GLOBAL ROUNDTABLE

Goldman Sachs

Global: Energy: Oil

$100 oil reality: Super-spike phase 2 ushers in a period of chronically high and rising prices

$100/bbl oil no longer a forecast

In our March 2005 "super-spike" report, we first advanced our view that oil markets had likely entered a multi-year "super-spike" period that would result in oil prices trading within a $50-$105/bbl price band; we characterized the upper end of the band as more likely to be driven by geopolitical turmoil and that recession was a key risk to our view. In fact, oil prices have reached $100/bbl without extraordinary turmoil and the US currently appears to be in recession.

Lackluster supply growth points to needed demand weakness

As year four of the "super-spike" era unfolds, we believe that non-OPEC supply may be in the process of a long-term flattening trend. The lack of supply growth means demand growth has to slow in the future. With oil prices regulated at below-market levels in China, the Middle East, and India, an extended period of weakness is likely required in the US, Europe, and Japan in order to free up sufficient supply for non-OECD demand growth.

Raising 2008-2012 commodity price deck

We have raised our respective 2008-2010 oil price deck to $95/bbl, $105/bbl, and $110/bbl from $80/bbl, $90/bbl, and $80/bbl previously. We see upside risks to our new forecasts as well as our current $135/bbl high-end "super-spike" range, as the lack of supply growth and price-insulated non-OECD demand suggests a future rebound in US GDP growth or a major oil supply disruption could lead to $150-$200/bbl oil prices.

Buy on dips

While we have a bullish long-term outlook and Attractive coverage views for most energy sectors around the world, we think oil prices could correct from recent highs, which would likely present the next strong buying time for the broad sector.

Favorite global Energy ideas

Top picks globally are: Frontier Oil, Cabot Oil & Gas, and Pride International in the Americas; ENI, Repsol, and Aker Kvaerner in Europe; Gazprom in Russia; and Cairn India, CNOOC, INPEX, S-Oil, and Thai Oil in Asia.

RELATED RESEARCH

Asia: Energy: Oil: "$100 oil: focus on E&Ps with growth and exploration catalysts," Kelvin Koh, CFA and team, March 7, 2008

Europe: Energy: Oil: "$100 oil reality: Reflecting a higher oil price cycle in our models," Michele della Vigna and team, March 6, 2008

Americas: Energy: Oil: "$100 oil reality: EPS, price target update for integrated oils, refiners," Arjun Murti and team, March 6, 2008.

Americas: Energy: Gas- E&P: "Raising oil, longer-dated gas forecast: UPL and EAC now rated Buy," Brian Singer and team, March 6, 2008.

Americas: Energy: Oil Services: "$100 oil reality: Raising oil services & driller price targets," Charles Minervino and team, March 6, 2008.

"Energy Investment Strategy: Investment Outlook": February 19, 2008.

Global: Energy: Oil: "The next leg up for oil markets—Still searching for demand destruction tipping point," September 14, 2007.

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The prices in the body of this report are based on the market close of March 5, 2008.

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Source: Goldman Sachs Research.

$100 oil reality: Super-spike phase 2 ushers in a period of chronically high and rising prices

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As year four of the "super-spike" era unfolds, we not only see no signs of a meaningful crude oil supply response but increasingly believe that non-OPEC supply may be in the process of a long-term flattening trend. This will place even greater dependence on a supply response out of the key OPEC producers of Saudi Arabia, Kuwait, United Arab Emirates, Iraq, Iran, and Venezuela. Of those countries, only Saudi Arabia seems to have a chance to materially lift supply over the next few years. With a different geopolitical outlook, we think upside to Iraqi and Venezuelan supply could exist long-term, but not near term.

The lack of supply growth means demand growth has to slow in the future. With oil prices regulated at below-market levels in the key non-OECD oil consuming regions China, the Middle East, and India, an extended period of weakness is on the verge of being required in the United States, Europe, and Japan in order to free up sufficient supply for non-OECD demand growth. In an era of struggling supply growth, what we have been calling "super-spike phase 2" may be a period of chronically high and rising oil prices that is required to stimulate a reduction in non-transportation fuels oil demand in the US, Europe, and Japan to make room for secular, price-insulated demand growth in China, the Middle East, and India.

Given our updated analysis, we have raised our respective 2008-2010 oil price deck to $95/bbl, $105/bbl, and $110/bbl up from $80/bbl, $90/bbl, and $80/bbl previously (see Exhibit 1)**. Moreover, we see upside risk to our current $135/bbl high-end "super-spike" range, as the lack of supply growth and price-insulated non-OECD demand suggests a future rebound in US GDP growth or a major oil supply disruption could lead to $150-$200/bbl oil prices.** Relative to our previous forecasts, we are now assuming the upcycle continues through 2010 versus 2009 previously. For 2011, we model a flat oil price year with 2010 as a placeholder rather than an explicit call that oil markets will flatten out in that year. After all, 2011 is a long time from now. We continue to reflect 2012 as a "normalized" year that reflects the return of excess capacity, lower costs, and a normalized return on capital of around 8% for industry. While there is no change to our 8% normalized return on capital, we now assume a higher cost structure than before resulting in a $60/bbl normalized oil price versus $50/bbl previously. The core of our "super-spike" view is that oil prices will keep rising until demand declines globally on a multi-year basis, resulting in the return of excess capacity and a lower cost structure. Given this view, once excess capacity returns, we think prices can move sharply lower. Consistent with our oil price revisions, we have also updated our natural gas price and refining margin forecasts.

Importantly, we believe risk relative to our new base-case view is skewed to the upside, especially if global economic growth were to shows signs of reaccelerating and the US successfully emerges from recession. It remains our view that a combination of demographic and geopolitical challenges in key oil exporting countries will limit the "natural" supply response and that oil prices need to move high enough to drive a multi-year reduction in demand.

Exhibit 1: Goldman Sachs Global Investment Research commodity price forecast changes

	Crude oil prices				Refining margins				Light-heavy, sweet-sour spreads				Natural gas	
	WTI spot oil ($/bbl)		Brent ($/bbl)		US Gulf Coast 3:2:1 ($/bbl)		Singapore Complex ($/bbl)		WTI-WTS ($/bbl)		Maya-WTI ($/bbl)		US Henry Hub ($/MMBtu)	
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
2008E:														
1QE	$95	$80	$94	$80	$9	$10	$8.5	$8.5	$4.75	$6.40	$15.00	$12.00	$9.25	$9.25
2QE	90	80	90	80	21	21	11.5	11.5	7.20	6.40	13.50	12.00	10.00	8.00
3QE	95	80	95	80	14	14	8.5	8.8	7.60	6.40	14.25	12.00	10.00	8.00
4QE	100	80	100	80	11	11	9.5	9.5	8.00	6.40	15.00	12.00	11.00	8.75
Year	$95	$80	$95	$80	$14	$14	$9.5	$10	$6.89	$6.40	$14.44	$12.00	$9.75	$8.50
2009E	$105	$90	$105	$90	$16	$16	$10.0	$10.0	8.40	7.20	13.13	18.00	10.50	10.00
2010E	$110	$80	$110	$80	$18	$14	$10.5	$9.5	8.80	6.40	11.00	16.00	9.00	8.50
2011E	$110	$75	$110	$75	$18	$13	$10.5	$9.0	8.80	6.00	11.00	15.00	8.00	7.00
2012N	$60	$50	$60	$50	$9	$8	$6.0	$6.0	4.80	4.00	10.80	10.00	6.50	6.00

Source: Bloomberg, Goldman Sachs Research estimates.

We remain long-term bullish on most energy sub-sectors around the world

Our secular outlook remains bullish, with most of our energy coverage groups around the world rated Attractive. In the US, we have a strong preference for the US refiners, natural gas-leveraged E&Ps and IPPs, and pipelines, with all four sectors rated Attractive. In Asia, we have an Attractive coverage view for E&Ps, oil services, gas distribution, and refining. In Europe, we have an overall Attractive coverage view for Energy, with oil services/drillers and E&Ps our favorite sub-sectors.

Sub-sectors we are less enamored with at the moment include the US integrated oils and US oil services/drillers, both of which are presently rated Neutral. We are especially bearish on risk/reward for the US coal stocks and have a Cautious coverage view.

