices, allowed for a sharp reduction in OPEC production while still maintaining the typical seasonal build in inventories (see Exhibit 4). However, we expect that this will prove to be short-lived, with the world oil market swinging back into deficit by 3Q11, as world oil demand picks up seasonally before its seasonal peak in 4Q. This seasonal swing will likely be amplified this year by reacceleration in economic growth in China and Japan, as well as by increased use of diesel-fired power generation in both countries over the summer months. Consequently, OPEC spare capacity will likely begin to draw down quickly in 2H11 and enter critically tight levels comparable to the Spring of 2008 by 1Q12, should all Libyan crude oil production remain off the market. However, it should be emphasized that our

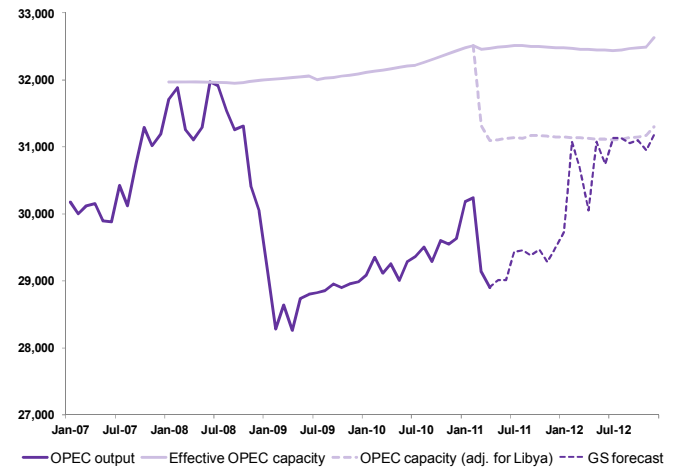
measure of “effective” spare capacity is based on the notion of what will likely be brought to market in relatively short order given existing infrastructure.

**Exhibit 3: While world oil inventories are much lower than last year, the declining trend has faltered**  
Million barrels, total petroleum



Source: IEA, Argus, GS Global ECS Research.

**Exhibit 4: The Libyan loss reduced effective OPEC spare capacity, reducing the time to a critically tight market**  
Thousand b/d



Source: IEA, GS Global ECS Research.

Consequently, we tend to see the largest deviation between our measure of effective spare capacity and the consensus estimate in Nigeria and Saudi Arabia. In Nigeria, we exclude 450 thousand b/d of shut-in production as we do not believe it can return to the market, without significant infrastructure investment. In Saudi Arabia, we estimate the level of effective full capacity at between 10.5-11.0 million b/d. In this sense we are differentiating between what is likely nameplate engineering capacity against what is most likely to be brought to market in a short-period of time and sustained for a long-period of time. There are many reasons why effective spare capacity would be below the nameplate engineering capacity level, and it is typical in most industries for effective full capacity to be reached at a utilization rate that is below 100% of full capacity. This could be due to bottlenecks that develop at high levels of utilization, the need to hold some capacity in reserve to ensure stability of the supply chain, or various other concerns.

By focusing on effective capacity rather than nameplate engineering capacity, one could simply note that in June 2008, when prices spiked to near \$150/bbl, capacity was effectively fully utilized despite the fact that industry consensus and the media reported that spare capacity was still 1.45 million b/d in Saudi Arabia. In our discussions, we find it more useful to work in terms of a notion of effective spare capacity, where zero effective spare capacity like we experienced in June 2008 is the trigger point for prices to rise high enough to create substantial demand rationing. For all OPEC countries, we typically treat “capacity” as equal to a production figure actually achieved within the past decade, in particular in the first half of 2008, when the oil price went above US\$100/bbl and provided the incentive to produce as much as possible. We then adjust these historical figures for underlying decline rates and key new start-ups.

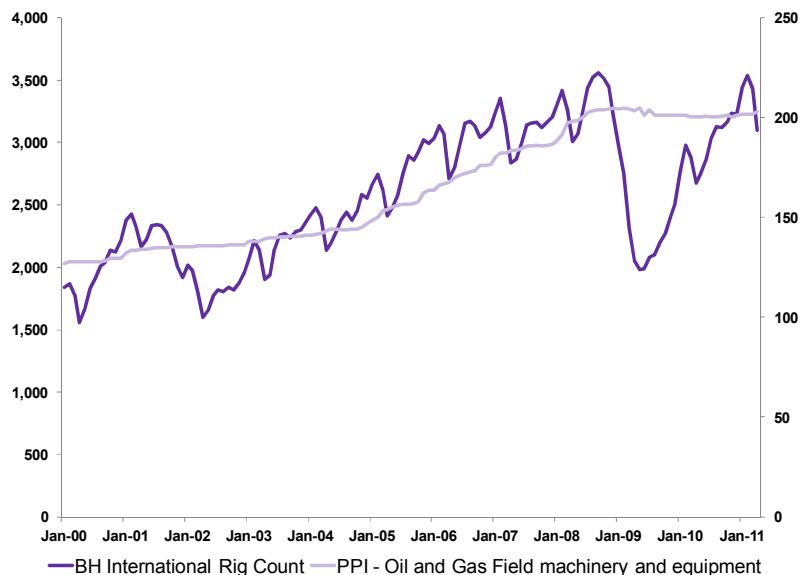
World oil inventories have been maintained at higher than expected levels at the expense of effective OPEC spare capacity. However, the decline in OPEC spare capacity and the loss of Libyan production is increasing the strain on non-OPEC production, and we are seeing tentative signs that industry cost pressures are beginning to emerge. The international rig



counts reported by Baker-Hughes now show rig counts above pre-recession levels, above the corresponding months in 2008 (see Exhibit 5).

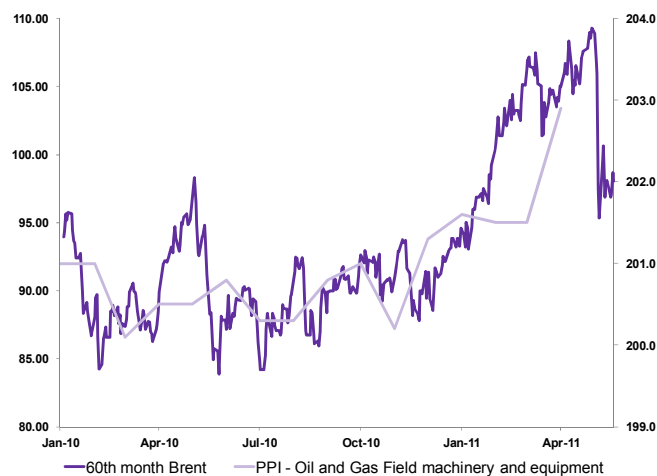
**Exhibit 5: International rig counts are back above 2008 levels, which is likely to put upward pressure on industry costs**

Rig count (left axis); Index (right axis)

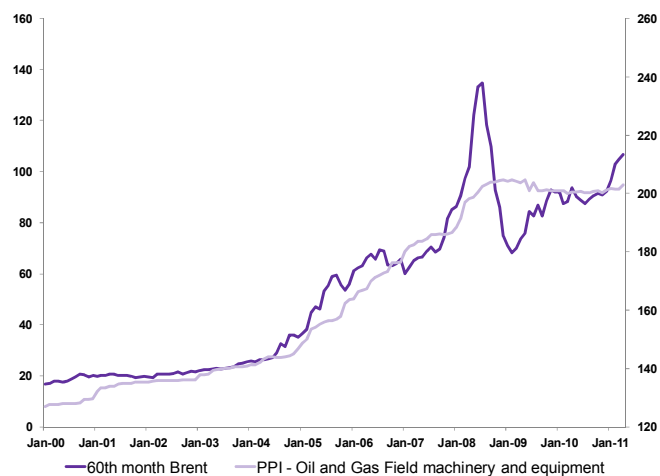


Source: Baker-Hughes, BLS, and GS Global ECS Research.

These higher rig counts and the increased pressure on the supply-side of the market are beginning to create cost pressures. The Producer Price Index (PPI) for Oil and Gas field machinery and equipment has been rising since November of last year (see Exhibit 6). This is the first rise following a period of flat to declining costs since the recession. We expect these cost pressures will continue to rise, providing more support for longer-dated Brent crude oil prices over \$100/bbl in 2H11 (see Exhibit 7).

**Exhibit 6: There are signs of rising cost pressures...**60<sup>th</sup>-month Brent price (\$/bbl, left axis); Index (right axis)

Source: ICE, BLS, and GS Global ECS Research.

**Exhibit 7: ... supporting higher long-dated oil prices.**60<sup>th</sup>-month Brent price (\$/bbl, left axis); Index (right axis)

Source: ICE, BLS, and GS Global ECS Research.

The increasing pressure on the supply-side infrastructure is also leading to increasing non-OPEC production disappointments, where we expect supply growth of 815 thousand b/d in 2011 to slow to only 400 thousand b/d in 2012. With world oil demand likely to continue to grow well in excess of non-OPEC production growth, we expect to transition eventually into an environment where long-dated prices rise above industry costs, like they did in 2008, as the marginal barrel of oil supplied becomes a barrel not consumed.

**Prices beginning to restrain demand, higher prices will likely be required as we move forward**

We expect the world economy to grow by about the trend growth rate of 4.5% in 2011. In a stable price environment, this would typically generate world oil demand growth of 2.5%, or 2.2 million b/d. With non-OPEC production expected to grow by only 815 thousand b/d, to meet this level of oil demand growth will require drawing on inventories and OPEC spare capacity. Further, with non-OPEC production growth expected to decline in 2012, and the ability to draw on inventories and OPEC spare capacity limited, higher prices are required to restrain demand growth, and potentially economic growth, in order to keep oil demand in line with available supplies.

We typically find that each 10% rise in oil prices slows demand growth by 15 bp (0.15%) for a given level of GDP growth. With oil prices expected to be 40% higher in 2011 than in 2010, this would reduce demand growth by 0.6%, or over 500 thousand b/d. To put it another way, the 40% rise in oil prices anticipated for this year will lead to the same level of oil demand growth as if the world economy was only growing 3.9% with stable oil prices. This is consistent with the type of demand restraint we have seen so far this year, with implied oil demand up 1.4 million b/d year over year (see Exhibit 8).

