Deutsche Bank
Markets Research

Industry
Oil & Gas

Date
12 April 2013

Asia
China

Energy
Oil & Gas

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F.I.T.T. for investors

Bottoms-up: China's demand for oil & oil products

Demand trends and forecasts

The new Chinese leadership intends to slow GDP growth to 7.5% from previous years +10%. We expect China's demand for oil and products to follow GDP growth lower. In this report we forecast China's oil and product demand (2012-16e) using historical data, DB projections and regression analysis. We expect China's demand for crude oil to slow to 5.7% CAGR (2012-16e) vs. 6.7% (2007-11). We expect China's demand for oil products to slow to 6.6% CAGR from 8.0%. These findings reinforce our current Asia Oil & Gas stock picks which favor special situations over those companies levered principally to the price of oil. Our top picks are Reliance Industries, Sinopec and ONGC.

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Premier Li Keqiang's 7.5% GDP growth target

During his 1st press conference after being appointed Premier of China, Li Keqiang was asked about his top three priorities: 1) maintain economic growth of 7.5%; 2) improve peoples' livelihoods; and 3) ensure social fairness. In elaborating on points 1 and 2, Premier Li cited "economic growth" at least a dozen times, while referencing the environment just once. Li Keqiang's priority was laid bare in his press conference. Nonetheless, Li's 7.5% pa growth target is still a hefty 25% lower than his predecessor's +10% pa growth target. From 2002 to 2012, the price of crude oil surged as China elbowed its way into the global oil trading system. We suspect that China is now well entrenched in the world's oil trading system and that the country's to be engineered GDP slow down will keep global oil prices "flat-to-down" over the coming years and consequentially in-line with current DB forecasts (Figure 1).

China's demand for oil and oil products – to slow down

We forecast China's demand for oil and oil products to slow 2011-16e, relative to 2006-11. From 2006-11, China's demand for oil grew at a 6.4% CAGR. For 2011-16e, we estimate that China's demand for oil will grow at 5.7% CAGR. From 2006-11, China's demand for diesel grew at a 7.2% CAGR; for 2011-16e we estimate that China's demand for diesel will grow at 6.6% CAGR. From 2006-11, China's demand for gasoline grew at a 7.9% CAGR; for 2011-16e we estimate that China's demand for gasoline will grow at 6.2% CAGR. Fuel oil and LPG consumption have slowed already due to hefty increases in China's natural gas consumption. For purposes of stock selection, we prefer special situations to oil price exposure: capacity growth, policy reforms and / or corporate restructurings. Reliance (Buy), ONGC (Buy), Sinopec (Buy) and Huchems (Buy) all tick at least one of these non-oil price triggers.

Valuation and risks

For the most part we value our integrated and upstream oil and gas companies based on discounted cash flows. The DCF provides us flexibility to incorporate changes to oil prices over an extended period of time. DB's Brent oil price forecasts are flat (US$ 113/ bbl) 2013-14 to down (US$ 110/ bbl) 2015-16e and terminal. China represents roughly 50 to 60% of global marginal oil demand. As China slows its economy (GDP) its demand for oil will follow suit. This dove tails well with DB's current outlook for the price of oil. The principal risks to our stock valuations are: 1) higher / lower than forecasted oil prices; and 2) unanticipated changes to policy, including tax – China remains a policy driven oil and gas market dominated by its State Owned Enterprises.

Companies Featured

Reliance Industries (RELI.BO),INR771.15			Buy
	2012A	2013E	2014E
P/E (x)	13.9	11.8	10.5
EV/EBITDA (x)	9.4	8.7	8.0
Price/book (x)	1.5	1.4	1.2

ONGC (ONGC.BO),INR306.40			Buy
	2012A	2013E	2014E
P/E (x)	8.3	9.9	8.3
EV/EBITDA (x)	3.6	3.8	3.1
Price/book (x)	1.7	1.7	1.5

Sinopec (0386.HK),HKD8.89			Buy
	2012A	2013E	2014E
P/E (x)	8.6	8.6	8.0
EV/EBITDA (x)	4.8	4.9	4.7
Price/book (x)	1.2	1.1	1.0

Huchems (069260.KS),KRW23,300.00			Buy
	2011A	2012E	2013E
P/E (x)	17.1	15.4	11.5
EV/EBITDA (x)	9.5	8.9	6.8
Price/book (x)	1.83	1.99	1.80

Oil Search (OSH.AX),AUD7.56			Buy
	2012A	2013E	2014E
P/E (x)	61.5	52.8	35.2
Div yield (%)	0.6	0.5	0.5
Price/book (x)	3.0	3.1	2.9

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Executive Summary

Top down to bottoms up – past and future

We suspect that China's demand for crude oil and its products will slow as the government 1) engineers its slowdown in GDP growth; and 2) attempts to move towards a consumer rather than investment driven economy. The government's current 5-year plan GDP growth target is 7.5%, which compares to the previous target of 10%. As China's GDP growth slows so will its demand growth for oil and other energy forms. We suspect that China's attempted shift to a consumer lead economy from an investment lead economy will be a generational shift rather than a shift measured in decades. In the interim, we suspect the government will need to inject a hefty dose of direct investment in order to maintain its targeted 7.5% GDP growth rate. Figure 25 gives ample proof that the government will continue to "turn-on" / "turn-off" economic activity when it's (politically) convenient – like beginning 3Q12, when the new government finally took up the reins of power.

This report consists of nine separate sections (themes):

1) An Executive Summary, which summarizes our principal findings in undertaking this research;

2) A section dedicated to the "Implications (of soft oil prices) on our Asian oil and gas stocks;

3) A section on data corruption; we take our data from China's National Bureau of Statistics (NBS) as reported by CEIC;

4) A China macro (top-down) oil and product demand section, in which we look at longer-term consumption patterns / trends and attempt to draw conclusions;

5) A China micro (bottoms-up) oil and product demand section in which we take historical consumption data and current DB China forecasts to construct regression models which we use to project future Chinese demand for both crude oil and oil products;

6) A section in which we analyze provincial demand in China for oil products;

7) A section in which we analyze seasonality in China's demand for oil and oil products;

8) Appendix A, in which we present our stock valuation tables; and

9) Appendix B, in which we present the data on seasonal demand patterns.

Within the China "Macro" section we have done some work and drawn conclusions about China's air pollution problems (Pages 32-34).

Our conclusions regarding China's future demand for oil and oil products are:

- We expect that China's demand for oil will grow at an average 5.7% pa over the 2012-16e time period vs.6.5% from 2007-11. In projecting China's demand for oil we consider future real GDP growth and urbanization growth.
- We expect that China's demand for diesel will grow at an average 6.7% pa over the 2012-16e time period vs. 7.2% from 2007-11. In projecting China's demand for diesel we consider future real GDP growth and growth in vehicles.
- We expect that China's demand for gasoline will grow at an average 6.2% pa over the 2012-16e time period vs. 8.0% from 2007-11. In projecting China's demand for gasoline we consider future vehicle growth.
- We expect that China's demand for fuel oil will decline at an average 0.5% pa over the 2012-16e time period vs. a decline of 3.7% pa decline from 2007-11. In projecting China's demand for fuel oil we consider future waterway freight turnover growth; and industrial natural gas consumption growth.
- We expect that China's demand for kerosene will grow at an average 7.2% pa over the 2012-16e time period vs. 10.4% from 2007-11. In projecting China's demand for kerosene we consider future air passenger traffic growth.
- We expect that China's demand for LPG will decline at an average 0.3% pa over the 2012-16e time period vs. growth of 2% from 2007-11. In projecting China's demand for LPG we consider future GDP growth and residential natural gas consumption growth.
- We expect that China's demand for naphtha will grow at an average 9.7% pa over the 2012-16e time period vs. 13.7% from 2007-11. In projecting China's demand for naphtha we consider future IP growth and future ethylene capacity growth.
- We expect that China's demand for asphalt will grow at an average 8.9% pa over the 2012-16e time period vs. 22% from 2009-11. In projecting China's demand for asphalt we consider future growth in the length of highways.

China's NBS does not report consumption / demand of naphtha. This is consistent with many other countries throughout Asia. We suspect that naphtha consumption is not reported by Asian bureaucracies because it is an intermediary product - used principally as a feedstock for ethylene production, rather than an end product for consumers. We estimate China's "Apparent Demand" for naphtha by dividing China's ethylene production (+ imports – exports) by 0.3. One ton of naphtha will yield 300 Kg of ethylene, 250 Kg of propylene, 100 Kg of butadiene and other petrochemical products.

In 2008 the NBS started to report China's Asphalt consumption. Given the lack of historical data on asphalt, our projections are skewed to short term growth patterns. Asphalt represents approximately 6-7% of China's oil product market (Figure 16).

China's air pollution issue

Much has been said recently about China's air pollution. Looking at Figures 31-38, we think it's obvious where China's air pollution problem lies. Roughly 80% of China's primary energy consumption comes from coal. While most countries around the world have been busy reducing the proportion of coal to other (oil, natural gas, nuclear, hydroelectricity and renewable) primary energy sources, China seems stuck in the past. "Clean coal" is a euphemism. Looking at Figures 31-38:

- In 1971, coal represented ~80% of China's primary energy consumption. In 2011, it looks as if coal still represented ~80% of China's primary energy consumption (Figure 32);
- In 1971, coal represented ~60% of India's primary energy consumption. In 2011, it looks as if coal represented ~50% of India's primary energy consumption (Figure 34);
- In 1971, coal represented ~50% of Germany's primary energy consumption. In 2011, it looks as if coal represented ~20% of German's primary energy consumption (Figure 36);
- In 1971, coal represented ~40% of the UK's primary energy consumption. In 2011, it looks as if coal represented ~15% of the UK's primary energy consumption (Figure 37 & 38);

Despite all the noise about forcing National V fuel standards onto the Chinese refineries, we suspect that king coal is the low hanging fruit. China enacted its first emission control standards in 2000. It upgraded its standards to National 2 in 2004 and to National 3 by 2007. The National 4 fuel standard was issued in January 2008, adopted in 2010 and is to be implemented by 2014. National 5 fuel standards will be issued 2013e and adopted nationwide by 2017e according to x-Premier Wen Jiaobao.

China's refineries have been upgrading fuel standards since 2000 and will continue to upgrade standards through 2017 and probably beyond. To us, the upgrading to National 5 standard from National 4 standard seems like business as usual. We suspect that there will be an immaterial impact on China's demand for oil and product due to China's continued fuel standard upgrades over the coming years.

DB Oil price forecasts

Our DB oil price forecasts are set by the DB Global Commodities Group. Our current oil price forecasts can be seen in Figure 1 below. We use Brent + / - a quality spread for our Asian company models. WTI is effectively a US domestic price benchmark. Our view as published in this report on China's demand for oil and oil products is consistent with our current house view of forecasted flat-to-down oil prices through 2016e. Consensus Bloomberg oil price estimates are also noted in Figure 1, below. DB and Bloomberg median consensus estimates for Brent are quite similar 2013-16e.

We note that DB upstream partners, Wood Mackenzie are forecasting 2013-17e Brent prices of US$ 107.50/ bbl, US$ 100.25, US$ 96.0, US$ 92, and US$ 93.84 / bbl of Brent in 2017e. After 2017, Wood Mac elevates its terminal oil price by a 2% inflation factor per year. Wood Mackenzie is forecasting materially lower Brent oil prices 2013-16e than DB and or Bbrg consensus.