We would use potential near-term pullback risk as the next best buying opportunity

Throughout the multi-year bull market for energy, 10%-15% corrections have occurred. Given the recent sharp rally in crude oil prices, we think it would make sense to be most aggressive on adding to positions in crude oil-leveraged companies after a pullback. Our 2Q 2008 projection of $90/bbl implies oil prices could correct as much as $10-$15/bbl from current levels. The combination of recent inventory builds, the normal seasonal demand slowdown in spring, and ongoing economic concerns could contribute to a pullback. At the present time, we believe a pullback of such a magnitude would represent the next strong buying opportunity for the sector, broadly speaking.

Goldman Sachs Global Energy Investment Research's global top picks

Our global top energy picks include the following (see Exhibit 2):

- Americas:
  - E&P (Attractive)—Cabot Oil & Gas, XTO Energy, Apache, and EOG Resources
  - Refining (Attractive)—Frontier Oil, Sunoco, Valero Energy
  - IPPs (Attractive)—NRG Energy, Reliant Energy
  - Pipelines (Attractive)—ONEOK

  - Integrated oils (Neutral)—Marathon Oil
  - Oil services/drilling (Neutral)— Pride International, Diamond Offshore
- Europe:
  - Integrated oils (Attractive)— BG, ENI, Repsol
  - E&P (Attractive)—Salamander Energy
  - Oil services (Attractive)— Aker Kvaerner, Subsea 7
  - Russia (Neutral)—Gazprom
- Asia:
  - Integrated oils (Attractive)—PetroChina-H
  - E&P (Attractive)—CNOOC, CITIC Resources, Cairn India, INPEX
  - Oil services (Attractive)—Aban Offshore, Ezra Holdings, KNM Group
  - Refining (Attractive)—S-Oil, Thai Oil
  - Gas Distribution (Attractive): GAIL, Gujarat State Petronet, China Gas

Exhibit 2: Goldman Sachs Global Energy top picks—Key financial and valuation metrics

	Price 3/5/2008	Ticker	Rating	Coverage view	Market Cap. ($ mn)	Enteprise Value ($ mn)	Target Price[1]	Total Return	P/E 2008E	P/E 2009E	EV/DACF 2008E	EV/DACF 2009E
Americas:												
Integrated Oils												
Marathon Oil	$53.64	MRO	Buy	Neutral	36,856	39,183	$70	32.5%	6.5	5.4	4.9	4.1
E&P												
Apache	$115.86	APA	Buy	Attractive	38,541	43,339	$151	30.8%	8.7	6.5	5.1	4.1
Cabot Oil & Gas	$51.01	COG	Buy	Attractive	4,953	5,184	$71	39.4%	19.0	13.5	8.5	6.9
EOG Resources	$120.61	EOG	Buy	Attractive	29,669	30,494	$154	28.1%	14.4	10.1	6.6	5.0
XTO Energy	$61.78	XTO	Buy	Attractive	23,836	26,646	$78	27.0%	13.9	9.1	7.5	5.7
Oil Services/Driling												
Pride International	$35.67	PDE	Buy	Neutral	5,828	7,177	$45	26.0%	9.8	8.5	7.3	6.7
Diamond Offshore	$123.37	DO	Buy	Neutral	15,931	16,069	$145	23.0%	11.6	9.8	9.8	8.3
Refining												
Frontier Oil	$34.39	FTO	Buy	Attractive	3,727	3,347	$52	51.9%	6.6	4.4	5.4	3.8
Sunoco	$61.07	SUN	Buy	Attractive	7,414	9,588	$85	41.1%	5.8	4.7	5.0	4.0
Valero Energy	$56.23	VLO	Buy	Attractive	31,985	36,539	$80	43.2%	5.4	4.0	4.7	3.9
IPPs												
NRG Energy	$42.72	NRG	Buy	Attractive	10,452	18,435	$51	19.4%	15.8	10.3	9.0	7.5
Reliant Energy	$24.67	RRI	Buy	Attractive	8,370	11,439	$32	29.7%	15.6	15.1	7.6	7.0
Pipelines												
ONEOK[2]	$47.92	OKE	Buy	Attractive	5,312	10,093	$52	11.9%	16.0	13.7	10.2	9.5
Europe:												
Integrated Oils												
BG Group	1213p	BG.L	Buy	Attractive	80,704	81,281	1500p	24.6%	15.7	15.0	10.6	9.7
ENI	€23.35	ENI.MI	Buy	Attractive	113,956	125,823	€30	32.1%	7.8	7.3	5.8	5.2
Repsol	€21.72	REP.MC	Buy	Attractive	38,769	48,447	€29	36.0%	8.6	7.8	5.2	4.8
E&P												
Salamander Energy	322p	SMDR.L	Buy	Attractive	262	135	424p	31.7%	25.5	26.8	13.2	15.6
Oil Services												
Aker Kvaerner	Nkr 125	AKVER.OL	Buy	Attractive	6,334	6,160	Nkr 160	30.6%	12.2	10.0	9.6	7.3
Subsea 7	Nkr 120.25	SUB.OL	Buy	Attractive	3,261	3,418	Nkr 145	20.6%	13.9	11.2	10.0	8.0
Russia												
Gazprom	$12.84	GAZPPE.RTS	Buy	Neutral	294,351	323,041	$16.0	25.6%	10.9	7.4	8.9	6.1
Asia:												
Integrated Oils												
PetroChina-H	HK$ 10.78	0857.HK	Buy	Attractive	254,125	256,612	HK$ 14.1	32.2%	11.0	10.8	6.4	6.2
E&P												
CNOOC	HK$ 11.86	0883.HK	Buy	Attractive	66,907	66,348	HK$ 15	25.2%	11.1	8.2	7.6	5.3
CITIC Resources	HK$ 3.41	1205.HK	Buy	Attractive	1,876	3,117	HK$ 5.25	55.3%	11.9	7.6	11.3	8.1
Cairn India	Rs 211.6	CAIL.BO	Buy	Attractive	8,444	8,866	Rs 285	34.7%	58.7	17.2	35.3	14.0
INPEX	¥1,170,000	1605.T	Buy	Neutral	20,176	24,862	¥1,490,000	20.7%	13.6	12.3	4.3	3.9
Oil Services												
Aban Offshore	Rs 3753.2	ABAN.BO	Buy	Attractive	3,106	6,206	Rs 5400	44.0%	9.6	7.6	7.5	5.7
Ezra Holdings	S$ 2.12	EZRA.SI	Buy	Neutral	735	741	S$ 3.38	64.1%	12.9	9.0	11.0	10.3
KNM Group	RM 5.7	KNMP.KL	Buy	Neutral	6,026	481	RM 9	58.6%	19.1	12.3	13.9	9.0
Refining												
S-Oil	₩64,400	010950.KS	Buy	Attractive	5,547	6,733	₩92,000	51.8%	7.1	7.5	NA	NA
Thai Oil	Bt 76	TOP.BK	Buy	Attractive	4,289	5,428	Bt 104	42.9%	6.6	5.8	NA	NA
Gas Distribution												
GAIL	Rs 403.1	GAIL.BO	Buy	Attractive	7,649	8,477	Rs 630	59.3%	12.3	10.8	NA	NA
Gujarat State Petronet	Rs 63.2	GSPT.BO	Buy	Attractive	769	1,163	Rs 95	51.0%	22.5	17.4	NA	NA
China Gas	HK$ 2.45	0384.HK	Buy	Attractive	939	1,386	HK$ 3.7	48.4%	15.5	11.1	NA	NA

[1] Target prices are based on P/E, cash flow, asset value, or DDM valuation methodologies; key risks included sustained lower commodity prices and interest rate volatility.
[2] ONEOK target price based on 6-month time period; all others shown are 12-month target prices

Source: Factset, Company data, Goldman Sachs Research estimates.