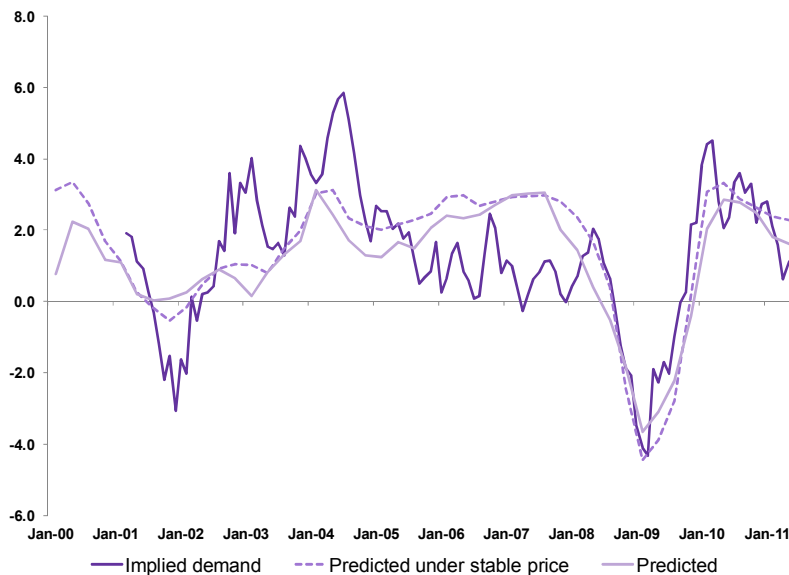
The higher oil prices are likely impacting demand through their impact on the pace of world economic growth as well. At the start of the year we expected world oil demand to grow by 2.2 million b/d in 2011, driven by world economic growth of 4.8% and restrained by a 20% rise in oil prices. Since then, however, we have decreased our world economic growth forecast to close to 4.5% and we increased our oil price forecasts to 40% over 2010 prices. Net, between slower economic growth and higher prices, we now see demand

rising 500 thousand b/d less than at the start of the year, and are lowering our oil demand forecast for 2011 to 1.7 million b/d.

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**Exhibit 8: Implied world oil demand is being restrained by higher oil prices**

% change year over year



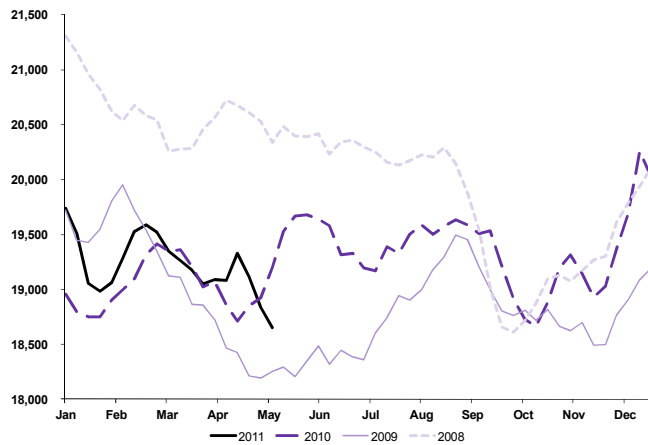
Source: IEA and GS Global ECS Research.

As we have seen in the past, the burden of higher prices is likely to continue to weigh on oil demand in the developed economies, as the marginal barrel of oil supplied to meet emerging market demand growth becomes a barrel not consumed in the developed market economies, and the process of resource realignment continues.

This process of resource realignment is being seen clearly in the US oil market, where total petroleum demand in recent weeks has been flat to down relative to last year (see Exhibit 9). The lack of growth in US total petroleum demand is consistent with the high price and slower economic growth environment that the US oil market has been adapting to in recent months. Given the recent modest downward revisions to the US economic outlook, with US Real GDP now expected to grow at 2.7 percent this year, slowing from 2.9 percent in 2010, we expect US oil demand growth of just 15 thousand b/d in 2011, down from our prior forecast of 165 thousand b/d.

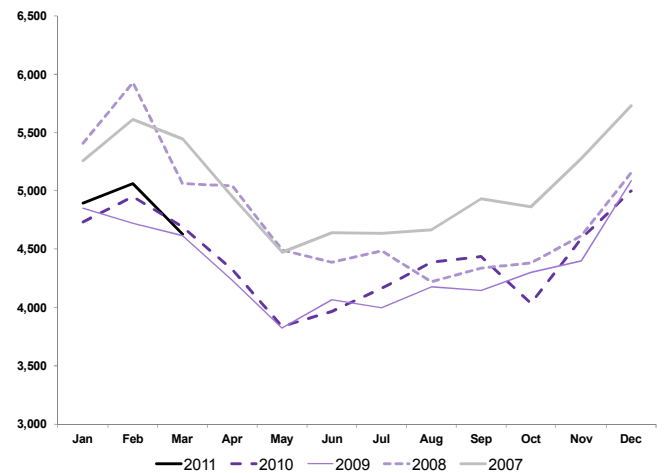
While we expect the effect of higher oil prices to be felt on oil demand growth across the developed market economies, preliminary data suggests that Japanese oil demand has been resilient to the economic contraction the country is experiencing as well as the high oil prices (see Exhibit 10). Recently released figures show Japanese GDP fell at an annualized pace of 3.7% in 1Q11. This was on top of a 3.0% annualized decline in 4Q10. Despite the contraction in GDP, Japanese demand was roughly flat to last year through March. While the effects of the earthquake may be making estimation of Japanese oil demand more difficult, we expect Japanese oil demand to be well-supported over the summer months by increased need for oil-fired generation due to the loss of nuclear generation capacity. We expect this will continue to offset the loss in oil demand from the economic contraction (see GS Energy Weekly: *Unfolding events continue to create upside risks to our forecasts*, March 21, 2011). Net we have changed our demand forecast for Japan to 175 thousand b/d growth in 2011 from previously 40 thousand b/d.

**Exhibit 9: US demand has been flat to down relative to last year and failing to rise seasonally...**  
 Thousand b/d



Source: DOE and GS Global ECS Research.

**Exhibit 10: ... Japanese demand has been surprisingly resilient, and should be supported by generation demand**  
 Thousand b/d

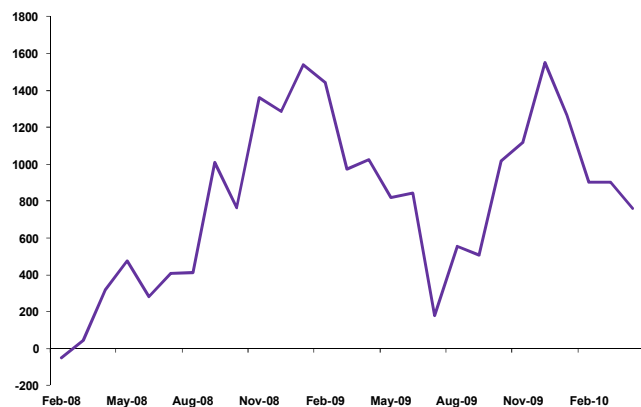


Source: IEA and GS Global ECS Research.

Among the non-OECD countries, demand growth continues to be led by China, which accounted for more than one-third of global demand growth in 2010. This was driven by rapid economic expansion but also by a policy induced power shortage which triggered strong demand for diesel for power production in diesel fueled generators in the second half of the year. While demand continued to grow in 1Q11, demand growth slowed down significantly, dropping to 760 thousand b/d in April (see Exhibit 11). This is consistent with the slowdown in economic activity: Chinese industrial production (IP) growth fell to -5.2% month-over-month s.a. in April from 20.2% in March. While we expect demand growth to recover in line with a reacceleration of economic growth in 2H11, pushing average oil demand growth to 800 thousand b/d in 2011, the current droughts that plague large parts of China could lead to renewed strong demand for diesel and push demand growth above our forecast. Electricity shortages in several provinces have been reported due to low hydropower capacity. This could once again lead to increased use of diesel in power generation. Further, diesel demand could also rise as large areas of arable land are threatened by droughts and need irrigation, which is often powered by diesel generators. China has become a net exporter of diesel over the over the past years but stopped exporting and even imported large volumes at the end of last year in order to alleviate acute diesel shortages across the country. While China became a net exporter in March again, the droughts increase the risk that China will again cut back diesel exports for the remainder of the year (see Exhibit 12).

### Exhibit 11: Chinese oil demand growth has slowed down again over the past months

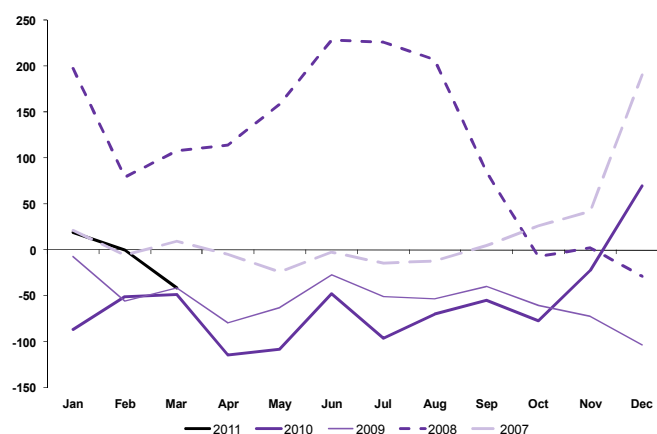
Change year-over-year, thousand b/d



Source: CNBS, GS Global ECS Research.

### Exhibit 12: China has been a net exporter of diesel in March, but droughts could reverse this trend

Net imports, thousand b/d



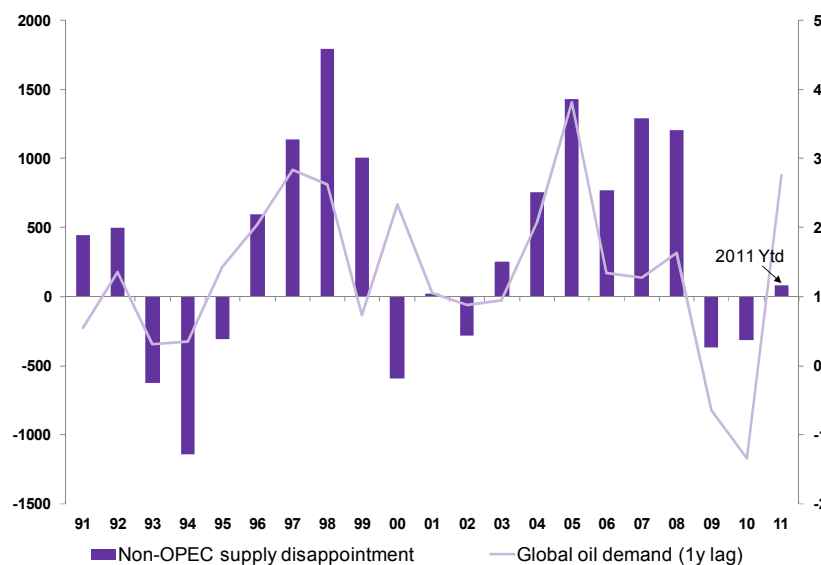
Source: CNBS, GS Global ECS Research.

### Non-OPEC supply disappointments begin to reappear, with the pace of production growth slowing

Non-OPEC supply growth surprised to the upside over the past two years after having disappointed to the downside for many years preceding the recession. As we highlighted before, this tends to be typical at the end of an economic cycle when oil demand declines while new service capacity finally comes on-line, effectively reducing the strains on oil service capacity (see *GS Energy Watch: 2011-2012 Outlook: On the road to a structural bull market in oil*, December 1, 2010). In addition, we also find that government pressure for fiscal renegotiations on the oil sector also tends to decline in lower oil price environments. While the service industry is unlikely to become bottlenecked again until next year (see Exhibit 13), recent high oil prices may already lead to an increased push from governments towards fiscal renegotiations.