Figure 1: DB Oil and Gas price forecasts (2013-16e)

	DB FORECASTS			Bbrg Median Consensus (08 April 2013)		
Last Adjusted : 9/April/2013	WTI (US$ / bbl)	BRENT (US$ / bbl)	DB Nymex Gas (US$ / mmBtu)	WTI (US$ / bbl)	BRENT (US$ / bbl)	BRENT DB - Consensus (US$/ bbl)
Q1 2012	102.9	118.4	2.51			
Q2 2012	94.2	110.2	2.35			
Q3 2012	92.2	109.5	2.90			
Q4 2012	88.2	110.1	3.54			
2012	**94.4**	**112.02**	**2.82**			
Q1 2013	94.4	112.6	3.48			
Q2 2013E	97.0	112.0	3.70			
Q3 2013E	105.0	115.0	3.80			
Q4 2013E	105.0	115.0	4.00			
2013E	**100.4**	**113.7**	**3.75**	**95.0**	**111.0**	**2.7**
Q1 2014E	100.0	110.0	4.30			
Q2 2014E	102.0	112.0	4.15			
Q3 2014E	105.0	115.0	4.20			
Q4 2014E	106.0	116.0	4.35			
2014E	**103.25**	**113.25**	**4.25**	**98.3**	**110**	**3.3**
2015E	**100.0**	**110.0**	**4.50**	**105.5**	**113**	**-3.0**
2016E	**105.0**	**110.0**	**4.75**	**108.0**	**111.5**	**-1.5**

Source: Deutsche Bank

Flat-to-down oil prices: Implications for our Asia stock picks:

On 01 December 2012, we published our 2013 Year Ahead stock outlook ("Positioning for 2013") where we made the case to invest in "special situations" for 2013 and avoid those oil and gas companies levered to oil prices. We advised to look for policy reforms, corporate restructurings and capacity / volume growth stories rather than loading up on E&P companies that are fully exposed to rising / falling oil prices. We reiterate this same opinion in this FITT report. Our picks in the Asia Oil & Gas space are presented in the following Section (pages 10-16) of this report.

Implications for Asia Oil & Gas shares

Top picks for 2013 – and beyond

On 01 December 2012, we published our 2013 Year Ahead stock outlook ("Positioning for 2013'). In this publication we made the case to invest in "special situations" for 2013 and avoid oil and gas companies levered to oil prices. We advised to look for capacity additions, policy reforms, corporate restructurings and the likes rather than loading up on E&P companies fully exposed to rising / falling oil prices. We reiterate this same opinion in this April 2013 FITT report.

E&P Companies:

Flat to lower oil prices will have the most impact on the earnings of E&P companies. In the simplest of terms, the earnings of E&P companies are driven by the price of oil and / or natural gas times (X) production volumes. Some E&P companies are less exposed to oil prices and more exposed to natural gas prices (See "Notes" in Figure 113). Others are more exposed to shale gas prices rather than conventional natural gas prices or gas prices that are controlled by a regulator (China's NDRC) rather than a market based natural gas price. LNG companies throughout Asia (principally the Australian E&P companies) have natural gas price links into the price of oil. Generally speaking, we prefer stay away from oil and gas E&P companies in an environment where DB is forecasting flat-to-down oil prices over the coming years (2013-16e).

Vertically Integrated Oil & Gas companies:

In a normal year, vertically integrated PetroChina generates 80% of its operating income from E&P and 20% of its operating income from its downstream businesses: Marketing, Refining, Chemicals and Natural Gas Pipelines.

In a normal year, vertically integrated Sinopec generates 20% of its operating income from E&P and 80% of its operating income from its downstream businesses: Marketing, Refining and Chemicals.

In an environment of flat-to-down oil prices, all else equal, we would prefer to be invested in Sinopec over PetroChina. In an environment of flat-to-down oil prices, all else equal, we would prefer to be invested in downstream relative to upstream oil businesses.

Refineries:

There is no direct correlation between oil prices and refining spreads – bold statement. In some cases falling oil prices can be reflected in higher refining margins, particularly in those markets where pump prices are sticky and controlled by only a few market participants. Similarly in markets where pump prices are subsidized or controlled by a regulator, lower oil prices can translate to higher refining profits. In general, we like to argue that oil prices reflect market demand and supply – regardless of the market; that rising or high oil prices reflect a tight market and that falling or low oil prices reflect a soft market.

On a macro basis, this could explain higher-lower refining margins following the oil price trend. We like to think however that in a rising / falling oil price environment, refineries at least have a fighting chance to deliver bottom line growth based on capacity issues, market structure, regulatory controls and/ or local demand patterns.

Petrochemical companies

Any sharp movement in oil price is negative for Asia petrochemical sector. Sharp increases in oil prices (as witnessed during 1H08) will lead to a margin squeeze as product prices cannot fully and immediately reflect the raw material price hike. Sharp declines in oil prices imply demand destruction (as witnessed 3Q08 and 2Q12), which should result in weak petrochemical prices, and hence hefty inventory loss. The best-case oil price scenario for our Asian petrochemical names would be a soft but gradual increase in oil prices as a reflection of growing demand for petrochemical products.

LNG-companies

LNG developments dominate the Australian Energy sector, with all large-cap stocks under our coverage either currently generating revenues from LNG projects (Woodside, Santos), or currently constructing LNG projects (Origin Energy, Santos, Oil Search). With LNG pricing linked to oil pricing, coupled with existing base oil projects, the sector is heavily linked to movements in oil prices. Woodside and Oil Search have the highest level of oil-linked revenues, while Origin Energy is the lowest given its base utility business. While Santos' earnings are predominantly linked to domestic gas prices that have no oil linkages, the company's high-cost oil production ensures the greatest leverage to movements in oil prices.

There are now eight LNG projects under construction in the Australasian region, totaling over US$200bn in investment on our forecasts. The scale of such development is unprecedented, exceeding even recent construction at Qatar's Ras Laffan mega-LNG development. As a consequence we are now seeing significant wage and cost pressures, and note five projects (QCLNG, GLNG, PNG LNG and Gorgon) have announced cost increases over the last 12 months. These cost increases have ranged from 16% to 41% over initial project estimates. With most projects yet to reach peak capex intensity, we do not see any abatement in cost inflation pressures in the coming 12 months.

Figure 2: Capex guidance and cost increases for Australasian LNG projects

Project	Sanction date	Original capex guidance	Updated capex guidance	Cost increase
Gorgon	Sep-09	US$37bn	US$52bn	41%
PNG LNG	Dec-09	US$15bn	US$19bn	27%
QCLNG	Nov-10	US$15bn	US$20.4bn	36%
GLNG	Jan-11	US$16bn	US$18.5bn	16%
Prelude	May-11	US$12bn		
APLNG	Jul-11	US$20bn	US$24-25bn	20-25%
Wheatstone	Sep-11	US$29bn		
Ichthys	Jan-12	US$34bn		

Source: Company data, Deutsche Bank

Our oil & gas picks in Asia:

We are looking for special situations in 2013-14e: capacity additions, volume growth, policy reforms, corporate restructurings and the likes.

Reliance is adding 51% to its petrochemical capacity 2013-15e; we expect government approvals on RIL's upstream activities to increase 2013e. ONGC should be a major beneficiary of government reforms. Sinopec is turning around its refining losses (2012-13e) on the back of lower oil prices. The government is implementing China's refining policy – no surprise given soft to down oil prices. Huchems sells chemical products under a fixed-spread-per-ton business model; we expect sales volume to increase 46% in 2013e due to capacity additions. Oil Search is approaching its start-up (2014e) of its single-asset LNG liquefaction project based in Papua New Guinea. Analyst, John Hirjee is estimating a project IRR of 19%.

Our valuation tables and recommendations for our Asia Oil & Gas, E&P companies, Vertically Integrated companies, LNG related companies, Refineries and Chemical companies can be found in Figures 113-117.

Reliance Industries (Harshad Katkar – Analyst: 9122 – 7158 4029)

Reliance (RIL IN) hits most of our non-oil price triggers for 2013-15e. Analyst Harshad Katkar notes that 1) RIL's petrochemical capacity is due to increase by 51% over the 2013-15e period (Figure 3); and 2) Government approvals for the development of RIL's domestic E&P business and gas price hike should dominate 2013. Investors have had two major concerns regarding this stock 1) RIL's growing cash hoard (~US$ 15bn Q4CY12) – and speculation over how it might be spent; and 2) chronic government delays in approving RIL's develop plans for its domestic E&P business.

For 2013, we expect 1) various domestic E&P approvals to be passed by the government; and 2) the continuation of an on-going (2013-15) US$ 12bn capex dedicated to expanding RIL's petrochemical capacity (2013-15e). On the domestic E&P side more specifically, we are looking for 1) government approvals on the development plans for R series fields in RIL's KG-D6 block and NEC25 block located offshore, central-east India and 2) the approval of materially higher RIL gas prices by no later than 1Q14.

Figure 3: Reliance petrochemical capacity additions

RIL planned petrochemicals expansions				
Chemicals	Existing Capacity	Expansion	Growth	Timeline
	TMT	TMT	%	
Purified Terephthalic Acid (PTA)	2,050	2,296	112%	2HCY13/1HCY14
Polyethylene Terephthalate (PET)	290	648	223%	2HCY13/1QCY14
Polyester Filament Yarn (PFY)	670	395	59%	1QCY13
Polyester Textured Yarn	153	140	92%	1QCY13
Poly Butadiene Rubber (PBR)	74	40	54%	2HCY13
Styrene Butadiene Rubber (SBR)		150	NA	2HCY13
Ethylene	1,883	1,365	72%	2HCY15
Propylene	759	154	20%	2HCY15
LDPE	190	400	211%	2HCY15
LLDPE/HDPE	928	550	59%	2HCY15
Paraxylene (PX)	1,856	1,800	97%	2HCY15
Mono Ethlene Glycol (MEG)	733	733	100%	2HCY15

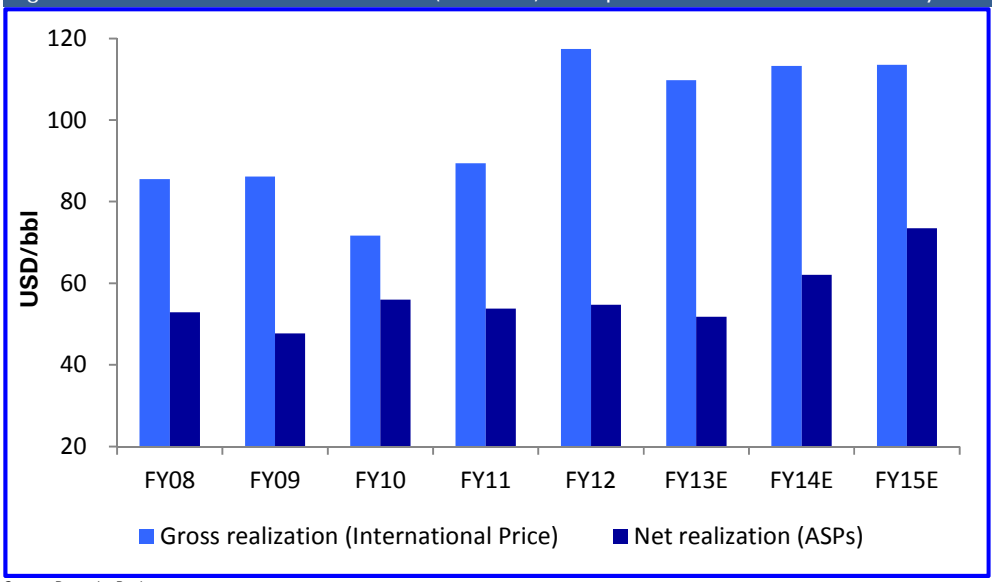
Source: Company data; Deutsche Bank

ONGC (Harshad Katkar – Analyst: 9122 – 7158 4029)

ONGC will be a key beneficiary of government's renewed thrust on oil sector reforms. Over FY13-14 we expect 1] almost 50% reduction in fuel subsidies due to measured and gradual increase in diesel prices and 2] approval for gas price hike to improve net realization on crude and natural gas produced by ONGC.

The Indian Government, in its bid to reign in fuel subsidies, has empowered oil companies to increase diesel prices. Higher diesel prices will reduce fuel subsidies and benefit ONGC, as it funds as much as ~32% of fuel subsidies. Every INR1/lit increase in diesel price increases ONGC's EPS by INR1.8/sh (5%). Being the largest producer of natural gas in the country, ONGC will also benefit from petroleum ministry's proposal to almost double natural gas prices. Every USD1/mmbtu higher gas price increases ONGC's EPS by INR3.3/sh and valuation by INR35/sh (9%). In addition, lower oil prices also benefit ONGC by reducing the fuel subsidies.

Figure 4: ONGC: Net crude realization (USD/bbl) to improve on lower diesel subsidy



Source: Deutsche Bank

Sinopec Corp (David Hurd – Analyst / 852 6040 2203)

Rising oil prices is a bad thing for Sinopec (SNP). We have oil prices flat to down 2012-16e. As oil prices rose 2005-1H08, so did SNP's refining losses. In early 2009, the government adjusted the refined product price policy – to no avail. As oil prices rose 2010-11, so did SNP's refining losses. In 2011, SNP reported a refining operating loss of Rmb 35.7bn (US$ 5.5bn) on total op. income of Rmb 105.3bn (US$ 16.3bn).