Super-spike phase 2: Chronically high and rising oil prices as secular trumps cyclical

As discussed in more detail in our September 14, 2007 global oils report "The next leg up for oil markets—Still searching for demand destruction tipping point," we believe oil markets are currently in "phase 2" of what we expect to be a three-phase super-spike era. Our oil market framework continues to emphasize the demand side of the equation as the key to reversing the multi-year oil bull market and reaching "phase 3"—the downward sloping side of the current "super-spike" era. We expect oil prices to remain robust until there is real evidence that global oil demand growth has turned negative and is likely to remain that way on a multi-year basis. A temporary flattening of global oil demand during a recession, which is possible in 2008, is not something that we think would alter the secular uptrend, even if it did drive a temporary pullback in oil prices.

In our September 2007 report, we upwardly revised the high-end of the "super-spike" band to $135/bbl from $105/bbl previously, as the price which might drive a multi-year decline in demand. However, as oil prices have steadily moved higher over the years, we have become less convinced that a particular price level will stimulate a sustained decline in demand. Rather, we increasingly believe it will be a future lack of supply availability perhaps due to a major disruption in oil supplies in a large oil exporting country that will spark a negative demand adjustment. If the disruption lasts long enough and is perhaps combined with a period of extended global economic weakness, the combination could be enough to reset the level of demand lower and recreate a spare capacity cushion. Much like occurred in the early 1980s, if oil consumers permanently adjust to the lower level of supply availability, future demand growth is then from the lower base and it could take decades of modest growth to return to previous levels of demand.

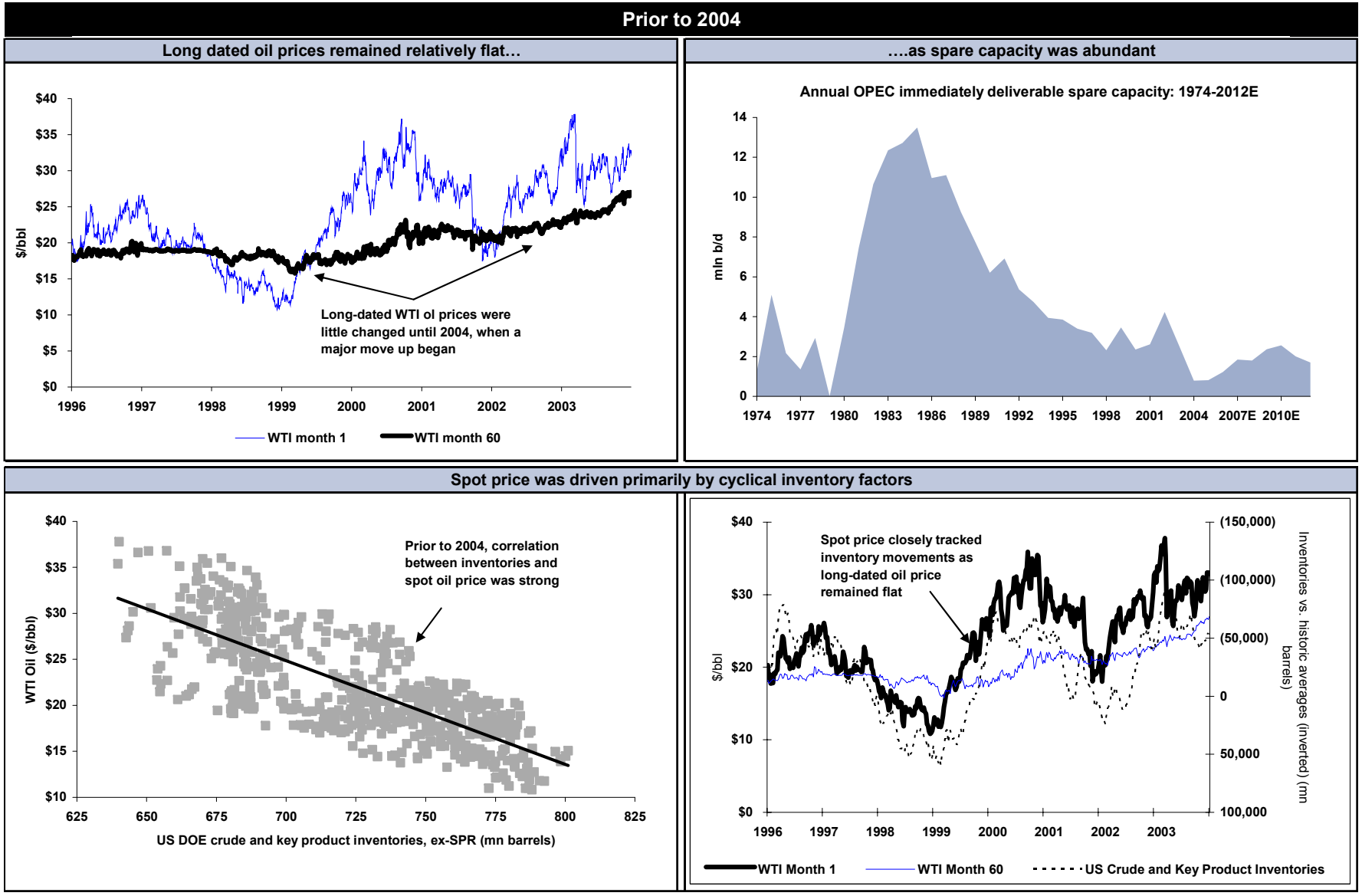
How high would prices reach in the event of a major supply disruption? We do not know, but believe that our current $135/bbl "high-end" forecast will prove conservative. Crude oil prices as high as $150-$200/bbl seem possible, given that at least a 50%-100% rise in end-user prices will likely be needed to force large amounts of demand out of the system. Until such a demand-disrupting event occurs, we think secular demand growth in China, the Middle East, and India coupled with struggling crude oil supply and rising marginal costs will result in a continued upward march of oil prices. Phase 2 of the current super-spike era might be better labeled as the period of chronically rising oil prices.

2004-2006: Secular strength trumped cyclical weakness to the surprise of most of the Street

We continue to see secular strength as the overwhelming driver of oil prices, with cyclical factors playing a much smaller role. Secular drivers include (1) increases in the marginal cost of oil production, (2) disappointing supply growth, (3) limited spare capacity, and (4) generally price-inelastic demand growth. Secular strength is evidenced by the sharp upward move in long-dated (i.e., 60 months forward) oil prices. Cyclical factors, which to us refer to short-term supply/demand and inventory movements, impact the front-end of the curve (months 1-12) and have played a much smaller role in realized oil prices for most of this decade.

In the 1990s when spare capacity was abundant and the market believed supply growth was easy to achieve and that demand was price sensitive, almost all of the movement in oil prices could be explained by cyclical factors, i.e., inventory movements (see Exhibit 3). Between 2004 and 2006, it became apparent that (1) spare capacity had been eliminated; (2) supply growth was disappointing to the downside; (3) the cost of adding new supply was rising materially; and (4) demand was far less sensitive to higher prices than previously perceived. This resulted in a sharp rally in long-dated oil prices (see Exhibit 4).

Exhibit 3: In the 1990s through 2003, cyclical factors were the dominant driver of oil prices as secularly oil markets had significant excess capacity

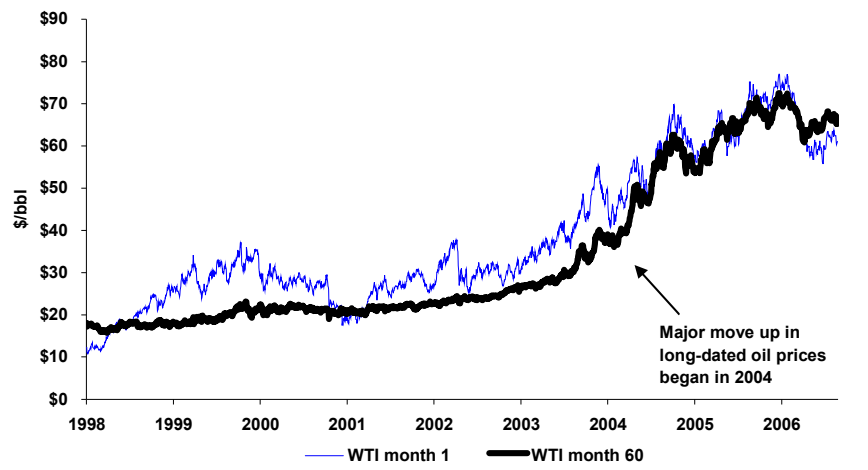


Source: Bloomberg, DOE, IEA, various media reports, Goldman Sachs Research estimates.