The oil price required to balance the budgets of oil exporting nations has sharply increased over the past few years. More specifically, our economists estimate that Russia needs an oil price close at around \$100/bbl (see *New Markets Analyst: Russia's budget, oil and taxation*, February 24, 2011) to balance their budget, while market estimates for Saudi Arabia have also risen by about \$10/bbl to a range of \$80-90/bbl. While higher budget requirements might have delayed fiscal renegotiations even as prices rose, with Brent now trading above \$100/bbl, tax renegotiations become more likely again. We expect this will have negative effects on supply growth. In a recent note (see *Europe Energy Oil: Fiscal renegotiation threatens the new higher-risk, higher-reward development pipeline*, May 20, 2011), our colleagues from the oil and gas equity research team highlighted that in countries with volatile fiscal regimes production growth tends to be a lot slower while fiscal stability leads to better production growth. While we would expect that higher oil prices will lead to renewed pressure for fiscal renegotiations in countries that have done so in the past, the recent spike in oil prices has led to debates over fiscal renegotiations also in countries with low and stable/falling tax environments such as Brazil and the United States. As a result, the trend of upward surprises in non-OPEC production is likely to reverse this year and likely to get worse in 2012 when bottlenecks in the service industry reappear. The past 3 months might have given a taste what is to come, as non-OPEC supply grew by 200 thousand b/d, while the IEA had initially forecasted 360 thousand b/d and also came in 270 thousand b/d below our initial forecast back in December.

**Exhibit 13: Non-OPEC supply is likely to surprise to the downside again starting this year**  
 Thousand b/d (left axis), % change in global oil demand, year-over-year



Source: IEA, GS global ECS Research.

While we expect 2011 non-OPEC supply again to grow strongly, it will not be a repetition of last year in our view. The upside surprise in 2010 non-OPEC supply was characterized by a high level of diversity in the sources of new supply, both in terms of regional growth and type of supply. This was in stark contrast, for instance, to the US natural gas market, where the supply growth was almost entirely driven by shale gas. Non-OPEC supply growth in 2010 surprised to the upside in the amount of crude oil produced in the US Gulf of Mexico, the Lower 48, Canada, China, Russia, Brazil and Colombia, but also from NGLs and biofuels.

In 2011, however, and particularly going into 2012, the sources of supply growth will likely narrow. Ethanol production growth will likely slow down materially both in the United States and Brazil and any material near-term growth in non-OPEC NGLs will likely be confined to the United States while we expect, for example, Canadian NGL production to decline. The growth in supply therefore should be mainly driven by crude oil, but also it appears that the strong supply growth that some regions have enjoyed over the past 2-3 years is coming to an end. We expect that US shale oil will drive new supply growth over the medium term and crude oil production in Latin America will continue to expand. However, the capacity expansion in Russia seems to have reached its peak and the one-off expansion of Chinese production last year is unlikely to be repeated in the near future. At the same time, crude oil production in the North Sea will likely continue its sharp downtrend. On net, we expect non-OPEC supply to grow by close to 815 thousand b/d in 2011 and slow down to 400 thousand b/d in 2012.

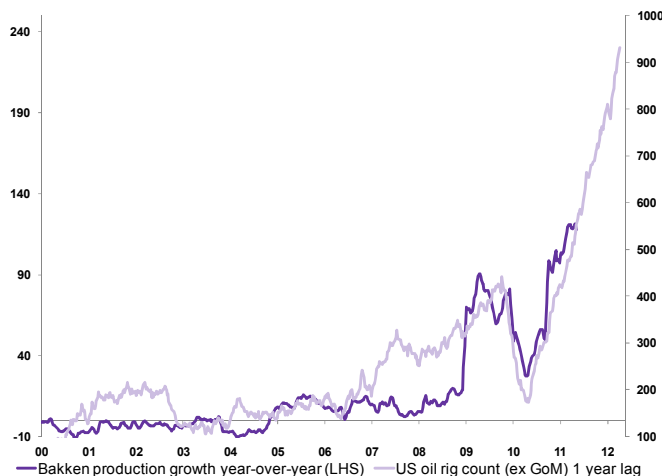
### The US supply growth story continues to gather strength

US supply growth continued at a fast pace in the first four months of 2011, up 224 thousand b/d year-over-year since the end of 2010, despite the fact that Gulf of Mexico production has started to decline sharply and NGL and biofuel production was relatively weak. Consequently, supply growth occurred mainly in the Lower 48. Crude production from the Bakken shale play, which was growing more than 100 thousand b/d last year, has accelerated further in recent months (see Exhibit 14) and production from Eagle Ford has increased sharply since the beginning of the year (see Exhibit 15). We expect this Lower 48 production growth to strengthen going forward: Crude production from the Bakken shale is

likely to increase by 135 thousand b/d this year, and the Eagle Ford by 100 thousand b/d. Production from Granite Wash, the Permian basin and California will likely add another 70 thousand b/d. In addition, we expect substantial volumes of NGLs to be produced from these plays. On net, the Lower 48 will likely be, thanks to the development of shale oil projects, the region with by far the largest supply growth over the next two years, adding close to 400 thousand b/d both in both 2011 and 2012.

**Exhibit 14: Crude oil production growth in the Bakken shale has accelerated further**

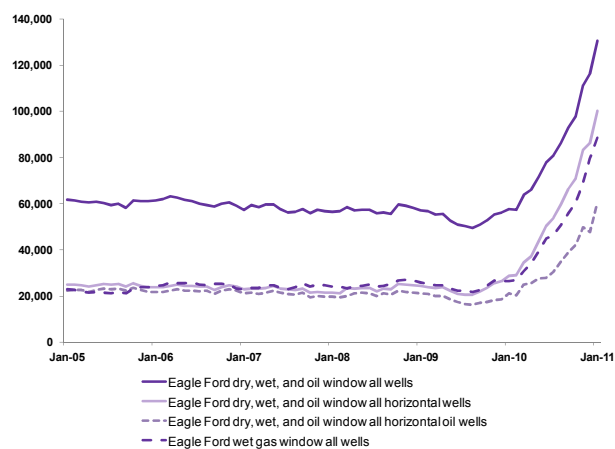
North Dakota production year-over-year change, thousand b/d (left axis); US oil rig count (ex GoM) (right axis)



Source: OGJ, Baker Hughes, GS Global ECS Research.

**Exhibit 15: Production in the Eagle Ford has increased sharply since the beginning of last year**

Oil production, b/d



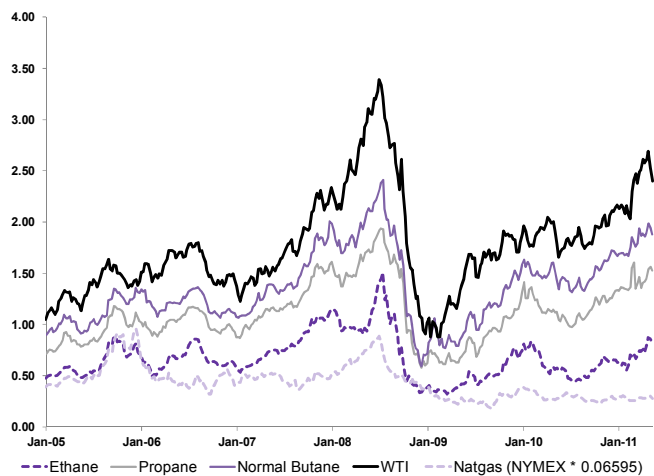
Source: IHS, GS Global ECS Research.

**US NGL production** was one of the largest sources of new supply in 2010, rising by more than 110 thousand b/d year-over-year. This was mainly the result of ongoing strong growth in natural gas production from shale plays and the high price of oil relative to natural gas. Gas producers have targeted more liquid-rich gas in order to benefit from high NGL prices that rose with oil prices. While NGL prices did not increase by the same magnitude as oil prices, they traded well above natural gas prices despite the substantial output growth (see Exhibit 16). The rapid expansion in the shale oil space due to the high oil-to-natural gas price ratio should further boost NGL production as some of the shale oil projects, most notably the Eagle Ford in Texas, are expected to yield large amounts of NGL.

Our model based on natural gas production, oil-to-natural gas price ratios, ethane prices and NGL demand suggests that NGL supply could grow by 200 thousand b/d year-over-year in both 2011 and 2012 (see Exhibit 17). This is in line with a bottom-up model accounting for new NGL-rich shale oil projects on top of the expected growth of natural gas production, even if the trend to more liquid-rich gas should level off from here. The question therefore arises whether there is enough demand for this production growth, particularly for ethane. Our equity research colleagues have recently highlighted that ethane demand could rise 20%-30% over the next five years due to new petrochemical plants built mainly along the US Gulf Coast (see Midstream & IPP Essentials: *Warming on NGL prices*, April 25, 2011). In addition, US ethane demand currently exceeds US production by about 50 thousand b/d, indicating further off-take capacity if ethane supply should grow strongly. However, NGL supply growth at 200 thousand b/d would in our view pose the risk that supply growth would outpace demand growth in the near future, which would require ethane rejection. In addition, some of the ethane that is currently produced

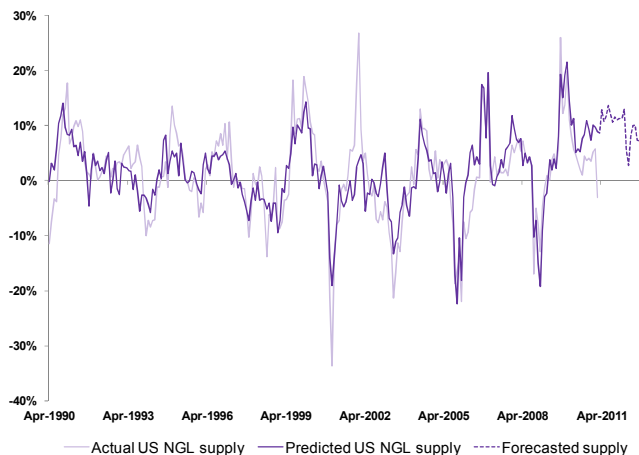
in some of the shale plays is likely rejected due to a lack of transportation capacity. As a result, we take a relatively conservative stance on NGL production and forecast growth of 80 thousand b/d and 100 thousand b/d in 2011 and 2012, respectively.

**Exhibit 16: Despite rising ethane output, ethane traded higher with oil while gas prices remained depressed \$/gal**



Source: Platts, NYMEX, DOE, GS Global ECS Research.

**Exhibit 17: Rising oil-to-gas ratios and continued growth in gas production suggest rising US NGL supply year-over-year change**



Source: Platts, NYMEX, DOE, GS Global ECS Research.