Sinopec's Chemical division made Rmb 26.7bn in operating profit 2011. We estimate that SNP's Chemical business will break even in 2012e and generate minimal profits (Rmb 4.6bn) in 2013e. We view SNP's Chemical business as "turn-around-potential" for 2013-15e, as the global economy improves. Only once has SNP's Chemical division lost money (2008 / Rmb 13bn). SNP cracks naphtha with a nameplate capacity of 8.66 mln TPA of ethylene. Petrochemical prices in China are not controlled by the government. Petrochemical prices in China are free market prices.

We believe the potential for E&P asset injections from Sinopec Group to Sinopec Corp (ListCo) is real and provides the opportunity for longer-term price appreciation on SNP shares. We suspect that Chairman Fu will at least begin the process of injecting E&P assets into Sinopec Corp over the coming 2013-15 time period. From our perspective,

E&P injections would raise operating margins and ROEs at SNP Corp and dilute lower margin / returns from SNP's downstream businesses. We would view E&P asset injections as a positive transformational event for Sinopec Corp.

Figure 5: Sinopec – downstream dependent on earnings growth

SINOPEC	2012 1Q	2Q	3Q	4Q	2012	2013e 1Qe	2Qe	3Qe	4Qe	2013e	2014e 1Qe	2Qe	3Qe	4Qe	2014e
E&P	19,551	20,912 40,463	14,810 55,273	14,781 70,054	70,054	14,500	15,500 30,000	18,000	22,195 40,195	70,195	15,500	16,500	18,500	22,961	73,461
Refining	(9,172)	(9,329) (18,501)	3,026 (15,475)	4,031 (11,444)	(11,444)	(1,900)	(1,000) (2,900)	50	293 343	(2,557)	600	400	100	174	1,274
Chemicals	1,309	(2,560) (1,251)	959 (292)	1,470 1,178	1,178	1,470	(1,500) (30)	500	1,550 2,050	2,020	339	678	1,187	1,187	3,390
Marketing	10,277	9,975 20,252	9,957 30,209	12,443 42,652	42,652	10,800	10,000 20,800	11,000	12,405 23,405	44,205	11,417	11,417	11,417	11,417	45,668
Others -	(611)	(611)	(611)	(611)	(2,443)	(611)	(611)	(611)	(611)	(2,443)	(611)	(611)	(611)	(611)	(2,443)
- Qtly EBIT	*21,354*	*18,387*	*28,141*	*32,114*	*99,997*	*24,259*	*22,389*	*28,939*	*35,833*	*111,421*	*27,245*	*28,384*	*30,593*	*35,129*	*121,351*
DB Brent (US$ / bbl)	*118.4*	*110.2*	*109.5*	*110.1*	*112.0*	*112.6*	*112.0*	*115.0*	*115.0*	*113.7*	*110.0*	*112.0*	*115.0*	*116.0*	*113.25*

Notes:
- Sinopec reports 1Q & 3Q results based on PRC accounting only; it presents Semi-annual and Annual results based on both IFRS & PRC
As a result Consolidated (IFRS) 1H results do not necessarily tie exactly to 1Q + 2Q (PRC) results.

Source: Deutsche Bank

Huchems (Shawn Park – Analyst / 82 2316 8977)

Through capacity expansions in its major products such as DNT, MNB and nitric acid, we expect Huchems' earnings to show meaningful growth in 2013. Furthermore, Huchems' business structure of a secured margin per ton and minimum volume off-take should be a positive catalyst and makes it resilient to any downturn in the polyurethane cycle. We expect Huchems to show robust earnings growth over the next two years, driven principally by the company's capacity expansion plans.

Figure 6: Huchems' sales and operating profit to expand

(Won bn)	2011	2012E	2013E	2014E	2015E
Sales total	**566.9**	**690.7**	**912.5**	**1,035.8**	**1,208.7**
Chemical	558.2	687.2	891.8	1,018.5	1,190.8
CDM	8.7	3.4	20.7	17.3	17.9
Operating profit-total	**56.1**	**74.6**	**100.7**	**115.0**	**125.8**
YoY	-26.4%	32.9%	35.1%	14.1%	9.4%
Chemical	47.5	69.7	86.7	101.1	111.4
YoY	-33.5%	46.8%	24.3%	16.7%	10.2%
CDM	8.6	4.8	14.1	13.9	14.3
YoY	78.7%	-43.9%	190.9%	-1.6%	3.5%
OPM-total	**9.9%**	**10.8%**	**11.0%**	**11.1%**	**10.4%**
Chemical	8.5%	10.1%	9.7%	9.9%	9.4%
CDM	99.0%	140.4%	68.0%	80.0%	80.0%

Source: Deutsche Bank estimates, Company data

Huchems' main contracted-customers are listed below in Figure 7. The spread-based business model provides Huchems with resilient earnings and it is hence viewed as a defensive play during a chemical down-cycle. At the same time, its capacity expansion plans should characterize the company as a growth stock. Based on its expansion plans, we anticipate sales volume to grow by 46% YoY in 2013.

Figure 7: Huchems' long-term contract details

Product	Customer	Contract year (yr)	Contract period
Nitric acid	BASF Korea	15	2003~2018
	Rodia Polyamide	8	2008~2016
MNB	Kumho Mitsui Chemical	15	2009~2024
DNT	KPX Fine Chemical	6	2008~2013
		10	2011~2021
	OCI Company Ltd	2	2008~ (extended bi-yearly)
Ammonium nitrate	Koryo Nobel Explosives	5	2011~2015

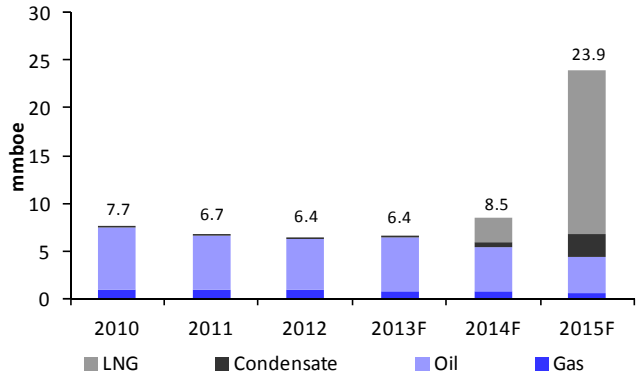
Source: Deutsche Bank, Company data

Oil Search (John Hirjee – Analyst / 613 9270 4318)

With its assets focused in Papua New Guinea, Oil Search has little exposure to the high cost construction and operating environment impacting the Australian E&P sector. Notwithstanding the recent 21% cost increase, the company remains highly levered to the ExxonMobil-led PNG LNG development. With first LNG due in 2014, we estimate a project IRR of 19%. Given a high liquids yield, favorable fiscal regime and lower cost construction environment, PNG LNG is by some way the most robust development project in the Australasian region.

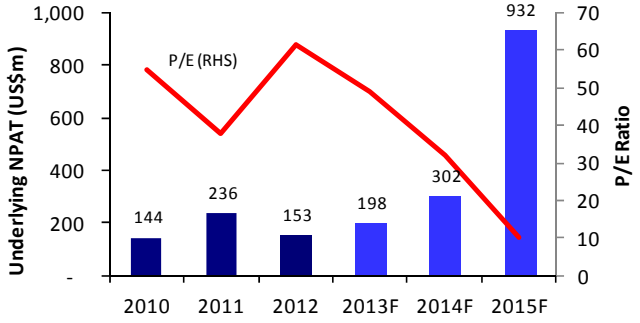
The project will drive significant production and earnings growth for Oil Search. We forecast production will grow 2.7x 2012 levels by 2015, and estimate 2015 earnings at 4.9x 2012 levels.

Figure 8: Oil Search production forecast by product



Source: Company data, Deutsche Bank

Figure 9: Oil Search NPAT and P/E forecasts



Source: Company data, Deutsche Bank

In addition, the PNG LNG project offers material growth upside. The recent discovery at P'nyang underpins a third train development, while drilling at the giant Hides gas field during 2013 could also materially increase project reserves. In addition, exploration acreage in the Gulf of Papua with JV partner Total offers a further growth avenue, with the first well recently spudding.

We estimate an EPS growth rate for Oil Search of 26% in 2013 and 39% CAGR 2012-14. Oil Search carries an estimated dividend yield of 0.6%. We show the stock trading at 49x our 2013 earnings estimates and 32x our 2014 earnings estimates. We forecast a 2015 P/E of 10.4x following the commencement of PNG LNG and the material earnings uplift.

The table below summarizes net income sensitivities of our Asian Oil & Gas companies to oil price movements:

Figure 10: Sensitivities of Net Income to changes in oil prices

	Given:	*Result:*	
ASIA Oil & GAS	+ / - US$ 5 / bbl change in Price of Oil	+ / - Change Net Income	NOTES:
- RELIANCE INDUSTRIES (BUY)	+ / - US$ 5 / bbl	No impact	Oil production at Reliance is imaterial
- ONGC (BUY)	+ US$ 5 / bbl	-4.5% Net Income	Net crude realizations to improve on lower diesel subsidy
	- US$ 5 / bbl	+ 4.5% Net Income	Net Inc has negative correlation with the price of oil
- SINOPEC (BUY)	+ US$ 5 / bbl	+ 4.0% Net Income	Assumes full pas through of oil price to refined product price.
	- US$ 5 / bbl	- 4.0% Net Income	Negative correlation oil price to Net Inc IF pass through not applied
- OIL SEARCH (BUY)	+ US$ 5 / bbl	+ 8.0% Net Income	LNG linked to oil price
	- US$ 5 / bbl	- 8.0% Net Income	
- WOODSIDE (BUY)	+ US$ 5 / bbl	+ 5.0% Net Income	LNG linked to oil price; however large domestic gas business
	- US$ 5 / bbl	- 5.0% Net Income	not priced off of oil.
- PETROCHINA (HOLD)	+ US$ 5 / bbl	+ 7.5% Net Income	Big E&P company discuised as verticaly integrated oil & gas
	- US$ 5 / bbl	- 7.5% Net Income	company
- CNOOC Ltd (HOLD)	+ US$ 5 / bbl	+ 9.0% Net Income	Pure E&P company. Currently 80% oil / 20% natural gas
	- US$ 5 / bbl	- 9.0% Net Income	
- MIE Holdings (HOLD)	+ US$ 5 / bbl	+ 11.0% Net Income	Pure E&P company. Currently 95% oil / 5% natural gas.
	- US$ 5 / bbl	- 11.0% Net Income	
- PTTEP (BUY)	+ US$ 5 / bbl	+ 5.7% Net Income	Natural gas E&P company - gas prices indexed to oil prices.
	- US$ 5 / bbl	- 5.7% Net Income	
- CAIRN INDIA (HOLD)	+ US$ 5 / bbl	+ 6.5% Net Income	Pure play E&P company. PSC - Government shares in profits
	- US$ 5 / bbl	- 6.5% Net Income	
- HUCHEMS (BUY)	+ / - US$ 5 / bbl	No impact	Petrochemical spreds business model; not exposed to oil price

Source: Deutsche Bank

Data issues

Before we start

The data presented in Figures 11-13 below demonstrates the way in which the National Bureau of Statistics (NBS) presents and disaggregates China's GDP, China's Oil Consumption and China's Oil Product Consumption. Throughout this report, we cut this data, analyze it, run regressions on it and present it in various different forms.

Crude oil is not consumed; crude oil is processed by refineries, which falls under "Manufacturing" as per the NBS data flow chart (Figure 12). It's interesting to note that in 2000, the NBS reported that 84% of China's oil went to refineries where as in 2010, 97% of China's oil went to Refineries. We suspect that this is nothing more than improving data collection / reporting by NBS. Crude oil is not consumed; it is first processed by a refinery and then consumed as oil products.

Again in Figure 12, regarding the 7.0% of crude oil that flowed to "Chemicals" in 2010 – there are two issues here: 1) some of China's chemical companies also have refineries to provide the naphtha feedstock for ethylene production; and 2) some of China's "chemical" companies are actually not chemical companies but rather tea-pot refineries in disguise. China's tea-pot refineries operate in the grey market; chemical companies in China operate in a free and open market. By masquerading as chemical companies, tea-pot refineries have a better chance of 1) obtaining crude oil supplies from government sanctioned importers, and / or ii) evading detection from central authorities that prefer to close down the tea-pot refineries and minimize competition for the SOEs. Given China's recent air pollution problem, we suspect government authorities now have yet one-more reason (pollution) to clamp-down on the tea-pot refineries. In China, by law, natural gas cannot (yet) be used as a feedstock for ethylene production.