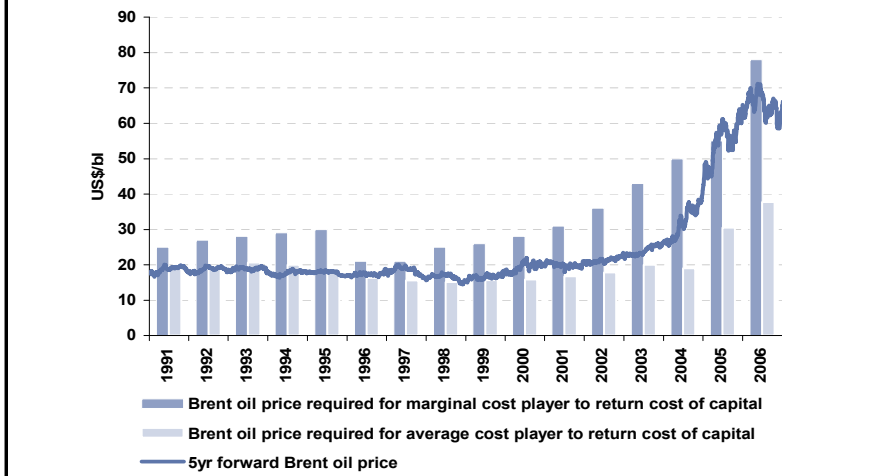
Exhibit 4: Starting in 2004, secular strength in oil markets became the dominant driver of oil prices, even overwhelming occasional cyclical weakness

2004-2006

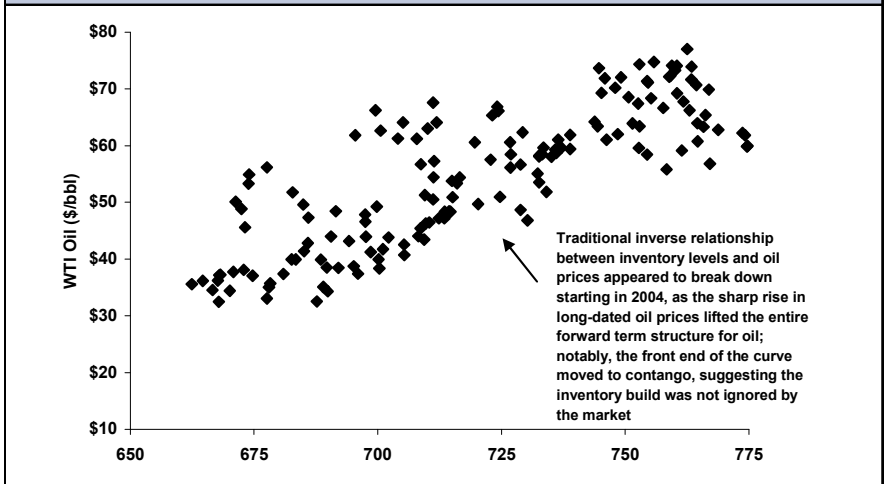
Long-dated oil prices began to rise…



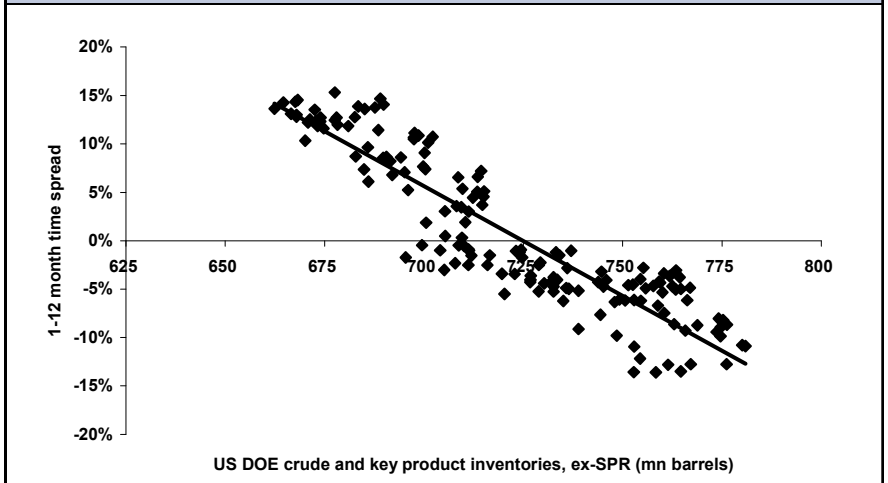
...as spare capacity was eliminated and marginal costs rose dramatically



The correlation between spot prices and inventories appeared to break down



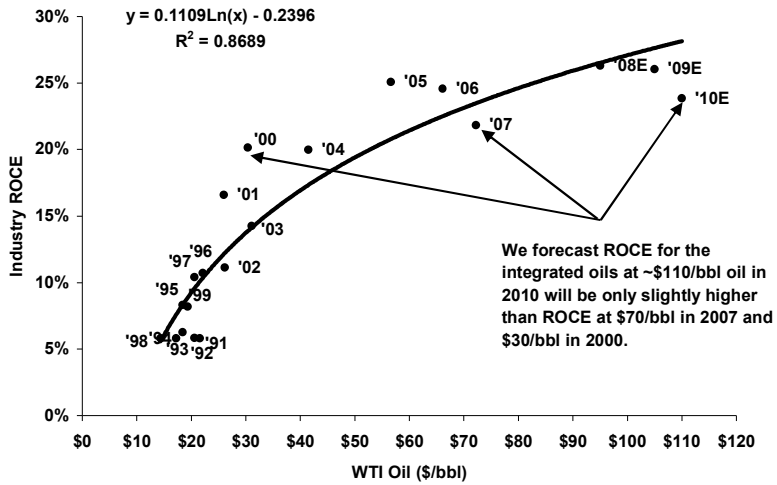
However, correlation with time spreads remained intact



Source: Bloomberg, DOE, IEA, various media reports, Goldman Sachs Research estimates.

Notably, 2004-2006 was a time that US inventories were building, resulting in the unexpected combination of cyclical weakness and secular strength. This led many to conclude—we think incorrectly—that a geopolitical risk premium, increased investor fund flows, or other distortions were driving oil prices as opposed to fundamentals. **We have not wavered in our view that fundamentals, not funds, have driven oil prices**. It is true that there is greater investor investment in energy equities and commodities. In our view, this is a natural response to the price signal that investment is needed in the sector. It is natural that the lure of higher returns on capital has attracted new investment. What is noteworthy is the lack of a supply response four years into the "super-spike" era. Perhaps the most remarkable statistic on the issue of cost inflation and challenged supply growth is the fact that our integrated oils coverage universe is on-track to generate ROCE in 2010 at our $110/bbl WTI forecast that is comparable to ROCE generated in 2000 at $30/bbl WTI (see Exhibit 5).

Exhibit 5: Integrated oils ROCE at $110/bbl oil in 2010E comparable to $30/bbl in 2000
Integrated oils include our North America-based super-cap and large-cap peer group

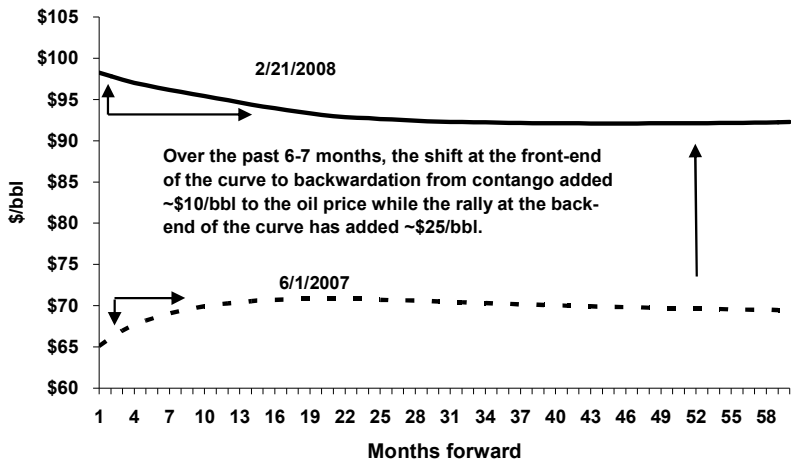


Source: Company reports, Goldman Sachs Research estimates.