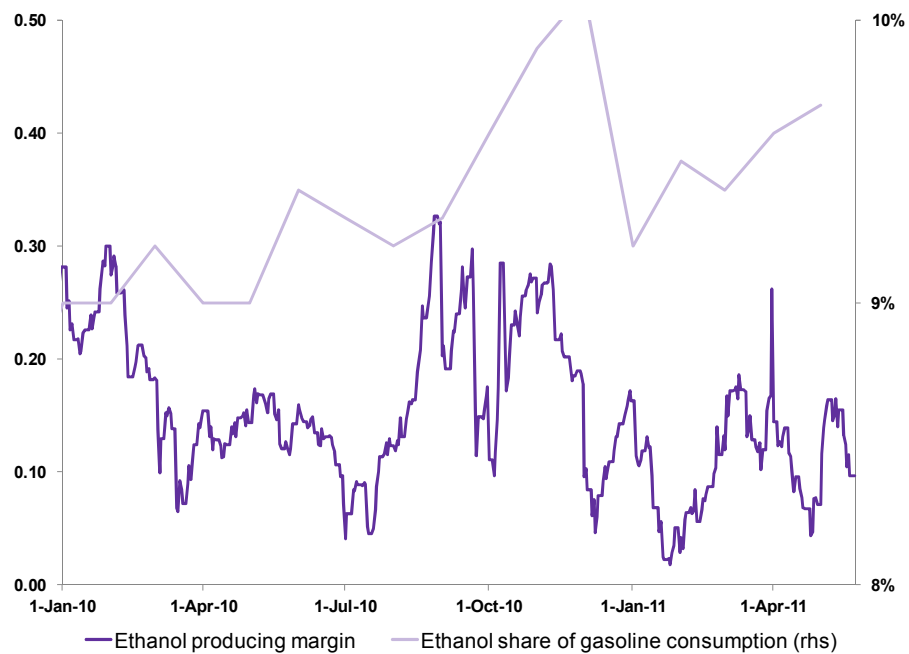
**US ethanol production** rose 150 thousand b/d year-over-year in 2010. Despite the large increase in corn in prices, ethanol margins remained positive throughout 2010 as oil prices rose by close to 25% over the same time period and the blenders benefited from a \$0.45/gal tax credit. This strong increase in ethanol blending has pushed the average ethanol blend rate already to 9.5% (see Exhibit 18). For 2011 and 2012 we still expect to see growth in ethanol production, but at a significantly slower pace, which is limited mainly by the blending cap of 10%. While the US Environmental Protection Agency (EPA) decided late last year to allow a 15% ethanol blend rate for cars and light trucks built from 2001 onward, we expect that there are significant obstacles that will make it difficult to push ethanol blending volumes much above current levels in the near term. Gas station owners have been very reluctant to offer E15, as they are concerned about potential liability issues should the higher ethanol content turn out to be harmful to car engines. There is also a considerable financial burden on gas station owners. As only cars from 2001 onwards would qualify for E15 gasoline, they would have to offer both the present E10 blend and the new E15 blend. They could do that by either installing a new tank for E15 and retrofitting an existing pump or by installing a blending pump, both being quite costly with currently no apparent economic incentive for the gas station owner to do so. Consequently, there are currently only a bit more than 200 stations with blending pumps installed in 13 states, out of a total of close to 160,000 gasoline outlets in the United States. Further, we do not expect US gasoline demand to grow this year. Quite the contrary, gasoline demand in 1Q has been weak and the weekly DOE data suggest that recent gasoline demand has been lacking the seasonal uptick into the driving season. As a result, with US gasoline demand likely ending up slightly below last year, even the same level of blended ethanol would slightly increase the blend rate and bring it close to the 10% cap. Consequently, we expect ethanol blending to rise close to the 10% blend rate until 2012, but don't expect additional ethanol demand growth, and thus production growth, beyond that. We therefore expect US ethanol production to increase by only 40 thousand b/d this year and remain close to flat in 2012.



The upside risk for US ethanol production lies in a potential poor sugar harvest, in particular in India or Brazil, the two largest producers, which would drive up sugar prices and thus make sugarcane-based ethanol production less appealing. This could trigger renewed export demand for US ethanol, similar to the situation that we observed in the past few months. But even under this scenario, we would only expect limited upside to our US ethanol production forecast, as this potential additional export demand would itself be constrained by low corn inventories. In particular, any significant growth in ethanol production would likely push corn prices higher and with the \$0.45/gal blender tax credit due to expire at the end of 2011, would likely make ethanol blending uneconomical in the United States, thus reducing the potential supply increase in 2012.

**Exhibit 18: US ethanol production is unlikely to grow at the same pace as last year as blending rates approach the 10% cap**

\$/gal (left axis); % ethanol blend rate in gasoline (right axis)



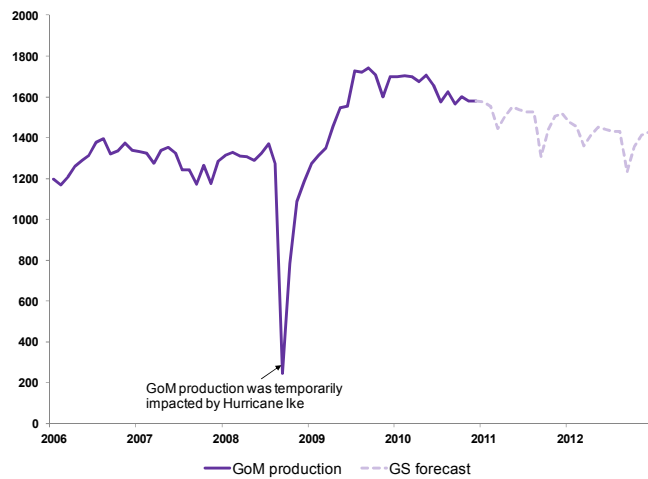
Source: DOE, USDA, GS Global ECS Research.

**Gulf of Mexico** production also rose by more than 80 thousand b/d last year due to new fields that came online before drilling was banned in the aftermath of the Macondo oil spill. The ramp-up of the Shenzi and Tahiti projects alone added roughly 100 thousand b/d and total incremental supply summed up to 160 thousand b/d. While drilling activity in the GoM has started to pick up again lately, we expect GoM production to decline sharply by 140 thousand b/d this year as a result of the reduced drilling activity during the moratorium last year and the uncertainty regarding future regulation in the aftermath of the Macondo oil spill (see Exhibit 19 and 20).

On net, the strong supply growth from the various shale plays in the United States will likely outweigh any negative impact on supply from the Gulf of Mexico and Alaska and we expect the United States to be by far the largest contributor of incremental supply growth in 2011/12, growing at around 400 thousand b/d each year.

### Exhibit 19: After strong growth in 2009/2010, GoM production started to decline...

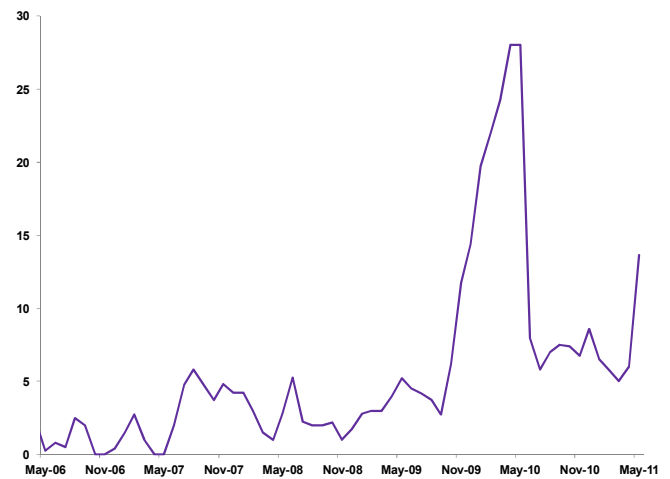
Thousand b/d



Source: DOE, GS Global ECS Research.

### Exhibit 20: ...as the drilling activity in the GoM remains depressed.

Active oil rigs in the GoM



Source: Baker Hughes, GS Global ECS Research.

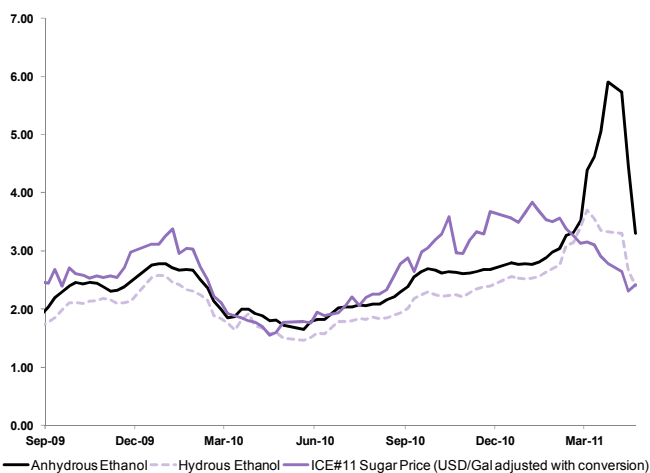
## BRICs are as important for supply growth as they are for demand growth

While the focus on the BRIC nations within the oil market is mainly on the demand side, as they account for about 50% of global demand growth, the BRICs will also deliver about 25% of supply growth in 2011 (and 65% of non-OPEC supply growth). However, the BRIC nations are at different stages of their capacity expansion: China and Russia still draw from the large capacity expansion from the last two years while Brazil is set to reap the fruits of their significant investments into the sector over the past years. India, which is by far the smallest producer within the BRICs, is expected to continue to grow production steadily but at a slower pace.

**Brazilian production** shows a similar picture to the United States, with crude oil supply forecasted to rise strongly while we expect ethanol production to remain roughly flat. Brazil's crude oil production should benefit from the ramp up of several projects in the second half of this year such as Petrobras' Lula & Cernambi, Marlim South and Golfinho, Statoil's Peregrino and Chevron's Frade among others. Brazil's biofuel production growth on the other hand will likely continue to be constrained by elevated sugar prices. Although Brazilian ethanol prices have recently surged significantly above sugar prices, we expect this move to reverse as the sugarcane harvest, and hence ethanol production, has begun in Brazil. The continued elevated sugar prices that we expect should in turn limit the incentive to increase the share of sugarcane used to produce ethanol going forward (see Exhibit 21).