Another data issue relates to diesel and gasoline consumption data as presented by NBS. Looking at the data for China diesel (Figures 49-51), in 2010 "Transport" represented 58.2% of diesel consumption while "Residential" represented 5.3% of consumption. Similarly with gasoline (Figures 58-60), in 2010, "Transport" represented 46.5% of gasoline consumption while "Residential" represented 17.6% of consumption. In our opinion, the only reason for "Residential" consumption of gasoline would be for automobiles, which we assume is also presented by NBS under "Transport". Regarding diesel, "Residential" consumption could be for home generators, trucks and / or farm equipment. We suspect that "Residential" demand for gasoline and to a lesser extent diesel is predominantly driven by "Transport". Whether NBS is double-counting or whether we should include "Residential" gasoline and diesel in "Transport" is an enigma, that the NBS has difficulty explaining. We will leave this issue for a rainy day.

In Section 6 of this report (Pgs 72-79), we look at product consumption by province in China. The data is interesting from the perspective of where China's demand for oil and oil products comes from geographically; however, the data (nominal quantity in tons) does not tie into the data as presented by economic business segment (Industry, Construction, Transport, Wholesale, Residential and Others). Fuel oil is consumed by Shandong and Guangdong Provinces – these are the tea-pot refineries, which do not have access to crude oil but do have access to fuel oil. The tea-pots crack fuel oil into diesel. Imports of crude oil are controlled by the government through import licensing; fuel oil is a freely traded product throughout China.

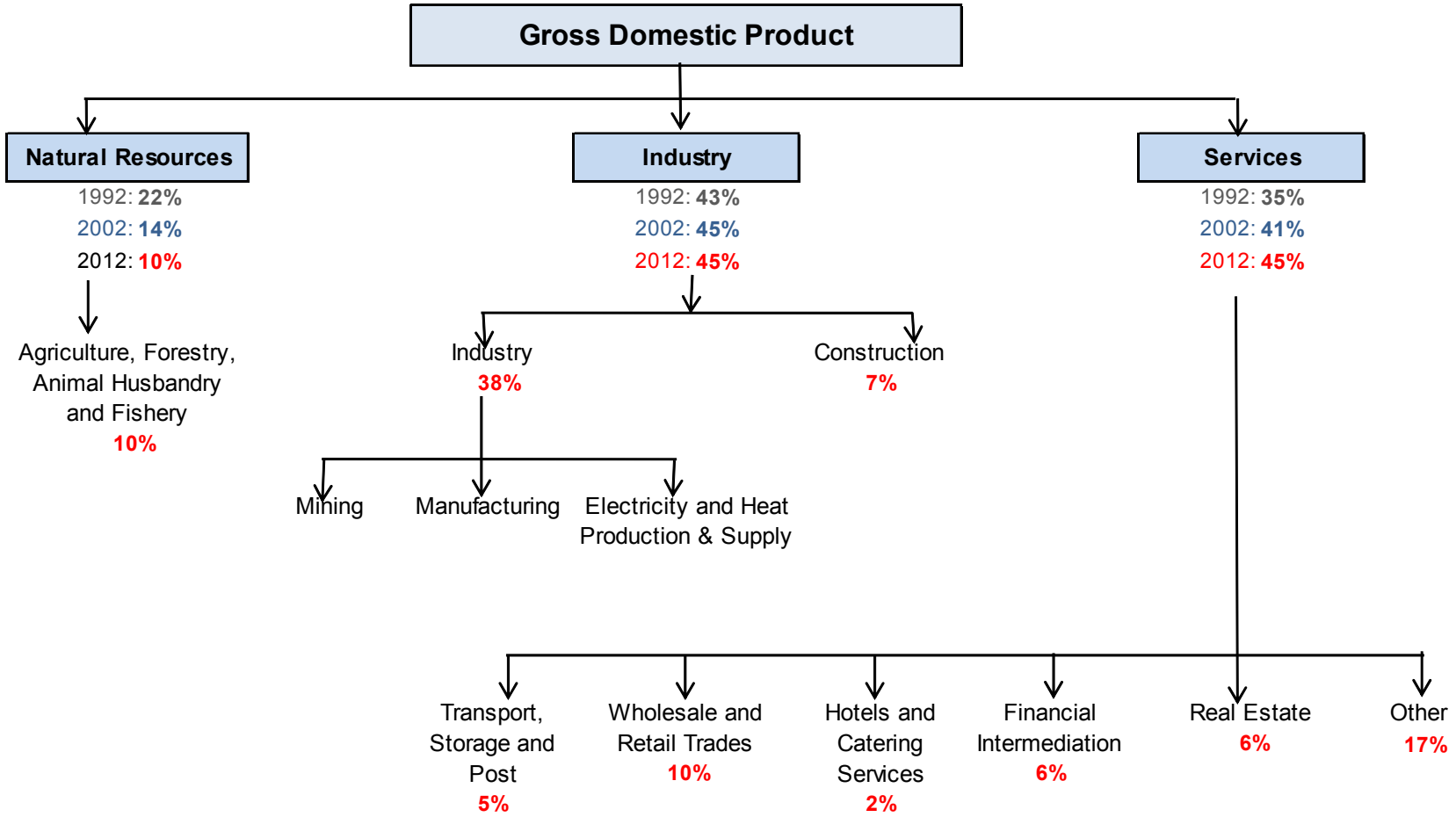
Consumption / demand data as reported by NBS / CEIC lags by roughly 1.5 years. Energy consumption data for 2011 should be released in May-June 2013e. The most recent full set of energy consumption / demand data as reported by NBS / CEIC is from 2010. Nonetheless, since 2004, we have publish a monthly "China's Apparent Demand – Oil and Gas" report sourcing NBS / CEIC data. Apparent demand for oil and oil products as reported monthly by NBS / CEIC is defined as domestic Production + Imports – Exports. Within the data presented in this FITT report any and all 2011 and / or 2012 data that is not labeled an estimate ("E") is an "Apparent Demand" number rather than a confirmed NBS domestic consumption number.

The R Square (single variable) and Adjusted R Square (multiple variables) values for some of our regression formulas are not as high (yet) as we would like to see them. This is a matter of time and more importantly, a matter of properly defining the major drivers of China's oil and oil products. Unfortunately, in the past, the government has been a major force in allocating resources such as crude oil and oil products. Trying to adjust a regression model for government policy is a difficult task.

In our oil and oil product regression formulas, we initially ran with multiple independent variables in an attempt to capture high R2 variables. What we encountered however was "multicollinearity" or high correlation between independent variables which results in high intercept values. The intercept value gives consumption growth (oil and oil product in this case) assuming 0% growth in the independent variables (GDP, IP, Vehicles growth, etc.). This was a non-starter for us. From a logic perspective, we could not argue 12% gasoline consumption growth under a China GDP scenario of 0% growth. As a result, we have limited our independent variables in our regression models to no more than two (currently).

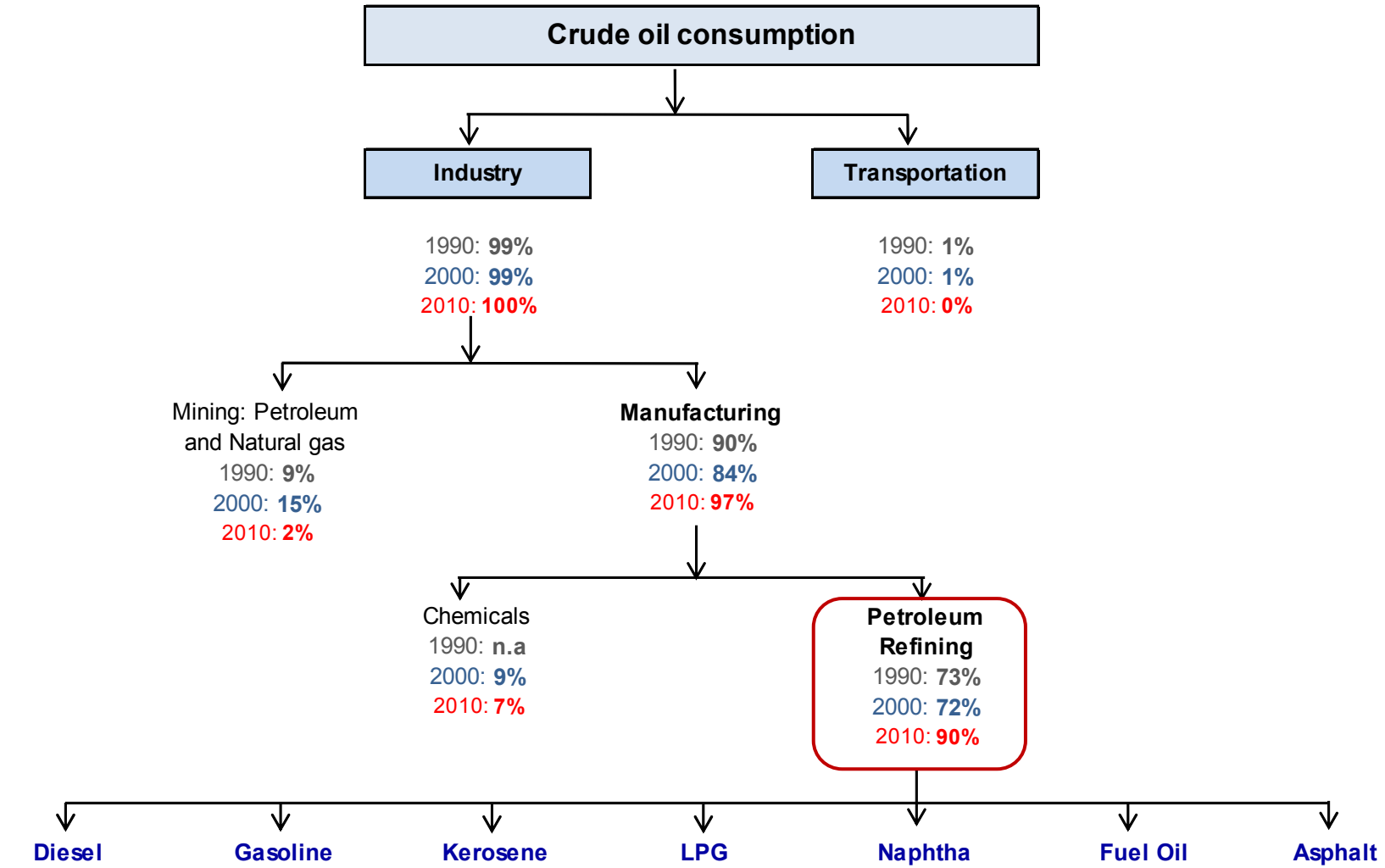
Figures 39 & 40 present the independent variables we have used in this report to forecast oil and oil product demand. Figure 40 also presents our forecasts (2012-16e) of independent variables. This research note is a work in progress; ultimately we will find higher R Square relationships once we better understand all the drivers of oil and oil product demand in China – a daunting task.