2H 2007: Secular and cyclical moving together, though secular the bigger driver

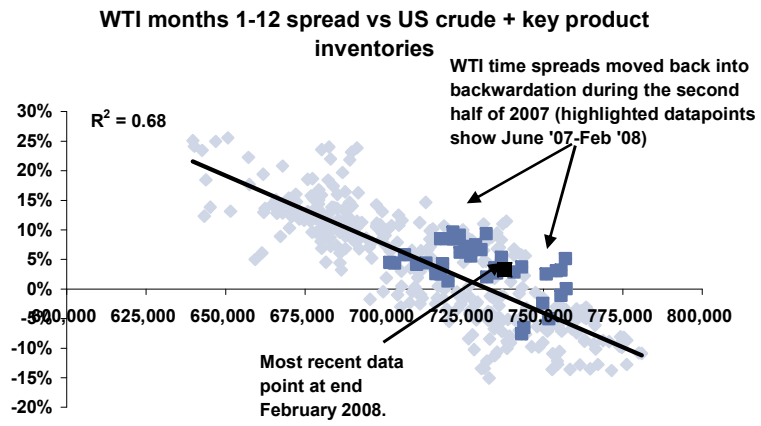
In our September 2007 global oils report we focused on expected cyclical strength (i.e., forecasted inventory reductions) coupled with steady gains in long-dated oil prices as the driver for our then well-above consensus crude oil forecasts of $80/bbl for 2008 and $90/bbl for 2009. Our call for declining inventories in 2H 2007 did bear out. However, oil prices have been persistently $10-$20/bbl higher than our previous $80/bbl 2008 forecast due to a much sharper rally in long-dated oil prices than we had forecast. In effect, the secular has again overwhelmed the cyclical. Specifically, in moving from around $65/bbl in June 2007 to $100/bbl now, we attribute roughly $25/bbl to a rise in long-dated oil prices and only $10/bbl to the move from contango to backwardation at the front-end of the oil curve (see Exhibits 6 and 7). The move in the front-end was consistent with the sharp decline in US and OECD inventories experienced in 2H2007.

Exhibit 6: Higher long-dated oil prices bigger driver than time spreads
y-axis: WTI oil prices in $/bbl; x-axis: months forward for WTI futures contracts



Source: Bloomberg, Goldman Sachs Research estimates.

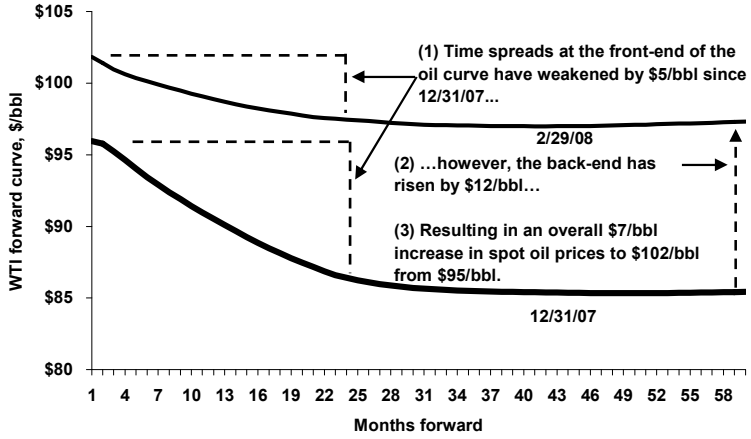
Exhibit 7: Inventory movements drive front-end of oil curve
y-axis: WTI month 1-12 (%); x-axis: US oil inventories in thousands barrels



Source: Bloomberg, DOE, Goldman Sachs Research estimates.

As inventories rose during the first two months of 2008, we saw weakness at the front of the curve, but notably further strength in the back end (see Exhibit 8). While a US recession and slower global economic growth in 2008 could slow global oil demand growth and loosen inventories a bit, strength in the long end of the curve indicates that commodity market investors do not believe this represents a more permanent shift in demand to one of continuous decline. This is in line with our own views.

Exhibit 8: The trend of strong secular fundamentals trumping cyclical weakness has continued in 2008



Source: Bloomberg, Goldman Sachs Research estimates.

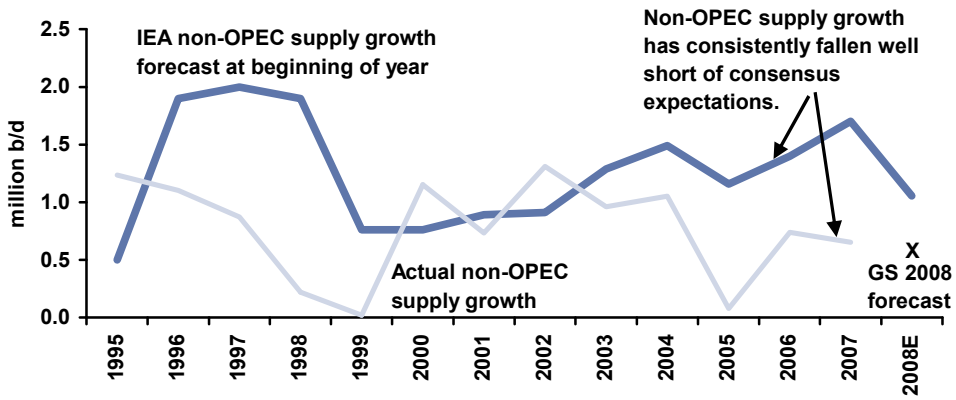
Oil supply struggling to grow: Supply growth needed if demand is to grow

As we look ahead toward the rest of 2008 and the remainder of this decade, the notion that oil prices could reach $100/bbl during a US recession would have been unimaginable several years ago, even for those of us that generally believed in the secularly bullish oil market outlook. For that matter, in the 1990s, just about no one would have believed that oil prices could average over $25/bbl in each year starting in 2000 and there still be no meaningful supply response. Yet here we are with a $100/bbl oil price during what most now believe to be a US recession as well as no appreciable supply response despite almost a decade of oil prices above $25/bbl. We have long cited "recession" as the key risk to our bullish outlook for oil markets. In fact, the US recession seems to be the only thing holding back further material price increases. Remarkably, oil prices are up $30/bbl since markets began worrying about a US recession last summer.

Non-OPEC supply: The great flattening may be in sight

For the first time in our 16 years covering oil markets, we no longer believe continuous increases in non-OPEC supply are a certainty. While for most of this decade we have consistently forecast non-OPEC supply to grow well below consensus expectations of much faster growth, we have always forecast **growth** (see Exhibit 9). We are increasingly of the view that growth in non-OPEC crude oil supply can no longer be taken for granted. To be sure, we are still forecasting non-OPEC supply growth over the next five years of 0.5 million b/d per year on average. However, based on our updated analysis of the industry's "Top 170" projects, the experience gleaned from collectively covering a large portion of the publicly-traded oil companies around the world, and continued geopolitical challenges in key oil exporting countries, we see risk to our already miniscule non-OPEC growth forecasts as skewed decidedly to the downside. The potential great flattening of non-OPEC supply, which seems to be a distinct possibility within the next decade, we believe will have profound implications for future economic and foreign policy of oil consuming and oil exporting nations as well as the strategic and financial outlook for our coverage universe of global oil companies.