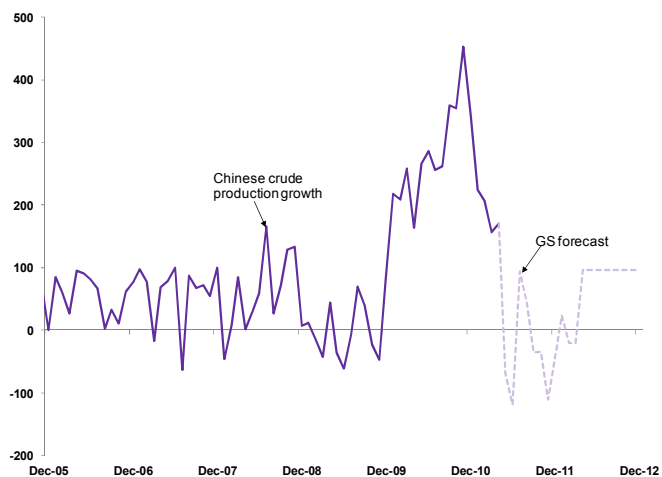
**Chinese production** was growing 244 thousand b/d over the first four months of the year, but this is mainly a base effect. New projects had ramped up and temporarily shut-in production restarted mainly until mid-year, so even though production is now slightly declining sequentially, it still shows strong year-over-year growth (see Exhibit 22). Consequently, we expect Chinese supply growth to slow down further going forward, which should result in average 2011 supply growth of 150 thousand b/d.

**Exhibit 21: While current prices favors ethanol production, we expect this trend to reverse in 2H11**  
\$/gal



Source: ICE, CEPEA, GS Global ECS Research.

**Exhibit 22: Chinese crude oil output growth has already slowed down markedly in recent months**  
Change year-over-year, thousand b/d

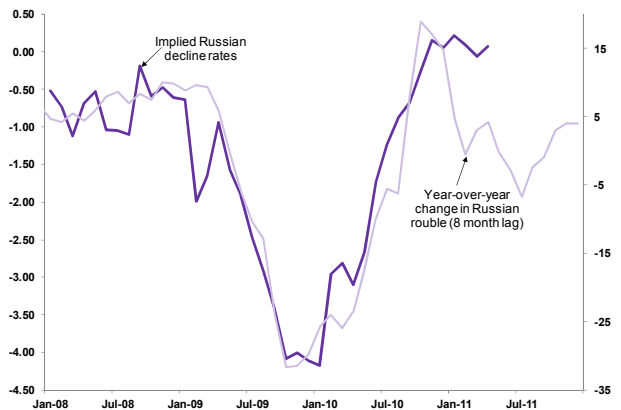


Source: CNBS, GS Global ECS Research.

**Russia's** output this year has been supported by a significant recovery in decline rates to close to zero (see Exhibit 23) but suffered at the same time from a slow down in the ramp up of new projects. On net, while production grew by 240 thousand b/d last year, it has slowed down more recently (see Exhibit 24). We continue to expect this trend of positive but slower supply growth to continue in 2011 but expect that production could turn flat by 2012 as the lion's share of new projects has now come on-stream and besides Vankor there aren't any large projects that are expected to add significant volumes from ramping up production over the next two years.

**Exhibit 23: Decline rates in Russian base production have recovered from the sharp drop in 2009...**

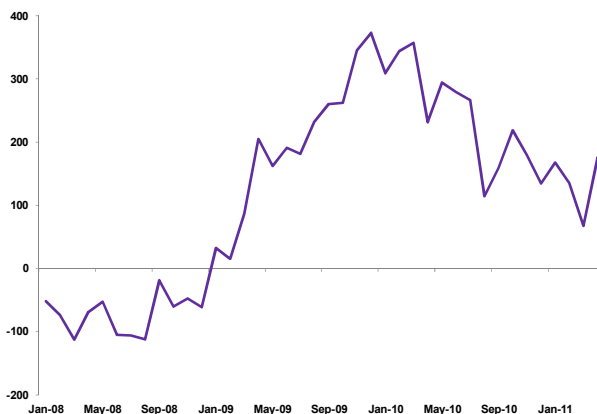
% change year-over-year in base production (left axis);  
% change year-over-year USD/Rub exchange rate (right axis)



Source: IEA, GS Global ECS Research

**Exhibit 24: ... and output growth slowed down materially as fewer greenfield projects ramp up**

Thousand b/d



Source: IEA, GS Global ECS Research.

In addition to the production growth in Brazil, China and Russia, Colombian crude oil production is also forecasted to grow more than 100 thousand b/d in 2011 as supply growth from Central-Southwestern region should continue to increase before slowing down in 2012 as some midstream bottlenecks might emerge.

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**Exhibit 25: GS price forecast**

	Unit	Forecasts							
		1Q11	2Q11	3Q11	4Q11	1Q12	2Q12	3Q12	4Q12
<b>Crude Oil</b>									
WTI	\$/bbl	94.0	104.0	107.0	114.0	117.5	125.0	129.0	135.0
Brent	\$/bbl	105.0	116.0	114.0	119.5	122.0	128.5	132.0	138.0
<b>Product</b>									
RBOB	cents/gal	2.7	3.1	2.9	2.9	3.1	3.3	3.3	3.4
USGC Heating Oil	cents/gal	2.8	3.0	3.0	3.2	3.3	3.4	3.6	3.7
NYHB Res. Fuel Oil	\$/bbl	92.0	102.5	103.5	109.0	112.0	118.5	122.0	128.0
London Gasoil	\$/bbl	882.0	952.0	933.5	988.0	1017.5	1070.0	1100.5	1151.5
<b>Cracks</b>									
RBOB	\$/bbl	17.90	25.60	14.90	9.10	11.60	14.80	11.00	6.20
USGC Heating Oil	\$/bbl	23.90	22.70	19.90	21.20	21.30	19.80	20.50	21.70
USGC Res. Fuel Oil	\$/bbl	-2.20	-1.30	-3.40	-4.80	-5.60	-6.30	-6.70	-7.10
London Gasoil	\$/bbl	13.00	11.70	11.20	13.10	14.40	14.80	15.50	16.40

Source: GS Global ECS Research, NYMEX, ICE, Platts.

## Exhibit 26: Demand

Thousand b/d

Demand	1Q2010	2Q2010	3Q2010	4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	1Q2012	2Q2012	3Q2012	4Q2012	Jan-09	Jan-10	Jan-11	Jan-12	yoy 10	yoy 11	yoy 12
USA	18819	19017	19492	19257	19039	19008	19409	19182	19008	18927	19328	19101	18771	19146	19160	19091	375	13	-69
US territories	310	278	288	307	313	281	292	311	310	279	289	308	294	296	299	296	2	3	-3
Canada	2193	2208	2284	2264	2278	2186	2234	2230	2266	2175	2223	2219	2147	2237	2232	2221	90	-6	-11
Mexico	2144	2167	2116	2137	2099	2158	2097	2134	2078	2136	2076	2113	2084	2141	2122	2101	57	-19	-21
<b>Total North America</b>	<b>23466</b>	<b>23670</b>	<b>24181</b>	<b>23965</b>	<b>23729</b>	<b>23634</b>	<b>24032</b>	<b>23857</b>	<b>23662</b>	<b>23517</b>	<b>23916</b>	<b>23740</b>	<b>23296</b>	<b>23821</b>	<b>23813</b>	<b>23709</b>	<b>525</b>	<b>-8</b>	<b>-104</b>
Argentina	687	705	728	715	716	724	745	743	741	761	783	780	635	709	732	766	73	23	34
Brazil	2629	2648	2767	2795	2698	2715	2832	2903	2792	2852	2974	3047	2540	2710	2787	2916	169	77	129
Chile	332	329	339	321	331	334	347	333	343	351	365	349	353	330	337	352	-23	6	16
Venezuela	707	711	730	730	714	727	747	758	739	764	785	796	751	720	737	771	-32	17	34
Other Latam	1772	1763	1791	1819	1795	1804	1833	1890	1857	1896	1925	1983	1743	1786	1831	1915	43	44	85
<b>Total Latam</b>	<b>6127</b>	<b>6155</b>	<b>6356</b>	<b>6380</b>	<b>6255</b>	<b>6304</b>	<b>6505</b>	<b>6627</b>	<b>6472</b>	<b>6624</b>	<b>6831</b>	<b>6955</b>	<b>6023</b>	<b>6255</b>	<b>6423</b>	<b>6721</b>	<b>231</b>	<b>168</b>	<b>298</b>
France	1857	1774	1821	1809	1823	1756	1806	1836	1821	1753	1798	1823	1829	1815	1806	1799	-14	-10	-7
Germany	2393	2394	2641	2530	2345	2393	2585	2498	2343	2388	2573	2479	2457	2489	2455	2446	32	-34	-9
Italy	1447	1475	1555	1536	1422	1425	1501	1486	1421	1422	1494	1475	1528	1503	1459	1453	-25	-45	-6
Spain	1460	1422	1428	1452	1436	1415	1425	1435	1434	1412	1418	1424	1467	1441	1428	1422	-26	-13	-5
UK	1648	1616	1634	1609	1633	1589	1606	1588	1632	1586	1598	1576	1667	1627	1604	1598	-41	-22	-6
Other OECD Europe	5387	5445	5720	5759	5392	5486	5771	5801	5386	5474	5744	5758	5689	5578	5613	5591	-111	35	-22
Non-OECD Europe	709	689	694	728	703	702	710	756	727	738	746	794	736	705	718	751	-31	13	33
<b>Total Europe</b>	<b>14901</b>	<b>14814</b>	<b>15492</b>	<b>15423</b>	<b>14754</b>	<b>14766</b>	<b>15405</b>	<b>15401</b>	<b>14765</b>	<b>14773</b>	<b>15371</b>	<b>15330</b>	<b>15374</b>	<b>15158</b>	<b>15082</b>	<b>15060</b>	<b>-216</b>	<b>-76</b>	<b>-22</b>
FSU	4285	4079	4330	4418	4306	4141	4432	4589	4455	4351	4654	4816	4017	4278	4367	4569	261	89	202
GCC	6650	6829	7283	6849	6817	6990	7454	7112	7053	7345	7828	7464	6688	6903	7093	7422	215	191	329
Other Middle East	793	758	801	790	798	772	820	821	826	811	861	861	766	786	803	840	19	17	37
<b>Total Middle East</b>	<b>7443</b>	<b>7586</b>	<b>8084</b>	<b>7639</b>	<b>7615</b>	<b>7762</b>	<b>8274</b>	<b>7933</b>	<b>7879</b>	<b>8156</b>	<b>8689</b>	<b>8325</b>	<b>7454</b>	<b>7688</b>	<b>7896</b>	<b>8262</b>	<b>234</b>	<b>208</b>	<b>366</b>
Total Africa	3362	3342	3322	3420	3405	3382	3400	3553	3522	3554	3571	3729	3328	3362	3435	3594	34	73	159
Australia	937	954	957	991	967	952	951	987	968	953	952	988	947	960	964	965	12	5	1
Japan	4790	4042	4330	4542	4863	4138	4530	4864	4897	4077	4423	4779	4368	4426	4599	4544	58	173	-55
Korea	2312	2179	2155	2351	2352	2204	2130	2324	2362	2213	2139	2333	2187	2249	2252	2261	63	3	9
New Zealand	159	144	156	160	169	149	155	159	169	149	156	159	156	155	158	158	-1	3	0
China	8605	8998	8771	9598	9630	9719	9771	9998	10430	10585	10571	10798	8022	8993	9779	10596	971	786	817
Hong Kong	387	340	377	391	370	345	386	406	383	363	405	427	378	374	377	394	-4	3	17
India	3166	3112	2829	3120	3231	3183	2895	3243	3343	3345	3040	3403	3002	3057	3138	3283	55	81	145
Indonesia	1447	1382	1398	1431	1472	1416	1430	1487	1523	1488	1502	1561	1379	1415	1451	1518	35	37	67
Malaysia	468	552	500	645	527	563	512	670	545	591	538	704	566	541	568	595	-24	27	26
Pakistan	446	443	405	463	452	453	414	481	467	476	435	505	420	439	450	471	19	11	21
Philippines	310	311	306	295	290	312	313	306	300	327	329	322	301	305	305	319	4	0	14
Singapore	1045	1107	1194	1155	1058	1129	1222	1199	1095	1187	1284	1259	1007	1125	1152	1206	119	27	54
Taiwan	1074	1024	978	965	1073	1049	1001	1003	1110	1102	1051	1052	981	1010	1031	1079	29	21	48
Thailand	1113	1037	1010	1054	1119	1056	1033	1095	1157	1110	1085	1149	1026	1053	1076	1125	27	22	50
Vietnam	402	372	350	368	414	382	358	383	428	402	376	402	358	373	384	402	15	11	18
Other non-OECD Asia	430	418	413	443	441	429	423	460	456	451	444	483	412	426	438	459	14	12	20
<b>Total Asia Pacific</b>	<b>27092</b>	<b>26416</b>	<b>26129</b>	<b>27974</b>	<b>28427</b>	<b>27478</b>	<b>27527</b>	<b>29066</b>	<b>29634</b>	<b>28817</b>	<b>28731</b>	<b>30322</b>	<b>25510</b>	<b>26903</b>	<b>28125</b>	<b>29376</b>	<b>1393</b>	<b>1222</b>	<b>1251</b>
OECD demand	45857	45114	46577	46705	46131	45140	46493	46835	46095	44944	46211	46535	45592	46063	46150	45946	472	86	-203
non-OECD demand	40820	40949	41318	42514	42361	42328	43083	44189	44293	44850	45553	46682	39410	41400	42990	45344	1990	1590	2354
<b>World Demand</b>	<b>86677</b>	<b>86063</b>	<b>87895</b>	<b>89219</b>	<b>88492</b>	<b>87468</b>	<b>89576</b>	<b>91024</b>	<b>90388</b>	<b>89793</b>	<b>91763</b>	<b>93217</b>	<b>85002</b>	<b>87464</b>	<b>89140</b>	<b>91290</b>	<b>2462</b>	<b>1676</b>	<b>2151</b>