Figure 11: GDP breakdown by CEIC - 2012



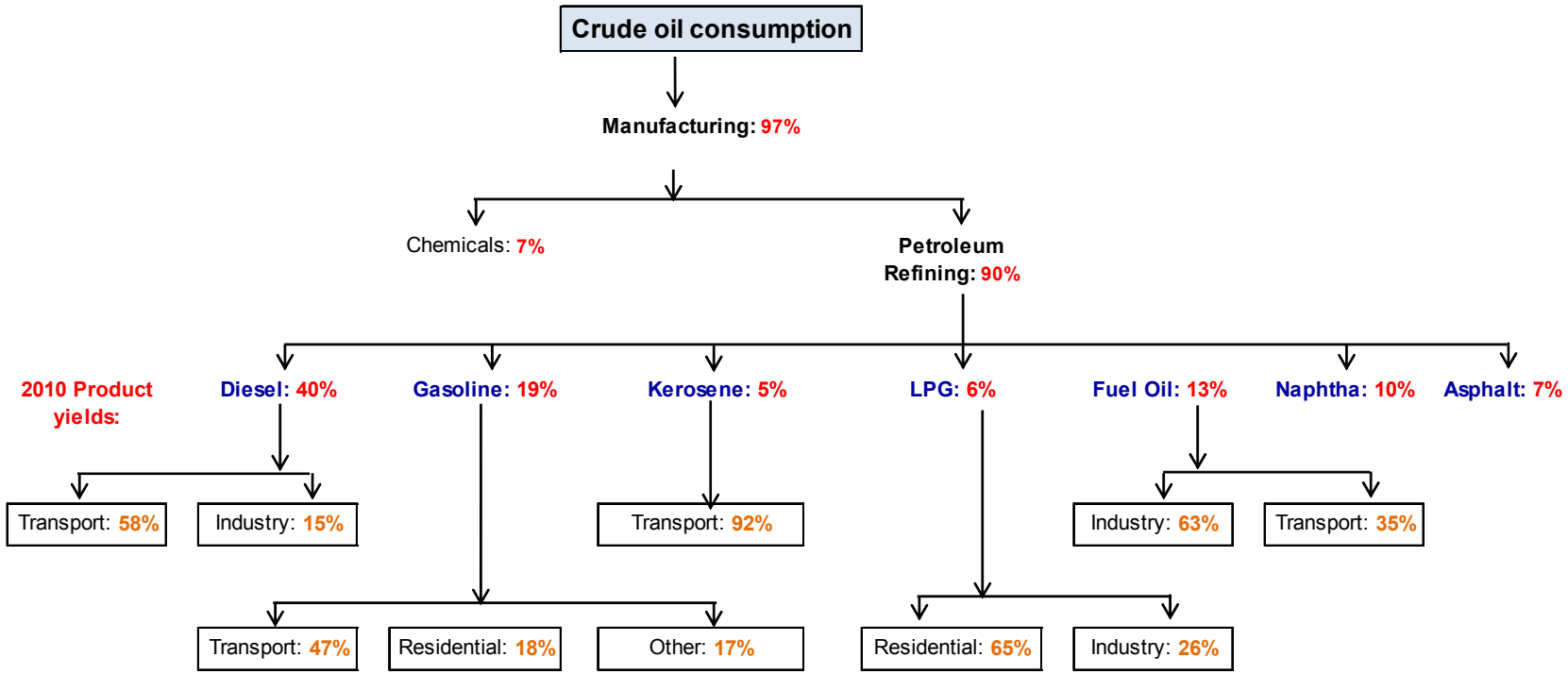
Source: CEIC, Deutsche Bank

Figure 12: Crude oil consumption breakdown for 1990, 2000 and 2010



Source: CEIC, Deutsche Bank

Figure 13: Refined products consumption in different segments



Source: CEIC, Deutsche Bank

Macro – top down

Sizing the market – looking at trends – elasticity - intensity

Figures 11-13 above depict how China's NBS reports it's GDP, Oil Consumption and Oil Product Consumption data. Figures 11-13 are part of our top-down macro analysis of China's demand for oil and oil products. China consumed `398 million tons of oil products in 2011. We suspect the real number is a bit higher, however, the NBS does not report bottom of the barrel products (tar, coke) nor does it report system losses.

Figure 14: Oil and oil product consumption / demand summary

(Million tons)	2007	2008	2009	2010	2011	2012E	2013E	2014E	2015E	2016E
Diesel	124.97	135.3	137.6	146.3	167.2	176.4	187.5	201.7	216.2	230.6
Gasoline	55.19	61.5	61.7	68.9	76.8	82.0	87.3	92.7	98.1	103.7
Kerosene	12.44	12.9	14.4	17.4	18.3	19.7	21.1	22.6	24.2	25.9
LPG	23.28	21.2	21.5	22.4	24.2	24.0	23.9	24.0	23.9	23.8
Naphtha	34.39	33.7	37.3	47.5	52.9	54.7	59.6	66.1	72.3	83.7
Fuel Oil	41.57	32.4	28.3	37.6	33.2	33.0	32.8	32.8	32.6	32.4
Asphalt	n.a	14.8	23.4	26.6	25.2	27.4	29.8	32.6	35.5	38.6
Total oil product demand	**291.84**	**311.8**	**324.1**	**366.7**	**397.7**	**417.1**	**442.1**	**472.6**	**502.8**	**538.7**
Oil product demand growth %	***5.7%***	***6.9%***	***3.9%***	***13.2%***	***8.4%***	***4.9%***	***6.0%***	***6.9%***	***6.4%***	***7.1%***
Oil demand	**340.32**	**355.0**	**381.3**	**428.7**	**440.3**	**464.8**	**491.4**	**520.8**	**550.4**	**580.8**
Oil demand growth %	***5.5%***	***4.3%***	***7.4%***	***12.4%***	***2.7%***	***5.6%***	***5.7%***	***6.0%***	***5.7%***	***5.5%***
Oil product demand / Oil demand (x)	**0.86**	**0.88**	**0.85**	**0.86**	**0.90**	**0.90**	**0.90**	**0.91**	**0.91**	**0.93**

Source: CEIC, Reuters, , Deutsche Bank

Figure 15: Oil and oil product demand growth summary

(%)	2007	2008	2009	2010	2011	2012E	2013E	2014E	2015E	2016E
Diesel	5.6%	*8.3%*	*1.7%*	*6.4%*	*14.2%*	*5.5%*	*6.3%*	*7.6%*	*7.2%*	*6.7%*
Gasoline	5.3%	*11.4%*	*0.4%*	*11.6%*	*11.5%*	*6.8%*	*6.5%*	*6.2%*	*5.8%*	*5.8%*
Kerosene	10.6%	*4.0%*	*11.2%*	*21.2%*	*5.2%*	*7.2%*	*7.2%*	*7.2%*	*7.2%*	*7.2%*
LPG	5.4%	*-9.0%*	*1.6%*	*4.0%*	*7.8%*	*-0.7%*	*-0.3%*	*0.5%*	*-0.4%*	*-0.8%*
Naphtha	21.0%	*-2.0%*	*10.5%*	*27.5%*	*11.3%*	*3.4%*	*8.9%*	*11.0%*	*9.3%*	*15.8%*
Fuel Oil	-4.8%	*-22.1%*	*-12.6%*	*32.9%*	*-11.6%*	*-0.7%*	*-0.5%*	*0.0%*	*-0.5%*	*-0.8%*
Asphalt	n.a	*n.a*	*57.3%*	*13.9%*	*-5.3%*	*8.7%*	*9.0%*	*9.4%*	*8.9%*	*8.6%*
Total oil product demand growth	***5.7%***	***6.9%***	***3.9%***	***13.2%***	***8.4%***	***4.9%***	***6.0%***	***6.9%***	***6.4%***	***7.1%***
Oil demand growth	***5.5%***	***4.3%***	***7.4%***	***12.4%***	***2.7%***	***5.6%***	***5.7%***	***6.0%***	***5.7%***	***5.5%***

Source: CEIC, Reuters, , Deutsche Bank

Figure 16: Oil product demand mix

(%)	2007	2008	2009	2010	2011	2012E	2013E	2014E	2015E	2016E
Diesel	*42.8%*	*43.4%*	*42.4%*	*40%*	*42.0%*	*42.3%*	*42.4%*	*42.7%*	*43.0%*	*42.8%*
Gasoline	*18.9%*	*19.7%*	*19.0%*	*19%*	*19.3%*	*19.7%*	*19.8%*	*19.6%*	*19.5%*	*19.3%*
Kerosene	*4.3%*	*4.1%*	*4.4%*	*5%*	*4.6%*	*4.7%*	*4.8%*	*4.8%*	*4.8%*	*4.8%*
LPG	*8.0%*	*6.8%*	*6.6%*	*6%*	*6.1%*	*5.8%*	*5.4%*	*5.1%*	*4.8%*	*4.4%*
Naphtha	*11.8%*	*10.8%*	*11.5%*	*13%*	*13.3%*	*13.1%*	*13.5%*	*14.0%*	*14.4%*	*15.5%*
Fuel Oil	*14.2%*	*10.4%*	*8.7%*	*10%*	*8.4%*	*7.9%*	*7.4%*	*6.9%*	*6.5%*	*6.0%*
Asphalt	*n.a*	*4.8%*	*7.2%*	*7%*	*6.3%*	*6.6%*	*6.7%*	*6.9%*	*7.1%*	*7.2%*
	100.0%	***100.0%***	***100.0%***	***100.0%***	***100.0%***	***100.0%***	***100.0%***	***100.0%***	***100.0%***	***100.0%***

Source: CEIC, Reuters, , Deutsche Bank

Long term Oil and Oil product growth rates

Are China's LT growth rates for oil and oil product consumption slowing (Figure 17)?

Diesel and gasoline have traditionally made up ~42% and 19% of China's oil product demand (Figure 16). If China demand for oil and products is going to slow materially, it would have to show up in these products. Diesel looks as if it might be slowing although gasoline shows no sign of a slowdown yet (Figure 17).

Recent discussions with our friends at IHS-CERA, suggest that roughly 9% of China's gasoline pool is now cut with methanol. This is an interesting figure as 1) the gasoline demand growth numbers below certainly do not show any substitution slow-down; and 2) similar to the "tea-pots", China's methanol market has a large "grey market" component. Methanol in China is produced from coal, requires lots of water (which China does not have) and releases lots of CO2 (which China needs to cut back on due to its pollution problem) in the process. The PRC government updated its policy on coal-to-chemical investments on 23 March 2011, prohibiting investments in small-scale coal to chemical projects and imposing tight thresholds on large scale projects. Despite methanol substitution and slowing automobile sales (Figures 63-66) China's demand for gasoline has yet to show signs of slowing.

LPG and fuel oil are both being replaced by natural gas for purposes of industrial energy, space heating and residential cooking. This process will continue over the coming decades as China moves towards a more developed-market natural gas consumption profile (Figures 33, 35, 36 and 37). We cannot envision PRC authorities allowing the tea-pots to suddenly gain access to crude imports. We have thought about this issue for many years. We suspect that a sudden and dramatic increase in China's crude oil imports is not what the PRC authorities are attempting to engineer – to the contrary. The teapots represent 20-25% (80-100 tons pa) of China's total refining capacity.

Figure 17: Oil and oil products CAGR's

Demand CAGR's (%)	Crude Oil	Diesel	Gasoline	Kerosene	LPG	Naphtha	Fuel Oil	Asphalt
1980 - 2010	5.3%	7.5%	6.6%	5.3%	10.3%	n.a	0.7%	n.a
1990 - 2010	6.7%	8.8%	6.7%	8.3%	11.5%	n.a	0.5%	n.a
2000 - 2010	7.3%	8.0%	7.0%	7.2%	4.9%	n.a	-0.3%	n.a
2005 - 2010	7.3%	5.9%	7.2%	10.1%	1.8%	15.5%	-2.4%	n.a
2011 - 2016E	**5.7%**	**6.6%**	**6.2%**	**7.2%**	**-0.3%**	**9.6%**	**-0.5%**	**8.9%**

Source: CEIC, Reuters , Deutsche Bank

The NBS started to report asphalt demand beginning in 2008. From 2008 to 2011 asphalt consumption grew at a 3-year CAGR of 19.3%. We suspect that asphalt consumption took a dive in 2008-09 given the worldwide financial crises. We suspect that the exceedingly high growth rate of asphalt (2008-11) reflects its recovery off-of a low base of consumption (2008). As a result, we have toned down our growth estimates for asphalt 2011-16e on a rather arbitrary basis, given the lack of long-term historical data on the product.

Demand elasticity

Oil and / or oil product "demand elasticity" is calculated as:

- Oil and / or oil product demand growth (%) / GDP growth (%)".

We define "elasticity" of demand as the percentage growth in oil and / or oil product demand per unit growth of GDP.

We like to look at this data point over longer periods of time and for different time sequences (Figure 19). To project our China demand for crude oil we have in the past often used 0.70 to 0.73 demand elasticity times (x) China GDP growth forecasts. We suspect that this remains a reasonable, top-down approach to forecasting China's demand for crude oil.

Note that the difference between China's "Oil demand elasticity" in Figure 18 and Figure 19 is the "Oil demand" numerator. In Figure 18, we are using China's domestic Consumption of oil as reported by the NBS, whereas in Figure 19 we are using China's "Apparent Demand" for oil as reported by the NBS. The difference is that "Apparent Demand" is estimated by taking NBS reported Production + Imports – Exports; whereas "Consumption" is a single point data as reported by the NBS. The two numbers are generally a bit different in absolute value.