Exhibit 9: Non-OPEC supply growth can no longer be taken as a given
million b/d



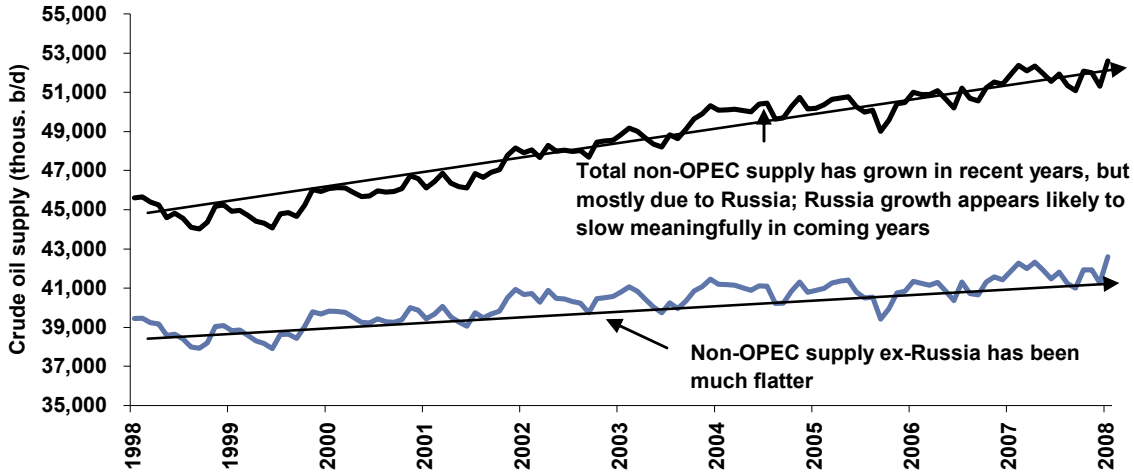
	GS forecast
2008E	0.5
2009E	0.6
2010E	0.3
2011E	0.2
2012E	0.6
'08E-'12E avg.	0.5

Source: IEA, Goldman Sachs Research estimates.

The question we see with non-OPEC supply growth is whether the great flattening actually happens in 2008. 2008 is the first year in recent memory where the Street does not seem to be forecasting a preposterously high level of non-OPEC growth for the coming year. Our current forecast for 2008 growth is 0.5 million b/d (adjusted for Ecuador re-joining OPEC). At the current time, we see a much higher probability of non-OPEC not growing in 2008 as opposed to achieving faster growth of say 1.0 million b/d.

Net non-OPEC growth over the past decade has been effectively driven by Russian production growth (see Exhibit 10). Due to a combination of tough domestic fiscal policies and maturity in legacy fields, Russian oil supply is expected to grow at much slower rates in the future. A flattening of Russian oil supply growth starting in 2008 is possible. In the absence of Russian oil supply growth, we are skeptical non-OPEC overall can grow meaningfully in coming years.

Exhibit 10: Net non-OPEC growth has been driven by Russia, which may be leveling off calling into question future non-OPEC gains



*Non-OPEC supply includes Angola and Ecuador

Source: IEA, Goldman Sachs Research estimates.

OPEC supply: Will Saudi Arabia do a better job than super majors in growing output?

With modest non-OPEC supply growth at best expected in coming years, growing demand will have to be met by OPEC production growth. The big question for OPEC is whether the group can be more successful than the western major oil companies at hitting 3% per annum production growth forecasts (see Exhibit 11). The western majors have collectively completely missed their production growth objectives. We find it hard to believe that state oil companies that have responsibilities to their country well beyond simply growing production will be more successful than the western majors.

Exhibit 11: Will Saudi Arabia be more successful in meeting its production growth objectives than were the Super Majors?

Saudi Arabia production profile (mn b/d):

	2005E	2006E	2007E	2008E	2009E	2010E	2011E	2012E	2013E	2014E	2015E
Crude oil production capacity	**10.00**	10.15	10.00	10.29	11.14	**11.75**	11.89	11.84	11.93	12.26	12.21
% growth (y-o-y)		1.5%	-1.5%	2.9%	8.3%	5.5%	1.1%	-0.4%	0.7%	2.8%	-0.4%
Net underlying decline rate		-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%	-1.5%
New projects:											
Haradh		0.30	0.30	0.30	0.30	0.30	0.29	0.27	0.26	0.24	0.23
Khursaniyah (AFK project)				0.38	0.50	0.50	0.50	0.50	0.48	0.45	0.43
Shaybah I				0.06	0.25	0.25	0.25	0.25	0.25	0.25	0.24
Khurais					0.60	1.20	1.20	1.20	1.20	1.20	1.14
Nuayyim					0.10	0.10	0.10	0.10	0.10	0.10	0.10
Shaybah II						0.10	0.20	0.20	0.20	0.20	0.20
Neutral Zone						0.08	0.15	0.15	0.15	0.15	0.15
Manifa I							0.15	0.30	0.30	0.30	0.30
Manifa II									0.15	0.30	0.30
Manifa III									0.15	0.30	0.30
Future projects										0.25	0.50
Total	0.00	0.30	0.30	0.74	1.75	2.53	2.84	2.97	3.23	3.75	3.88
Saudi decline rate sensivitiy:											
Crude oil production capacity	**10.00**	10.00	9.70	9.85	10.56	**11.02**	11.00	10.81	10.74	10.94	10.74
% growth (y-o-y)		0.0%	-3.0%	1.5%	7.3%	4.3%	-0.2%	-1.8%	-0.6%	1.8%	-1.7%
Net underlying decline rate		**-3.0%**	-3.0%	-3.0%	-3.0%	-3.0%	-3.0%	-3.0%	-3.0%	-3.0%	-3.0%
Crude oil production capacity	**10.00**	9.80	9.31	9.28	9.83	**10.11**	9.92	9.56	9.34	9.39	9.06
% growth (y-o-y)		-2.0%	-5.0%	-0.3%	5.9%	2.9%	-1.9%	-3.6%	-2.3%	0.5%	-3.5%
Net underlying decline rate		**-5.0%**	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%
Crude oil production capacity	**10.00**	10.30	10.30	10.74	11.75	**12.53**	12.84	12.97	13.23	13.75	13.88
% growth (y-o-y)		3.0%	0.0%	4.2%	9.4%	6.6%	2.5%	1.1%	2.0%	3.9%	1.0%
Net underlying decline rate		**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Saudi's ability to grow production is highly dependent on the assumed net underlying decline rate on base production, a challenge similar to the issue the Super Majors have faced.

Source: Saudi Aramco, Upstream magazine, Goldman Sachs Research estimates.

We do not make a "peak oil" argument about OPEC supply. We believe substantial oil resources almost certainly exist that if developed could help meet future demand growth. The problem we see is that the probability of the resources being developed in a timely manner is very low in just about all OPEC countries with the possible exception of Saudi Arabia. In our supply/demand models, we give Saudi Aramco, Saudi Arabia's state-owned oil company, full credit for meeting its production profile objectives. However, similar to the western majors, the risk is far greater that their forecasts are missed rather than exceeded. If it becomes apparent in coming years that Saudi Arabia is unable to meaningfully grow its oil supply to help meet future oil demand growth, we believe oil prices will move appreciably higher to the level that forces meaningful demand moderation.

Alternative energy: Biofuels are not a viable alternative to traditional transportation fuels

We see the forced usage of ethanol and other biofuels as misguided public policy that provides no observable purpose to consuming countries beyond transferring wealth to agricultural regions. Corn ethanol, which now effectively has a mandate to

reach 10% of US gasoline supply in coming years, appears to offer few redeeming qualities. The product we do not think materially reduces demand for crude oil-based transportation fuels, reduces transportation fuel supply flexibility, appears to worsen the environment in a number of important areas, and has contributed to sharply higher agricultural commodity prices. In terms of positives, ethanol has likely boosted the incomes of farmers and companies that supply products and services to the agricultural industry. Regardless, we do not see so-called first generation biofuels as doing much to improve energy security or independence.

There is greater hope that second generation biofuels, such as cellulosic ethanol, biobutanol, and jutophra-based biodiesel, will provide a better supply side solution to today's energy challenges. The problem we see is that the second generation alternatives are just that; it will take a generation to prove economic viability. We are not aware of a single future technology that has proven it can commercially scale.

Without robust supply growth, high prices needed to curb US/Europe/Japan oil demand

With supply struggling to grow, a multi-year decline in global oil demand, such as what was experienced between 1981 and 1985, we think is the key to reversing the secular energy bull market. Notwithstanding the potential for slower growth in 2008 due to the US recession, we do not think global oil demand is on the verge of experiencing sustained multi-year declines.