Source: IEA, GS Global ECS Research.

## Exhibit 27: Non-OPEC supply

Thousand b/d

Supply	1Q2010	2Q2010	3Q2010	4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	1Q2012	2Q2012	3Q2012	4Q2012	2009	2010	2011	2012	yoy10	yoy11	yoy12
Alaska	664	583	562	629	571	614	542	569	540	580	513	538	658	610	574	543	-49	-36	-31
GOM	1701	1679	1589	1587	1525	1531	1452	1489	1431	1436	1365	1398	1557	1639	1499	1407	82	-139	-92
L-48	3340	3486	3651	3712	3751	3909	4007	4035	4164	4319	4416	4445	3323	3547	3925	4336	224	378	411
US NGL	1959	1988	1990	2062	1974	2066	2117	2165	2113	2158	2240	2223	1886	2000	2081	2184	114	81	103
US Ethanol	834	845	866	910	910	895	912	912	921	906	923	923	711	864	907	918	153	44	11
Total US	8497	8581	8658	8900	8732	9013	9031	9171	9169	9398	9458	9527	8136	8659	8987	9388	523	328	402
Canada Conventional	1927	1943	1900	1960	2006	1816	1823	1924	1891	1712	1719	1814	1792	1933	1892	1784	141	-40	-109
Canada non-conventional	671	785	822	898	827	759	1039	1062	998	930	1210	1233	764	794	922	1093	30	128	171
Canada NGL	676	615	628	653	684	603	591	616	657	579	568	592	662	643	624	599	-19	-20	-25
Total Canada	3274	3343	3351	3512	3517	3177	3454	3603	3546	3220	3497	3639	3218	3370	3438	3475	152	68	38
Mexico	2987	2961	2941	2924	2962	2848	2787	2788	2829	2720	2662	2663	2972	2953	2847	2719	-19	-106	-128
<b>Total North America</b>	<b>14758</b>	<b>14884</b>	<b>14950</b>	<b>15335</b>	<b>15211</b>	<b>15039</b>	<b>15272</b>	<b>15562</b>	<b>15543</b>	<b>15339</b>	<b>15617</b>	<b>15829</b>	<b>14326</b>	<b>14982</b>	<b>15271</b>	<b>15582</b>	<b>656</b>	<b>289</b>	<b>311</b>
Argentina	710	710	706	664	685	672	714	710	684	671	713	710	724	697	695	695	-27	-2	-1
Brazil Biofuels	77	592	744	381	50	470	795	515	75	495	820	540	419	449	457	482	29	9	25
Brazil crude oil	2017	2068	2044	2089	2089	2187	2322	2402	2186	2281	2413	2491	1956	2054	2250	2343	98	195	93
Brazil NGL	78	81	84	87	88	84	84	87	87	84	84	87	74	83	86	85	9	3	0
Total Brazil	2172	2741	2872	2558	2226	2741	3200	3003	2348	2860	3316	3117	2449	2586	2793	2910	137	207	117
Colombia	760	783	794	819	866	928	951	939	966	1000	999	975	675	789	921	985	114	132	64
Other Latam	461	458	461	440	446	459	462	455	439	452	454	447	454	455	456	448	1	1	-8
<b>Total Latam (non-OPEC)</b>	<b>4104</b>	<b>4691</b>	<b>4833</b>	<b>4481</b>	<b>4223</b>	<b>4800</b>	<b>5327</b>	<b>5108</b>	<b>4437</b>	<b>4983</b>	<b>5483</b>	<b>5250</b>	<b>4302</b>	<b>4527</b>	<b>4865</b>	<b>5038</b>	<b>225</b>	<b>338</b>	<b>173</b>
Norway	2363	2155	1966	2206	2168	2006	1947	2082	1969	1823	1770	1892	2399	2170	2051	1864	-229	-119	-187
UK	1516	1404	1210	1351	1287	1278	1199	1305	1151	1143	1072	1168	1485	1370	1267	1134	-115	-103	-134
Turkey	48	50	48	48	46	45	45	44	43	42	41	41	46	48	45	42	2	-3	-3
Other OECD Europe	595	577	563	603	610	623	610	600	615	628	615	605	626	585	611	616	-41	26	5
Non-OECD Europe	138	137	136	135	136	135	134	133	144	143	142	141	139	136	135	143	-3	-2	8
<b>Total Europe</b>	<b>4659</b>	<b>4323</b>	<b>3913</b>	<b>4342</b>	<b>4248</b>	<b>4087</b>	<b>3934</b>	<b>4165</b>	<b>3923</b>	<b>3779</b>	<b>3640</b>	<b>3847</b>	<b>4695</b>	<b>4309</b>	<b>4109</b>	<b>3797</b>	<b>-386</b>	<b>-201</b>	<b>-311</b>
Azerbaijan	1014	1073	1078	1001	1011	1063	1015	1060	1001	1053	1005	1049	1050	1042	1037	1027	-9	-4	-10
Kazakhstan	1646	1600	1607	1686	1700	1684	1556	1659	1700	1684	1556	1659	1575	1635	1650	1650	60	15	0
Russia	10395	10426	10439	10539	10519	10553	10550	10567	10493	10527	10524	10541	10209	10450	10547	10521	241	97	-26
Other FSU	426	429	424	433	449	412	390	387	400	367	347	345	448	428	410	365	-19	-19	-45
<b>Total FSU</b>	<b>13482</b>	<b>13528</b>	<b>13547</b>	<b>13660</b>	<b>13679</b>	<b>13712</b>	<b>13511</b>	<b>13673</b>	<b>13594</b>	<b>13630</b>	<b>13432</b>	<b>13594</b>	<b>13282</b>	<b>13554</b>	<b>13644</b>	<b>13563</b>	<b>272</b>	<b>89</b>	<b>-81</b>
Bahrain	190	190	190	190	200	193	189	189	199	192	188	188	194	190	193	192	-4	3	-1
Oman	855	858	867	878	890	917	947	960	934	961	991	1005	812	864	928	973	52	64	44
Syria	385	385	385	385	378	372	366	360	363	357	352	346	401	385	369	354	-16	-16	-15
Yemen	287	280	274	268	260	186	274	286	246	176	259	270	306	277	252	238	-28	-26	-14
<b>Middle East (non-OPEC)</b>	<b>1718</b>	<b>1713</b>	<b>1716</b>	<b>1721</b>	<b>1728</b>	<b>1668</b>	<b>1776</b>	<b>1795</b>	<b>1741</b>	<b>1686</b>	<b>1790</b>	<b>1809</b>	<b>1712</b>	<b>1717</b>	<b>1741</b>	<b>1756</b>	<b>4</b>	<b>25</b>	<b>15</b>
Congo	295	293	291	289	289	293	303	308	295	299	308	313	270	292	298	304	22	6	6
Egypt	739	739	739	739	741	707	687	682	693	662	643	638	749	739	704	659	-10	-35	-45
Equatorial Guinea	285	278	270	263	260	270	272	267	261	270	272	267	307	274	267	268	-33	-7	1
Gabon	248	233	249	249	248	237	252	251	252	241	256	255	238	245	247	251	7	2	4
South Africa	182	182	182	182	182	180	179	179	179	177	176	176	179	182	180	177	3	-2	-3
Sudan	466	465	476	474	464	462	471	461	467	466	474	465	473	470	465	468	-3	-6	3
Other Africa	364	362	362	362	403	445	466	468	433	474	495	497	375	362	445	475	-12	83	30
<b>Total Africa (non-OPEC)</b>	<b>2580</b>	<b>2551</b>	<b>2569</b>	<b>2558</b>	<b>2587</b>	<b>2594</b>	<b>2629</b>	<b>2616</b>	<b>2580</b>	<b>2589</b>	<b>2625</b>	<b>2612</b>	<b>2591</b>	<b>2565</b>	<b>2607</b>	<b>2602</b>	<b>-27</b>	<b>42</b>	<b>-5</b>
Australia	530	517	517	493	442	486	566	586	459	503	583	602	553	514	520	537	-39	6	16
China	3989	4059	4144	4219	4214	4185	4304	4282	4311	4282	4401	4379	3891	4103	4246	4343	212	144	97
India	829	835	883	911	914	931	925	916	930	947	941	933	797	865	921	938	67	57	16
Indonesia	984	995	980	940	934	961	955	932	915	942	936	914	981	975	945	927	-6	-30	-19
Malaysia	740	717	700	708	704	660	650	641	716	674	665	657	740	716	664	678	-24	-52	14
Other OECD Pacific Asia	102	99	96	91	96	93	93	93	93	91	91	91	97	97	94	92	0	-3	-2
Other non-OECD Pacific Asia	1170	1153	1193	1146	1148	1160	1174	1167	1192	1204	1217	1210	1139	1165	1162	1206	26	-3	43
<b>Total Asia Pacific (non-OPEC)</b>	<b>8345</b>	<b>8375</b>	<b>8513</b>	<b>8507</b>	<b>8451</b>	<b>8477</b>	<b>8667</b>	<b>8617</b>	<b>8616</b>	<b>8643</b>	<b>8834</b>	<b>8785</b>	<b>8199</b>	<b>8435</b>	<b>8553</b>	<b>8720</b>	<b>236</b>	<b>118</b>	<b>166</b>
Processing gains	2290	2292	2326	2310	2335	2327	2357	2340	2365	2357	2387	2370	2251	2305	2340	2370	53	35	30
Other Biofuels	494	525	529	487	509	566	635	644	609	666	735	744	461	509	589	689	48	80	100
<b>Total non-OPEC supply</b>	<b>52429</b>	<b>52883</b>	<b>52896</b>	<b>53401</b>	<b>52971</b>	<b>53269</b>	<b>54109</b>	<b>54521</b>	<b>53408</b>	<b>53671</b>	<b>54543</b>	<b>54841</b>	<b>51820</b>	<b>52902</b>	<b>53718</b>	<b>54116</b>	<b>1083</b>	<b>815</b>	<b>398</b>