Figure 18: Oil and oil product demand elasticity

(x)	2007	2008	2009	2010	2011	2012E	2013E	2014E	2015E	2016E
Diesel	0.39	0.86	0.18	0.61	1.53	0.70	0.77	0.85	0.88	0.87
Gasoline	0.37	1.18	0.05	1.11	1.23	0.88	0.79	0.69	0.71	0.75
Kerosene	0.74	0.42	1.22	2.04	0.55	0.92	0.87	0.80	0.88	0.93
LPG	0.38	(0.93)	0.18	0.39	0.84	(0.09)	(0.03)	0.05	(0.05)	(0.10)
Naphtha	1.48	(0.21)	1.14	2.65	1.22	0.44	1.08	1.24	1.14	2.05
Fuel Oil	(0.34)	(2.31)	(1.37)	3.16	(1.25)	(0.09)	(0.06)	(0.00)	(0.07)	(0.10)
Asphalt	n.a	n.a	6.23	1.33	(0.57)	1.12	1.09	1.06	1.10	1.12
Total oil product demand	**0.40**	**0.71**	**0.43**	**1.26**	**0.91**	**0.62**	**0.73**	**0.78**	**0.79**	**0.93**
Oil demand elasticity	**0.39**	**0.45**	**0.81**	**1.20**	**0.29**	**0.71**	**0.70**	**0.67**	**0.70**	**0.72**
GDP growth %	***14.2%***	***9.6%***	***9.2%***	***10.4%***	***9.3%***	***7.8%***	***8.2%***	***8.9%***	***8.1%***	***7.7%***

Source: CEIC, Reuters, Deutsche Bank

In Figure 19 below, the outliers in red have not been considered in calculating "Adjusted Mean". The outliers are considered however in "Median" values. In the past we have used China's mean and / or median values of 0.73 and 0.70 to forecast China's demand for oil.

Figure 19: Global oil demand elasticity- Oil demand growth / GDP growth

Year	USA	Japan	Germany	China	Brazil	Turkey	Saudi Arabia	Russia
1981	-2.39	-1.38	-84.95	-0.95	1.02	0.91	4.23	na
1982	2.79	-2.13	7.14	-0.13	2.83	2.03	-0.97	na
1983	-0.02	-0.10	-1.45	0.19	0.81	-0.30	-1.17	na
1984	0.36	1.16	-0.18	0.23	0.42	0.66	-1.76	na
1985	-0.10	-0.84	1.44	0.45	0.35	-0.30	-0.41	na
1986	1.17	0.37	2.27	0.74	1.39	1.32	-0.36	na
1987	0.64	0.09	-1.93	0.53	0.64	1.45	-1.27	na
1988	1.02	1.03	-0.02	0.64	9.83	2.92	0.21	na
1989	-0.05	0.68	-1.53	1.15	0.53	-26.55	-26.60	na
1990	-0.90	1.14	0.81	-0.25	0.64	0.71	1.64	na
1991	8.88	0.54	0.92	0.87	1.27	-0.23	0.76	na
1992	0.64	2.61	0.40	0.61	-8.28	1.07	-1.37	na
1993	0.32	-12.67	-1.85	0.72	0.31	1.83	85.51	1.83
1994	0.64	7.13	-0.33	0.12	0.81	0.78	15.28	1.08
1995	-0.10	0.03	0.00	0.75	1.23	1.39	-23.62	2.49
1996	0.95	0.17	1.65	0.85	3.17	0.69	1.69	3.04
1997	0.31	-0.90	-0.37	1.38	2.02	0.10	1.28	-0.56
1998	0.43	2.11	0.05	0.07	103.44	-0.39	2.55	0.78
1999	0.60	-10.36	-1.52	0.84	11.00	0.17	-4.78	0.32
2000	0.24	-0.25	-0.62	0.80	-0.23	0.80	0.55	-0.21
2001	-0.16	-16.82	1.13	0.23	1.07	0.68	1.95	-0.19
2002	0.08	-6.13	1099.67	0.94	-0.51	0.42	11.17	0.21
2003	0.67	1.55	8.42	0.97	-3.64	0.23	0.98	-0.01
2004	1.12	-1.14	-0.76	1.72	0.11	0.01	1.43	-0.01
2005	0.09	0.64	-1.70	0.25	0.39	-0.32	0.91	-0.18
2006	-0.30	-1.33	0.28	0.48	0.76	-0.35	1.46	0.52
2007	-0.08	-1.46	-3.36	0.34	1.23	0.74	3.58	-0.07
2008	0.00	2.70	5.75	0.45	1.14	2.16	2.03	0.79
2009	1.95	2.10	0.89	0.70	2.77	1.44	15.73	0.64
2010	0.77	0.19	0.43	1.23	1.18	-0.52	2.02	0.88
2011	-1.06	-0.15	-1.09	0.60	0.33	0.89	0.58	1.30
Adj MEAN :								
1981-2011	**0.32**	**0.29**	**-0.03**	**0.56**	**0.99**	**0.70**	**1.21**	**0.67**
1999-2011	**0.30**	**0.28**	**-0.05**	**0.73**	**0.75**	**0.49**	**2.20**	**0.31**
MEDIAN :								
1981-2011	**0.32**	**0.09**	**0.00**	**0.61**	**0.81**	**0.69**	**0.98**	**0.52**
1999-2011	**0.09**	**-0.25**	**0.28**	**0.70**	**0.76**	**0.42**	**1.46**	**0.21**

Source: BP statistical Review, IMF, CEIC Reuters, Deutsche Bank

Demand intensity

Oil and oil product "demand intensity" is calculated as:

- Oil and / or oil product demand (000 bpd) / GDP (US$ bn).

Oil product demand intensity indicates how much oil and / or total oil product is used per nominal value of GDP. There are two ways to make this ratio look more efficient: 1) grow GDP faster than oil and / or oil product consumption, and / or 2) reduce the amount of oil and / or oil product used in generating a nominal unit of GDP growth. China has been growing its GDP at +/- 10% pa for the past 20-years, whereas it has been growing its oil and product demand by +/- 6.5% pa over the same period of time.

Figure 20: Oil demand intensity (000 bpd / US$ bn)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
United States	1.9	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2
China	3.6	3.5	3.5	3.1	2.7	2.2	1.8	1.6	1.6	1.3
Japan	1.3	1.3	1.1	1.2	1.2	1.1	1.0	0.9	0.8	0.8
India	4.7	4.1	3.7	3.2	2.8	2.5	2.4	2.6	2.0	1.9
Russia	7.4	6.1	4.4	3.4	2.8	2.0	1.7	2.2	1.9	1.6
Germany	1.3	1.1	1.0	0.9	0.9	0.7	0.7	0.7	0.7	0.7
Canada	2.8	2.4	2.2	2.0	1.8	1.6	1.5	1.6	1.5	1.3
United Kingdom	1.1	0.9	0.8	0.8	0.7	0.6	0.6	0.7	0.7	0.6

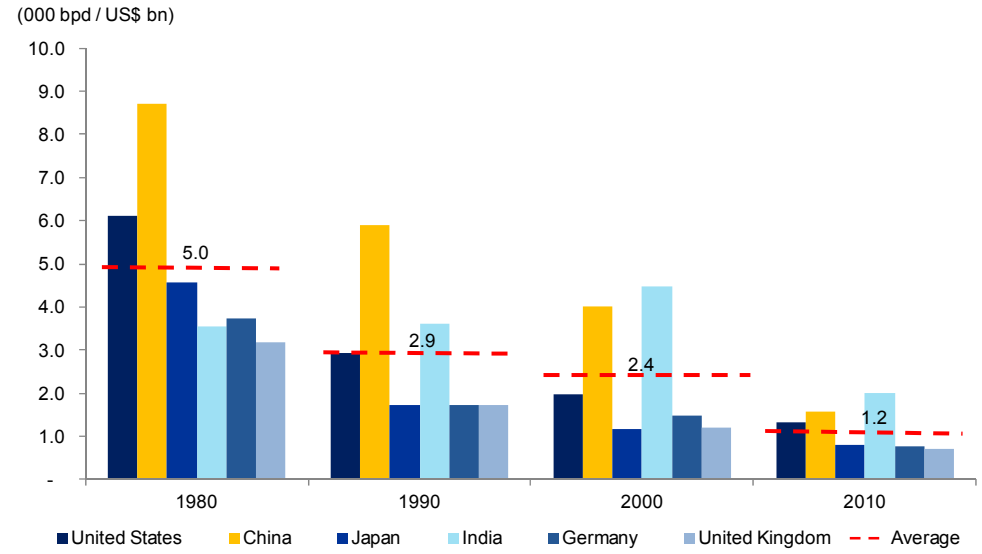
Source: BP Statistical Review, IMF, Deutsche Bank

Figure 21: Total oil product demand intensity (000 bpd / US$ bn)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
United States	1.9	1.8	1.7	1.6	1.5	1.5	1.2	1.3	1.3	1.3
China	3.5	3.4	3.3	3.0	2.7	2.2	1.7	1.7	1.6	1.3
Japan	1.3	1.3	1.1	1.2	1.2	1.2	0.7	0.9	0.8	0.8
India	4.4	4.0	3.5	3.1	3.0	2.4	2.3	2.5	2.0	1.8
Russia	7.6	6.2	4.7	3.6	2.8	2.1	1.7	2.4	2.0	1.7
Germany	1.3	1.1	1.0	0.9	0.9	0.7	0.6	0.7	0.8	0.7
Canada	2.8	2.5	2.3	2.0	1.7	1.6	1.2	1.6	1.4	1.3
United Kingdom	1.1	0.9	0.8	0.8	0.7	0.6	0.6	0.8	0.7	0.7