2008 global oil demand growth could flatten in a "hard landing" scenario, but secular pressure remains to the upside

Our base-case outlook calls for +1.0 mn b/d, or +1.2%, of global oil demand growth in 2008, with a "hard landing" downside scenario potentially resulting in flat global oil demand growth. However, given the strong secular momentum in the economic development of key non-OECD areas including China, the Middle East, and India, not to mention the regulated pricing regimes that insulate consumers in those areas from feeling the full brunt of world oil prices, we believe there is strong long-term upward pressure on global oil demand growth.

Of the +1.0 mn b/d of base-case growth we forecast for 2008, about 0.3 mn b/d, or +0.3%, we attribute to assumed "normal" weather, meaning underlying economic driven oil demand growth is estimated to be just +0.7 mn b/d, or +0.8%. We estimate 2008 oil demand in the "Big 3" OECD areas of the US, Europe, and Japan will decline by 0.3 mn b/d, or -0.6%. However, continued growth in the key non-OECD areas of China, the Middle East, and India more than make up for the OECD shortfall, resulting in a worldwide 2008 oil demand growth expectation of +1.0 mn b/d, or +1.2%.

While US oil demand might temporarily dip into negative territory in 2008, we believe demand growth would resume with stronger economic growth. Japanese oil demand may be permanently in decline, but that is not a new development and has long been reflected in our views. Europe continues to teeter between slightly positive and slightly negative demand growth, but this also is not a new development and has long been incorporated in our projections. Therefore, in order to have multi-year negative global oil demand growth, we believe non-OECD economies would need to consume **less** oil each year, which we think is not likely.

2008 "hard landing" downside demand risk seems manageable given lackluster supply growth

We believe the risk of "hard landing" in 2008 is manageable, given that non-OPEC supply appears to be struggling and OPEC would appear to be in a position to make modest adjustments to keep markets in balance (see Exhibit 12). In our hard landing sensitivity scenario, we assume more meaningful oil demand declines occur in the US, Europe, and Japan, and growth in the rest of the world is cut in half, resulting in an overall global growth that is basically flat-to-slightly negative. Offsetting the downside demand risk is the strong potential for non-OPEC supply to stagnate in 2008, rather than grow the +0.5 mn b/d we assume. In addition, we believe the "Big 3" within OPEC—Saudi Arabia, Kuwait, and UAE—could choose to voluntarily reduce supply to levels seen as recently as last summer. The combination of the supply disappointments and adjustments could offset further demand erosion in a hard landing scenario.

The key to potential OPEC cuts in 2008 proving successful would be a resumption of global oil demand growth in 2009. If the combination of oil demand declines and non-OPEC supply growth results in a multi-year trend of needed OPEC cuts, we would have greater concern that high oil prices could not be sustained, which is essentially what occurred between 1981 and 1986. However, if global oil demand growth resumed in 2009 (or earlier), OPEC in all likelihood would need to re-increase production and spare capacity would remain limited.

Exhibit 12: Even in a "hard landing" scenario, supply/demand balances look manageable
million b/d, unless otherwise indicated; Current is our base-case 2008 forecast, with downside the hard landing scenario

	Growth rate		Impact	
	Current	Downside	(mn b/d)	
Demand:				
US	0.0%	-1.5%	(0.3)	
Europe	-1.0%	-2.0%	(0.2)	
Japan	-1.4%	-3.0%	(0.1)	
Rest of world	2.9%	1.5%	(0.6)	
Total demand reduction	**1.2%**	**-0.2%**	**(1.2)**	**"Hard landing" demand scenario**
	Growth rate		**Impact**	
	Current	**Downside**	**(mn b/d)**	
Supply:				
Non-OPEC disappoints	1.1%	0.0%	(0.5)	**Non-OPEC could easily not grow in 2008.**
	Production (mn b/d)			
OPEC voluntary reductions:	**Current**	**Downside**		
Saudi Arabia	9.2	8.6	(0.6)	**OPEC's Big 3 could cut back to levels seen as recently as summer 2007.**
UAE	2.6	2.5	(0.1)	
Kuwait	2.6	2.4	(0.2)	
Total OPEC 3			(0.8)	
Total supply reduction			**(1.3)**	
Incremental inventory build (reduction)			**(0.1)**	**"Hard landing" S/D balances look manageable**

Source: Goldman Sachs Research estimates.

Without meaningful supply growth, prices will need to rise to force demand reductions in US, Europe, and Japan

The unrelenting increase in long-dated oil prices appears consistent with the long-term supply/demand challenges we see. The combination of struggling crude oil supply growth and price-insulated secular demand growth in what we would call the "New Big 3"—China, the Middle East, and India—suggests oil prices will need to rise high enough to stimulate sustained declines in oil demand in the "Old Big 3"—the US, Europe, and Japan—in order to keep markets in balance.

China, Middle East, and India drive secular demand growth increases as US, Europe, and Japan fade in importance

Exhibit 13 illustrates the demand issue. In 1998, the US, Europe, and Japan accounted for 55% of global oil demand. Over the last 10 years, the Old Big 3's market share of global oil demand has fallen to 49% of the worldwide total, as its 14% share of global growth over the last decade has been well below its current share of overall usage. Only the US has come close to maintaining its historic importance to world oil demand, as secular declines in Japan and stagnation in Europe has eroded the relative importance of those areas to global oil demand.

The New Big 3 of China, the Middle East, and India has seen its collective share of global oil demand grow to 19% in 2007 from 14% in 1998, with the group accounting for a stunning 47% of global oil demand growth over the last decade. Similarly, the rest of the world had held its own with the New Big 3, with overall world market share growing over the last decade by over 1% and accounting for 39% of global oil demand growth.

Over the next five years, we believe 66% of global oil demand growth will be in the New Big 3 and another 22% of growth in the rest of the world (excluding the Big 6), with only 13% of growth coming from the Old Big 3 including no contribution from Europe and further declines in Japan. The New Big 3 we think is conservatively on-track to demand +0.8 mn b/d of incremental oil each year. Including a conservative increment for the rest of the world excluding the "Old Big 3" suggests secular future oil demand growth of around +1 mn b/d.

Exhibit 13: With supply struggling and secular growth in the "New Big 3", rising oil prices needed to reduce "Old Big 3 " demand
million b/d, unless otherwise indicated

	Oil Demand			'98-'07 annual avg. (mn b/d)	Future growth	
	1998	2007	'98-'07 CAGR		CAGR	mn b/d
Old World:						
US	18.9	21.2	1.3%	0.3	1.0%	0.2
Europe	16.1	16.2	0.0%	0.0	0.0%	0.0
Japan	5.5	5.0	-1.1%	(0.1)	-1.0%	(0.0)
Old Big 3	40.5	42.3	0.5%	0.2	0.4%	0.2
New World:						
China	4.0	7.5	7.1%	0.4	5.0%	0.4
India	2.0	2.8	4.0%	0.1	5.0%	0.1
Middle East	4.5	6.2	3.6%	0.2	5.0%	0.3
New Big 3	10.5	16.5	5.1%	0.7	5.0%	0.8
Big 6	51.1	58.8	1.6%	0.9	1.7%	1.0
Rest of world	22.3	27.2	2.3%	0.6	1.0%	0.3
Worldwide	73.3	86.0	1.8%	1.4	1.5%	1.3

Market share:	Share of total demand			Share of Growth	Share of Growth
	1998	2007	Change		
Old World:					
US	26%	25%	-1%	18%	17%
Europe	22%	19%	-3%	0%	0%
Japan	8%	6%	-2%	-4%	-4%
Old Big 3	55%	49%	-6%	14%	13%
New World:					
China	6%	9%	3%	27%	30%
India	3%	3%	1%	7%	11%
Middle East	6%	7%	1%	13%	25%
New Big 3	14%	19%	5%	47%	66%
Big 6	70%	68%	-1%	61%	78%
Rest of world	30%	32%	1%	39%	22%
Worldwide	100%	100%	0%	100%	100%

Source: Goldman Sachs Research estimates.

Making room for demand growth in the New Big 3 means price-induced declines in Old Big 3

In a world where crude oil supply growth is flattish, prices would need to rise high enough to force on the order of 1 mn b/d of demand reductions in the Old Big 3, which are otherwise on pace we think to demand an additional +0.15 mn b/d of oil each year, essentially entirely by the US as we have Europe flat and Japan in secular decline. The question is how high do prices need to rise to stimulate a demand reduction of this magnitude?