Source: IEA, GS Global ECS Research.

## Exhibit 28: OPEC supply

Thousand b/d

Supply	1Q2010	2Q2010	3Q2010	4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	1Q2012	2Q2012	3Q2012	4Q2012	2009	2010	2011	2012	yoy10	yoy11	yoy12
Algeria	1247	1240	1257	1270	1270	1260	1250	1250	1200	1200	1200	1180	1236	1253	1258	1195	17	4	-63
Angola/Cabinda	1917	1825	1707	1653	1650	1710	1875	1950	2033	2033	2033	2033	1766	1775	1796	2033	9	21	237
Ecuador	467	465	463	473	497	500	500	500	490	480	487	460	470	467	499	479	-3	32	-20
Iraq	2383	2309	2338	2425	2667	2698	2925	2995	3069	3152	3238	3295	2432	2364	2821	3188	-68	458	367
Iran	3713	3750	3687	3670	3630	3660	3690	3690	3640	3575	3530	3503	3738	3705	3667	3562	-33	-38	-105
Kuwait	2287	2300	2303	2297	2360	2403	2400	2400	2350	2350	2350	2350	2275	2297	2391	2350	22	94	-41
Libya	1527	1545	1557	1560	1138	200	217	250	250	250	250	250	1546	1547	451	250	1	-1096	-201
Nigeria	1997	1950	2150	2213	2137	2220	2220	2220	2200	2198	2185	2172	1824	2078	2199	2189	253	122	-10
Qatar	834	824	831	847	887	844	830	830	913	955	953	945	822	834	848	942	12	14	94
Saudi Arabia	8298	8370	8532	8652	8918	8755	8811	8618	9717	9835	10305	10337	8245	8463	8776	10048	218	313	1273
UAE	2283	2300	2330	2333	2478	2503	2500	2500	2467	2450	2450	2450	2270	2312	2495	2454	42	184	-41
Venezuela	2233	2250	2230	2200	2223	2223	2210	2210	2170	2150	2127	2103	2154	2228	2217	2138	75	-12	-79
<b>Total OPEC oil</b>	<b>29186</b>	<b>29183</b>	<b>29384</b>	<b>29594</b>	<b>29855</b>	<b>28977</b>	<b>29428</b>	<b>29413</b>	<b>30499</b>	<b>30629</b>	<b>31107</b>	<b>31078</b>	<b>28778</b>	<b>29337</b>	<b>29418</b>	<b>30828</b>	<b>559</b>	<b>82</b>	<b>1410</b>
<b>Total OPEC NGL</b>	<b>4985</b>	<b>4991</b>	<b>5258</b>	<b>5385</b>	<b>5585</b>	<b>5562</b>	<b>5709</b>	<b>5804</b>	<b>5885</b>	<b>5862</b>	<b>6009</b>	<b>6104</b>	<b>4738</b>	<b>5155</b>	<b>5665</b>	<b>5965</b>	<b>417</b>	<b>510</b>	<b>300</b>
<b>Total OPEC supply</b>	<b>34171</b>	<b>34174</b>	<b>34642</b>	<b>34979</b>	<b>35440</b>	<b>34539</b>	<b>35137</b>	<b>35217</b>	<b>36384</b>	<b>36491</b>	<b>37116</b>	<b>37182</b>	<b>33516</b>	<b>34491</b>	<b>35083</b>	<b>36793</b>	<b>975</b>	<b>592</b>	<b>1710</b>
<b>World Supply</b>	<b>86600</b>	<b>87057</b>	<b>87538</b>	<b>88380</b>	<b>88411</b>	<b>87808</b>	<b>89246</b>	<b>89738</b>	<b>89792</b>	<b>90161</b>	<b>91659</b>	<b>92022</b>	<b>85336</b>	<b>87394</b>	<b>88801</b>	<b>90909</b>	<b>2058</b>	<b>1407</b>	<b>2108</b>

Source: IEA, GS Global ECS Research.

## US oil stocks

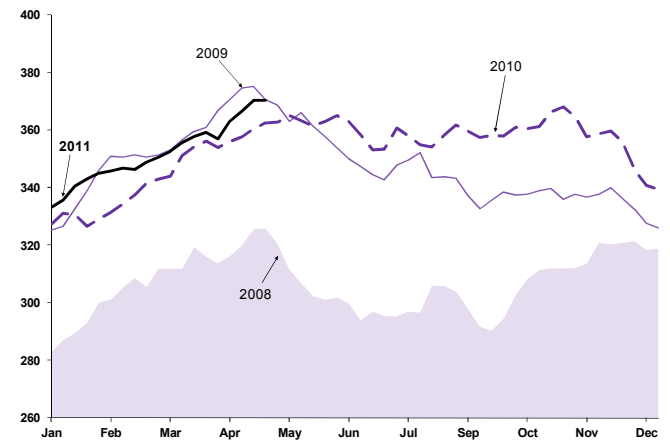
Million barrels

Product	End-of-Week			Change	
	13-May-11	15-Apr-11	14-May-10	4Wk	Year
Total Petrol	1047.5	1030.7	1087.3	16.8	-39.9
Crude Oil	370.3	357.0	362.7	13.3	7.6
Total Product	677.1	673.7	724.6	3.4	-47.5
Mogas	205.9	208.1	221.8	-2.2	-15.9
Jet Fuel	39.3	41.2	44.1	-1.9	-4.8
Distillate	143.1	148.3	152.8	-5.2	-9.7
Resid	36.3	36.9	45.8	-0.6	-9.5
Other	201.6	192.7	138.1	8.9	63.6

Source: DOE.

## US crude oil stocks

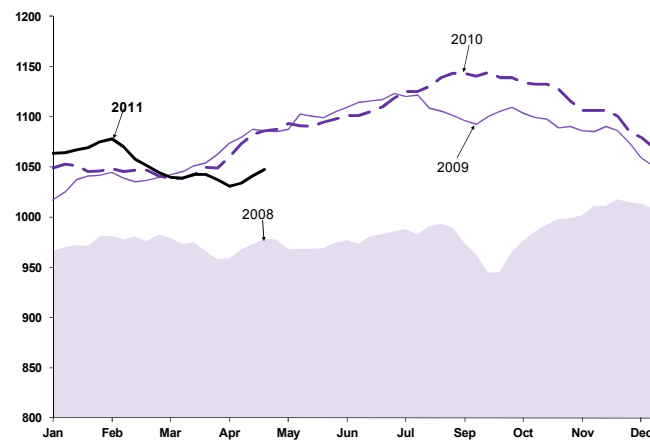
Million barrels



Source: DOE.

## US total hydrocarbon stocks

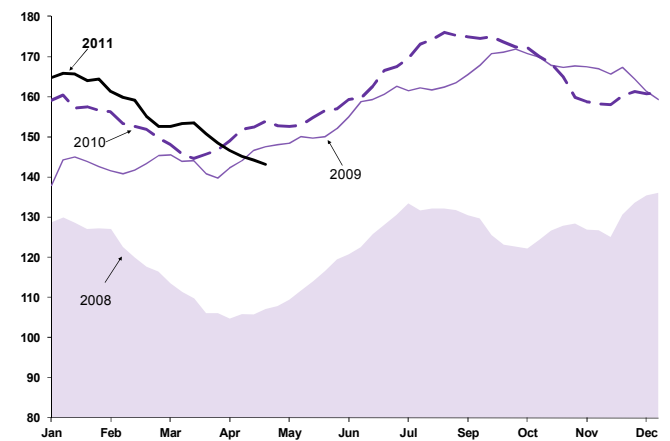
Million barrels



Source: DOE.

## US distillate stocks

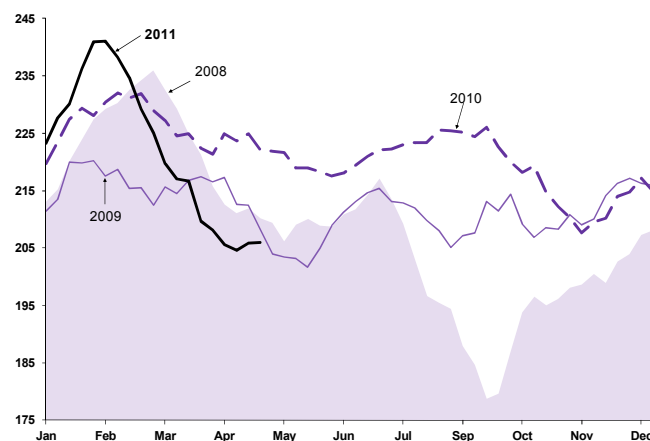
Million barrels



Source: DOE.

## US motor gasoline stocks

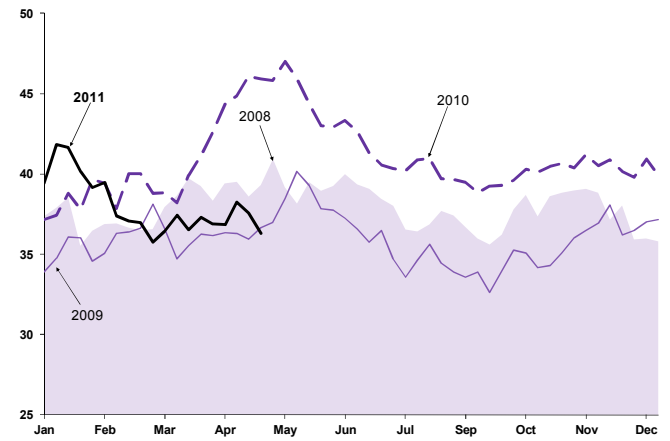
Million barrels



Source: DOE.