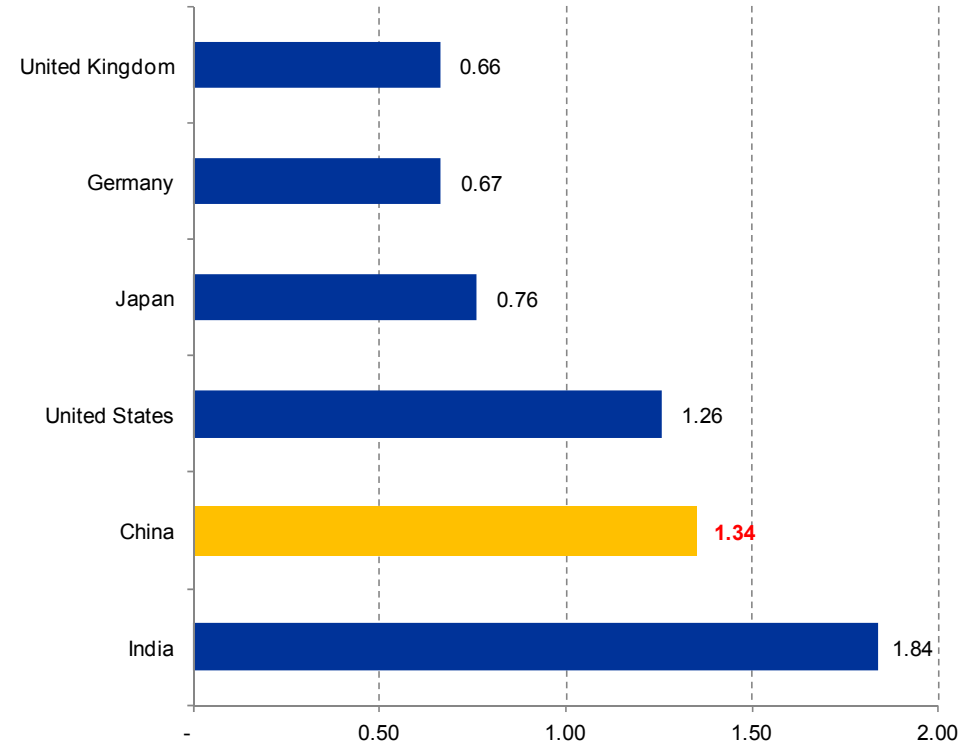
Source: EIA, IMF, Deutsche Bank

Figure 22: China's oil product demand intensity – overtakes India



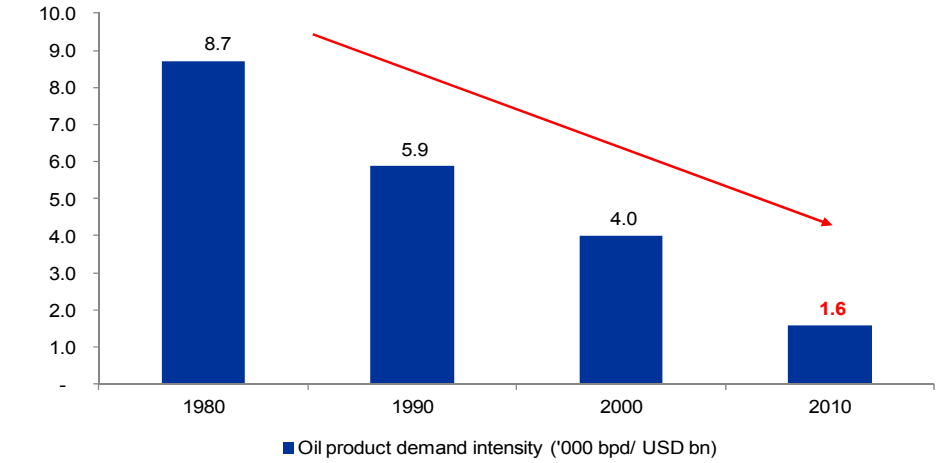
Source: EIA, IMF, Deutsche Bank

Figure 23: Oil product demand intensity in 2011



Source: EIA, IMF, Deutsche Bank

Figure 24: Oil product demand intensity in China

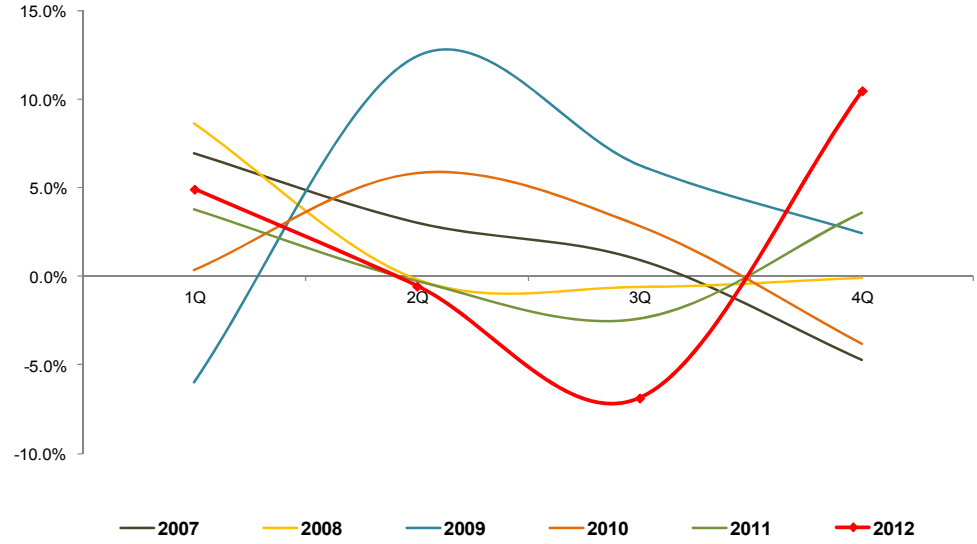


Source: EIA, IMF, Deutsche Bank

Seasonal Demand

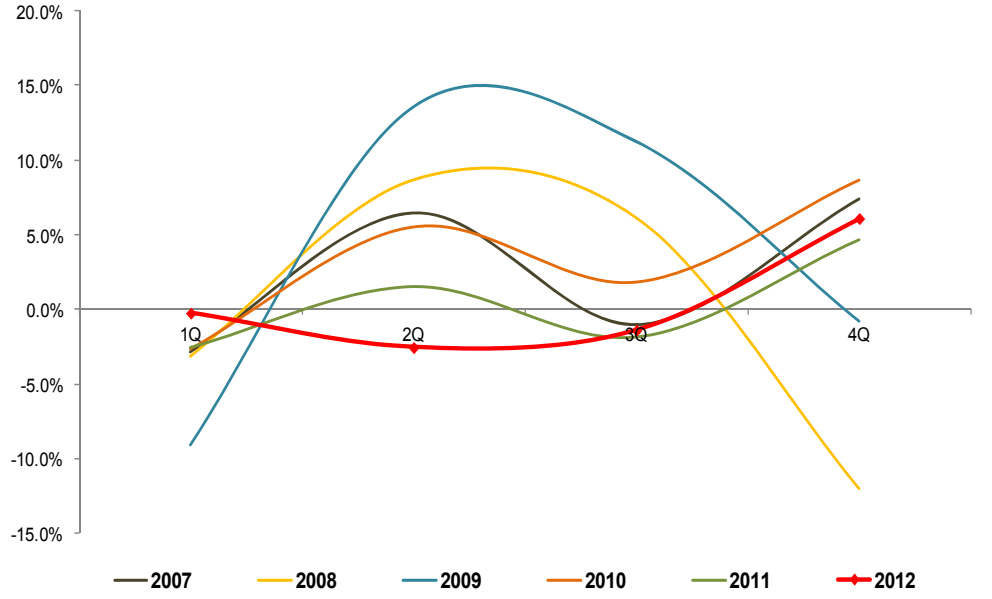
The below graphs provide a glimpse into China's seasonal oil and product demand. Diesel demand seems to build through 2Q – spring planting season. Gasoline demand seems to build through 3Q. Fuel oil demand builds into the winter months – space heating. Jet travel seems to peak 3Q. Naphtha shows no sign of seasonality – ethylene capacity additions are not seasonal events. The most remarkable seasonal graph in our opinion is "Crude oil apparent demand growth" (Figure 25). We suspect that the dramatic pick up in "Apparent oil demand" which began 3Q12 and runs counter to previous year seasonal patterns, is the result of economic pump priming as the new government takes over the reins of power in Beijing. It's always nice to start-off the new administration on a positive note.