In Exhibit 14, we focus on the US in trying to determine the likelihood of achieving sustained declines in oil demand in order to "free up" available supply for secular growth in China, the Middle East, and India. Notably, 77% of current US oil demand of 19 mn b/d (excludes LPG and ethane) is for light transportation fuels (gasoline, diesel, jet fuel), which have no commercially-viable

substitute product making consumers secularly price-insensitive. Sustainably destroying US transportation fuels demand in our view is unlikely.

This leaves the 4.4 million b/d of non-transportation fuel oil demand in the US as the key to balancing global oil supply/demand. The primary substitute products for gasoil (i.e., mostly heating oil in the US), naptha, and residual fuel oil include natural gas, coal, and nuclear. Importantly, current US natural gas prices are below oil-equivalent product prices. However, with Europe and OECD Asia natural gas prices much higher than the US, we see upward pressure on US natural gas prices. The potential for rising US natural gas prices would reduce the incentive to switch out of crude oil-based products.

For now, we make the simple conclusion that oil prices will need to continue to move higher in order to drive sustained negative demand growth in US non-transportation fuels oil demand; we will look to conduct additional analysis in the coming months to further analyze the timing and price points at which US non-transportation fuels oil demand would be permanently impaired. We would also note that given the competitive global pricing of reasonable substitutes (primarily natural gas) for non-transportation fuel oil uses, it would seem that sustained weak US economic growth will also be a pre-requisite if negative US oil demand growth is to be realized.

Exhibit 14: Reducing non-transportation oil demand in US seems more likely than reducing transportation fuels demand
million b/d, unless otherwise indicated

	2001	2002	2003	2004	2005	2006	2007	Average Growth Rate	Standard Deviation
US GDP growth	0.8%	1.6%	2.5%	3.6%	3.1%	2.9%	2.2%	2.4%	1.0%
US oil demand growth:									
US transportation fuels growth	1.6%	1.2%	1.5%	3.0%	1.3%	1.5%	2.2%	1.8%	0.6%
US non-transportation fuels growth	-1.1%	-3.5%	3.8%	5.0%	0.0%	-7.3%	-4.3%	-1.0%	4.4%
US total oil demand growth	-0.2%	0.6%	1.4%	3.5%	0.4%	-0.6%	0.7%	0.8%	1.3%
US oil demand (mn b/d):									
US transportation fuels demand[1]	13.2	13.3	13.5	13.9	14.1	14.3	14.6		
US non-transportation fuels demand	4.7	4.5	4.7	4.9	4.9	4.6	4.4		
US total oil demand[2]	17.9	17.9	18.2	18.9	19.1	18.9	19.0		
Transportation fuels as % of total US demand	*74%*	*75%*	*74%*	*74%*	*74%*	*76%*	*77%*		
Non-transportation fuels:									
Gasoil	1.2	1.1	1.2	1.1	1.1	1.0	0.8		
Naptha	0.3	0.3	0.3	0.4	0.4	0.3	0.3		
Residual fuel oil	0.9	0.8	0.9	1.0	1.0	0.8	0.9		
Other products	2.3	2.3	2.4	2.5	2.5	2.5	2.4		
Growth rate:									
Gasoil (i.e., non-diesel middle distillate)	0.7%	-4.8%	1.4%	-3.8%	-0.7%	-10.2%	-20.8%	-5.5%	7.9%
Naptha	-19.2%	17.9%	5.2%	22.0%	-6.6%	-11.9%	-5.3%	0.3%	15.3%
Residual fuel oil	-9.4%	-12.2%	9.6%	10.9%	5.9%	-22.7%	9.7%	-1.2%	13.4%
Other products	4.2%	-1.8%	2.8%	4.8%	-1.0%	1.1%	-2.0%	1.2%	2.9%

[1] Transportation fuels include gasoline, diesel, and jet fuel.
[2] Total US oil demand excludes LPG and ethane.

Source: Goldman Sachs Research estimates.

Raising 2008-2012 commodity price forecasts

We have raised our respective 2008-2010 oil price forecasts to $95/bbl, $105/bbl, and $110/bbl up from $80/bbl, $90/bbl, and $80/bbl previously (see Exhibit 15). Relative to our previous forecast, we are now assuming the upcylce continues through 2010 versus 2009 previously. For 2011, we model a flat oil price year with 2010 as a placeholder rather than an explicit call that oil markets will flatten out in that year. After all, 2011 is a long time from now.

Exhibit 15 shows the build-up of our forecasts in terms of the key secular and cyclical assumptions. For 2008-2010, we assume long-dated oil prices of $85/bbl, $95/bbl, and $103/bbl, respectively. We believe our forecasts are conservative given that long-dated oil prices are currently $98/bbl. However, given that we are in a recessionary environment, we are purposely taking a more conservative approach to our base-case commodity assumptions. The cyclical component of our forecasts flow directly from our oil supply/demand models and resulting inventory movements, which in turn impacts our forecasts for the slop of the front-end of the curve (i.e., months 1-12).

We continue to reflect 2012 as a "normalized" year that reflects the return of excess capacity, lower costs, and a normalized return on capital of around 8% for industry. While there is no change to our 8% normalized return on capital, we now assume a higher cost structure than before resulting in a $60/bbl normalized oil price versus $50/bbl previously. The core of our "super-spike" view is that oil prices will keep rising until demand declines globally on a multi-year basis, resulting in the return of excess capacity and a lower cost structure. Given this view, once excess capacity returns, we think prices can move sharply lower.

Consistent with our oil price revisions, we have updated our natural gas price and refining margin forecasts as well. For more details on our natural gas view, see our February 24, 2008 global gas report, "US gas market in undersupply—$10+/MMBtu needed as spring LNG imports disappoint." For more details on our refining view, see our January 3, 2008 report, "Refining - Secular outlook bullish: Use weakness to buy US refiners ahead of next big move up."

Exhibit 15: Goldman Sachs Global Investment Research commodity price forecast changes

	Crude oil prices				Refining margins				Light-heavy, sweet-sour spreads				Natural gas	
	WTI spot oil ($/bbl)		Brent ($/bbl)		US Gulf Coast 3:2:1 ($/bbl)		Singapore Complex ($/bbl)		WTI-WTS ($/bbl)		Maya-WTI ($/bbl)		US Henry Hub ($/MMBtu)	
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
2008E:														
1QE	$95	$80	$94	$80	$9	$10	$9	$10	$4.75	$6.40	$15.00	$12.00	$9.25	$9.25
2QE	90	80	90	80	21	21	21	21	7.20	6.40	13.50	12.00	10.00	8.00
3QE	95	80	95	80	14	14	14	14	7.60	6.40	14.25	12.00	10.00	8.00
4QE	100	80	100	80	11	11	11	11	8.00	6.40	15.00	12.00	11.00	8.75
Year	$95	$80	$95	$80	$14	$14	$14	$14	$6.89	$6.40	$14.44	$12.00	$9.75	$8.50
2009E	$105	$90	$105	$90	$16	$16	$16	$16	8.40	7.20	13.13	18.00	10.50	10.00
2010E	$110	$80	$110	$80	$18	$14	$18	$14	8.80	6.40	11.00	16.00	9.00	8.50
2011E	$110	$75	$110	$75	$18	$13	$18	$13	8.80	6.00	11.00	15.00	8.00	7.00
2012N	$60	$50	$60	$50	$9	$8	$9	$8	4.80	4.00	10.80	10.00	6.50	6.00

Source: Bloomberg, Goldman Sachs Research estimates.

Exhibit 16: Key assumptions underlying WTI spot oil forecast
$/bbl, unless otherwise indicated

	WTI spot forecast	Month 1-12 backwardation/ (contango), %	Long-dated forecast
2008E	$95	6.4%	$85
2009E	$105	4.9%	$95
2010E	$110	1.6%	$103

Source: Goldman Sachs Research estimates.

Reg AC

I, Arjun N. Murti, hereby certify that all of the views expressed in this report accurately reflect my personal views about the subject company or companies and its or their securities. I also certify that no part of my compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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