## US residual fuel stocks

Million barrels

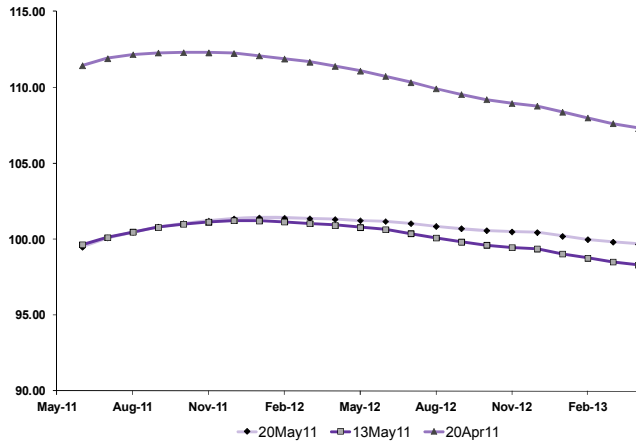


Source: DOE.



**WTI forward curve**

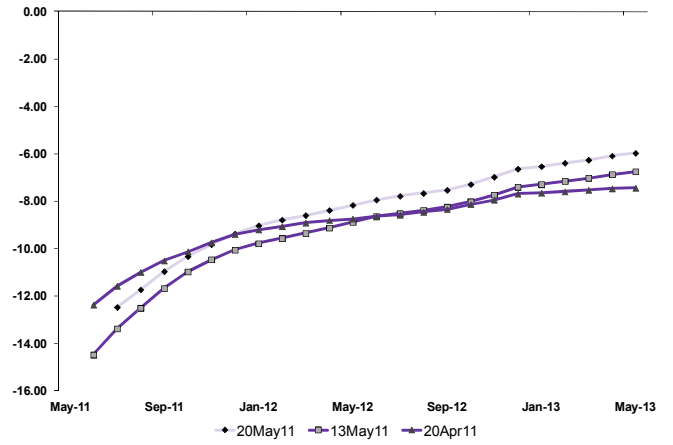
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**WTI-Brent forward curve**

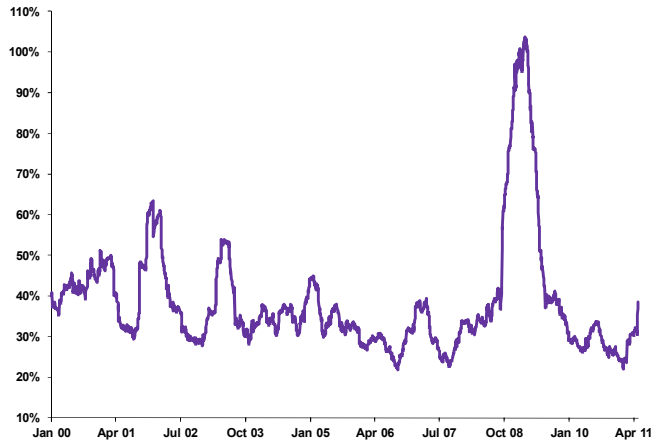
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**Historical realized WTI volatility**

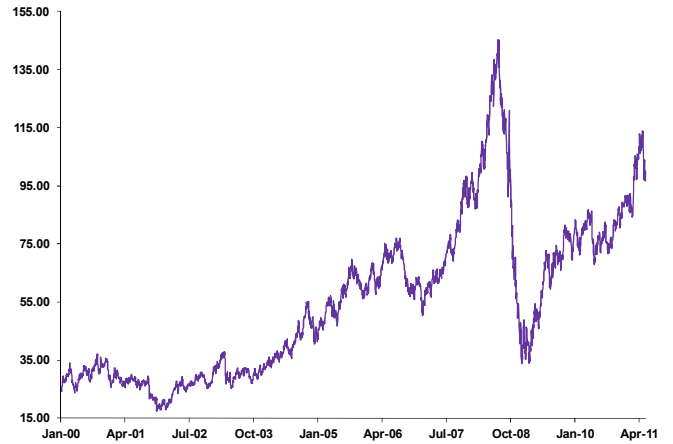
Percentage



Source: Goldman Sachs Global ECS Research.

**Historical WTI prices**

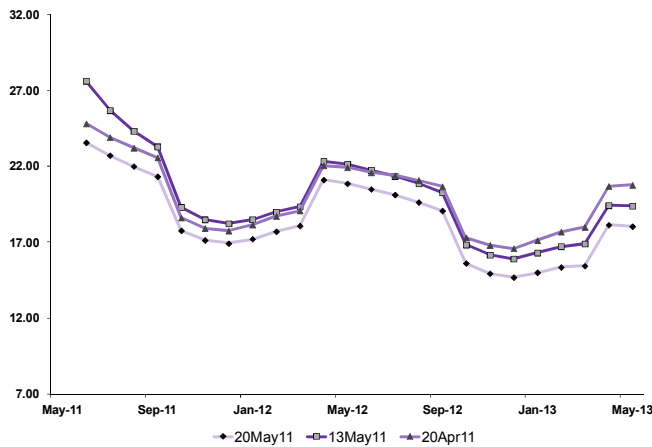
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**321 NYMEX forward curve**

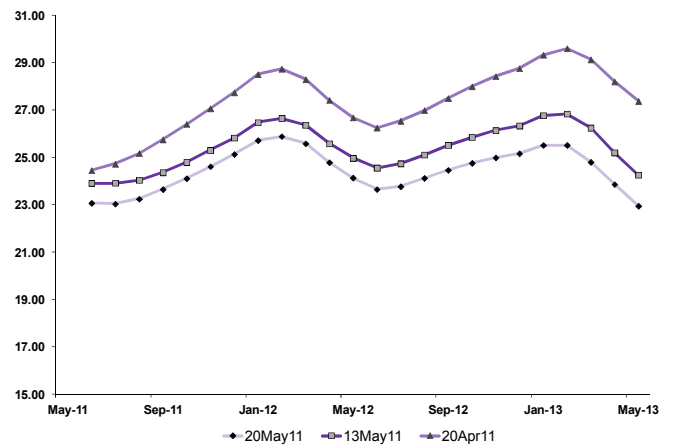
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**NYMEX heating oil crack forward curve**

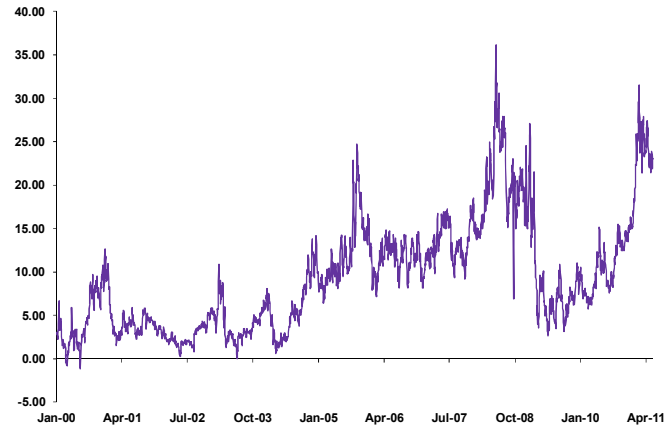
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**Historical NYMEX heating oil crack prices**

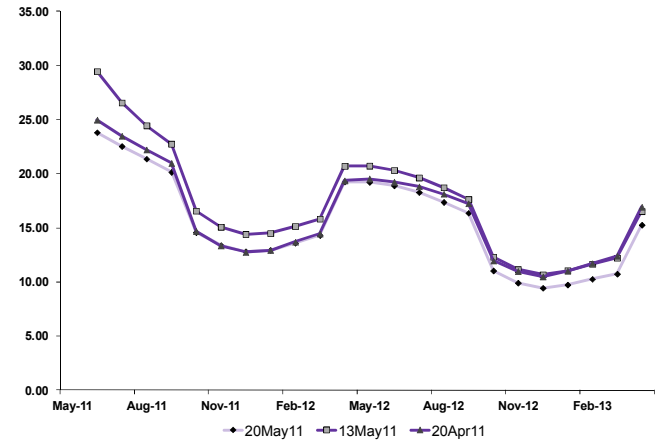
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**RBOB crack forward curve**

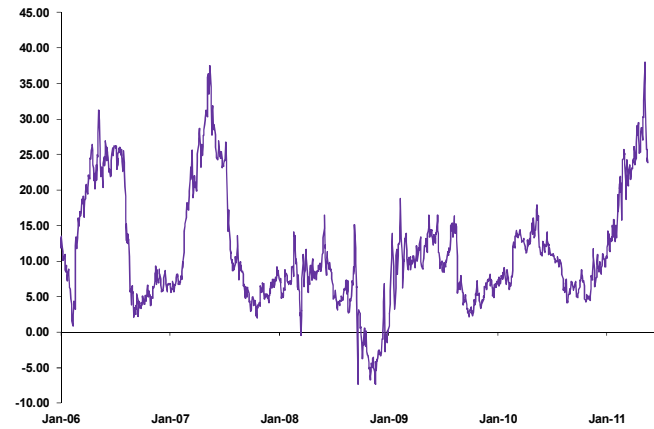
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**Historical RBOB crack prices**

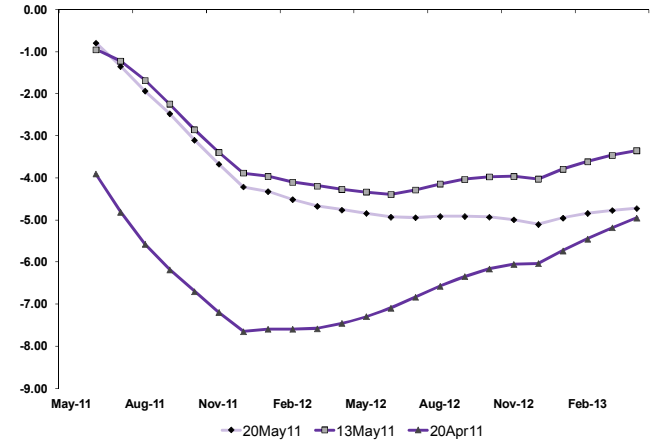
US\$/bbl



Source: Goldman Sachs Global ECS Research.

**USGC 1.0 percent fuel oil crack forward curve**

US\$/bbl



Source: Goldman Sachs Global ECS Research.

## Reg AC

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We, David Greely, Stefan Wieler, CFA, Jeffrey Currie, Damien Courvalin and Allison Nathan, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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