Figure 25: Crude oil apparent demand growth



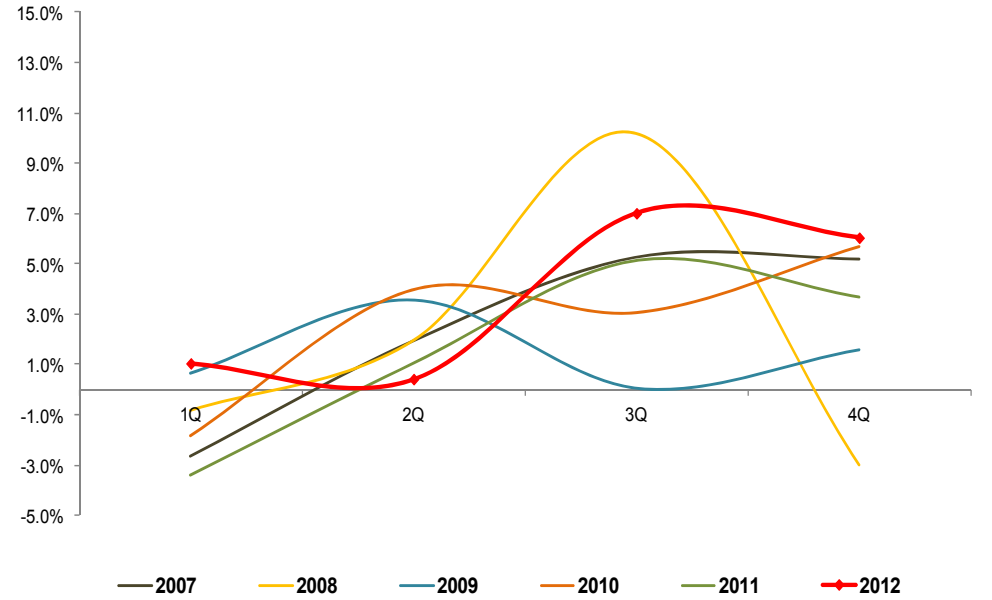
Source: CEIC, Reuters, Deutsche Bank

Figure 26: Diesel apparent demand growth



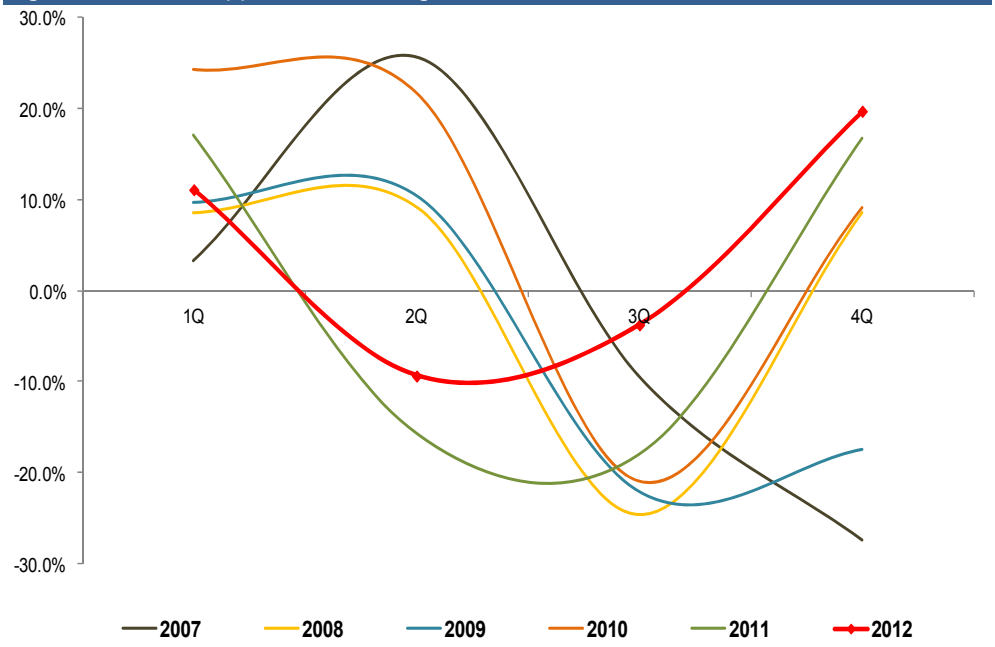
Source: CEIC, Reuters, Deutsche Bank

Figure 27: Gasoline apparent demand growth



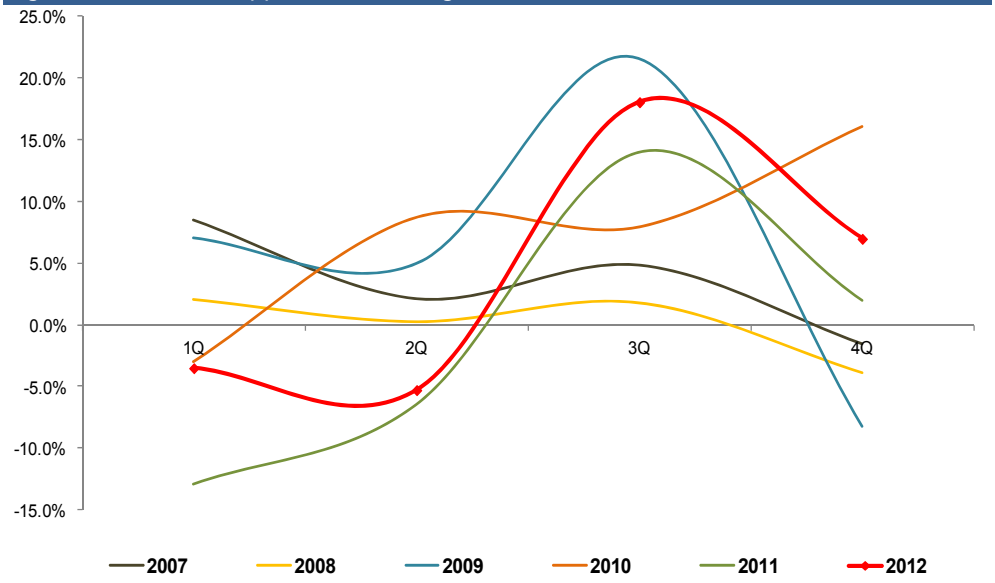
Source: CEIC, Reuters, Deutsche Bank

Figure 28: Fuel oil apparent demand growth



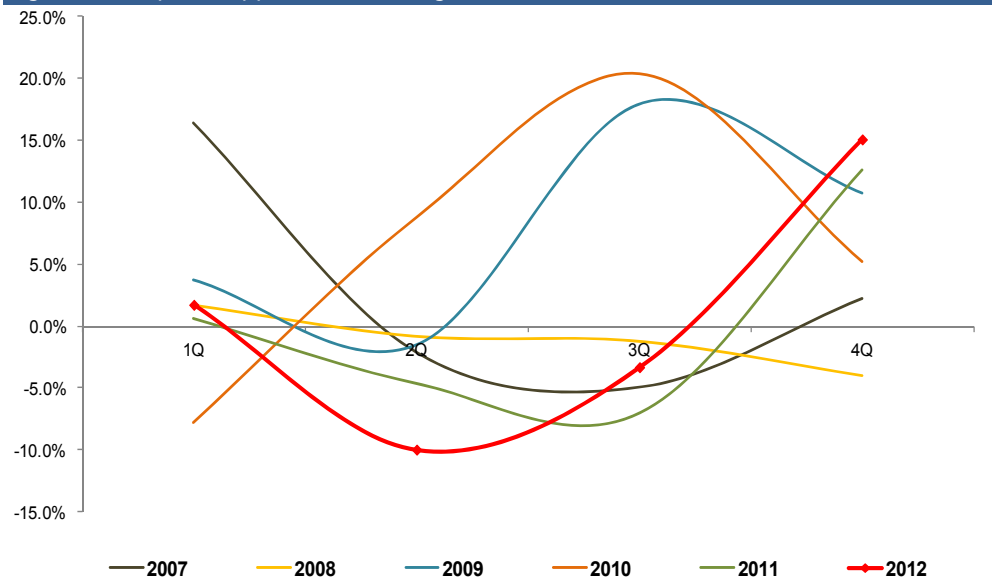
Source: CEIC, Reuters, Deutsche Bank

Figure 29: Kerosene apparent demand growth



Source: CEIC, Reuters, Deutsche Bank

Figure 30: Naphtha apparent demand growth

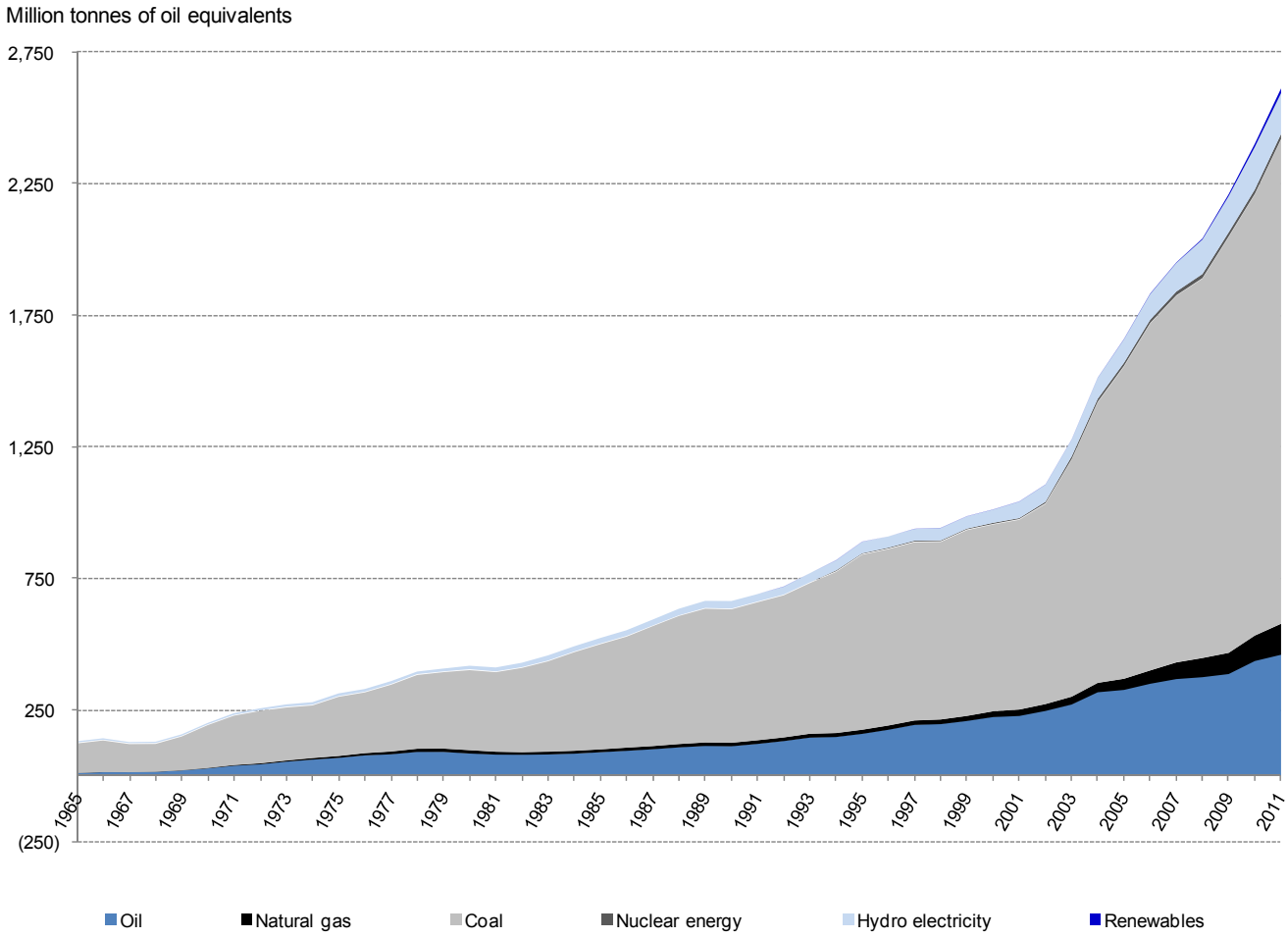


Source: CEIC, Reuters, Deutsche Bank

Primary energy consumption – China's air pollution issue

Figure 31, below depicts how China's "primary energy" (oil, natural gas, coal, nuclear, hydro electricity and renewable) consumption has evolved since 1965. The most striking feature of Figure 31 is China's overwhelming and continued reliance on coal as an energy source. In Figures 32-38, we compare China's primary energy consumption to that of the United States, India, Japan, Germany and the UK. Figure 38 depicts how the UK cleaned up its air pollution mess from 1948 through 2008. We suspect that China's air pollution problem will likewise not be solved overnight, but rather over the coming decades. Because of the long-tail required to reduce environmental degradation, we suspect that change in China will be gradual but persistent and that the impact on near-term (2012-16e) oil and oil product demand inconsequential.

Figure 31: Primary energy consumption trend in China

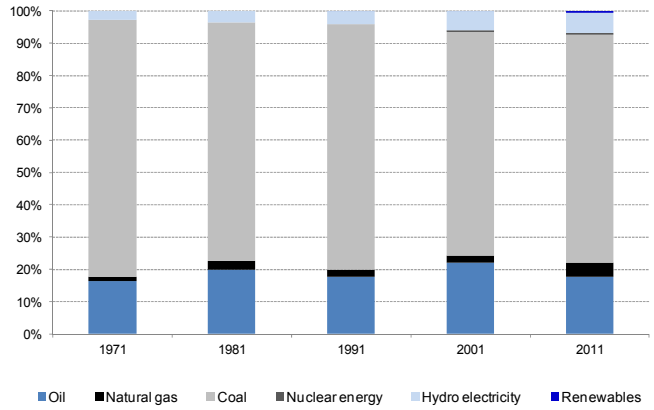


Source: BP Statistical Review, Deutsche Bank

Note: Renewable energy demand data for China is available only since 1990.

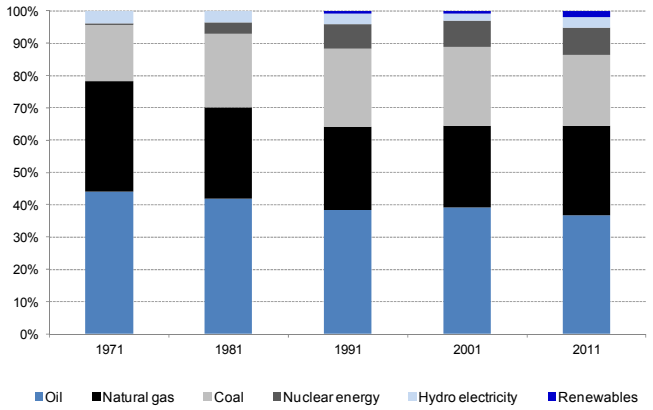
Primary energy consumption of various countries

Figure 32: Primary energy consumption of China



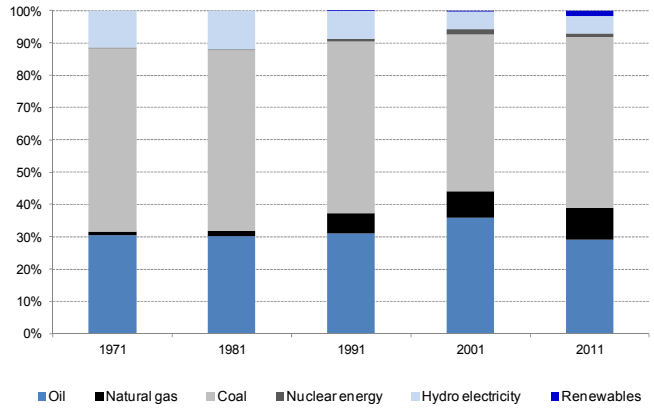
Source: BP Statistical Review, Deutsche Bank

Figure 33: Primary energy consumption of USA



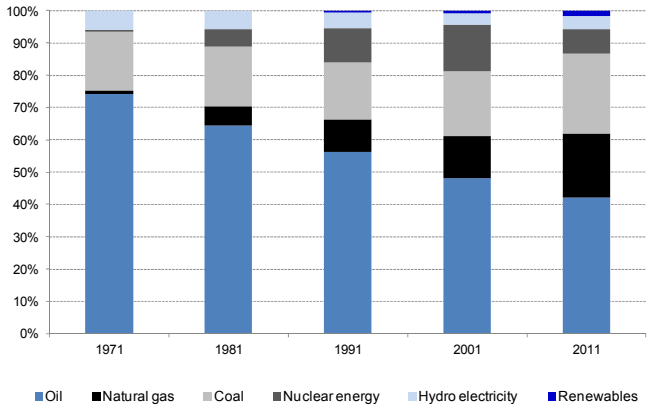
Source: BP Statistical Review, Deutsche Bank

Figure 34: Primary energy consumption of India



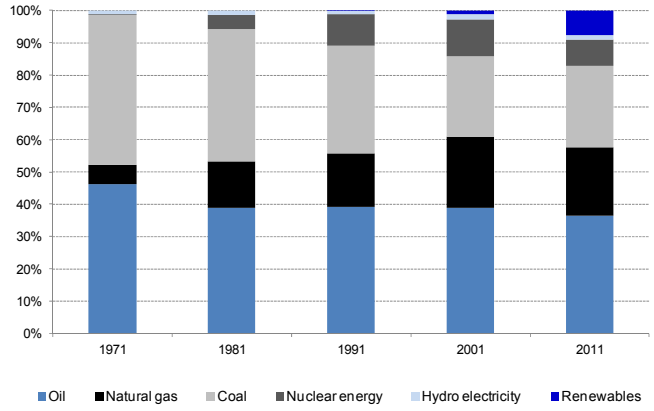
Source: BP Statistical Review, Deutsche Bank

Figure 35: Primary energy consumption of Japan



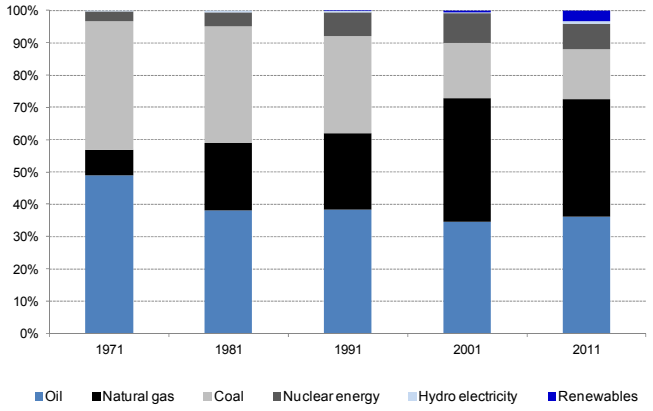
Source: BP Statistical Review, Deutsche Bank

Figure 36: Primary energy consumption of Germany



Source: BP Statistical Review, Deutsche Bank

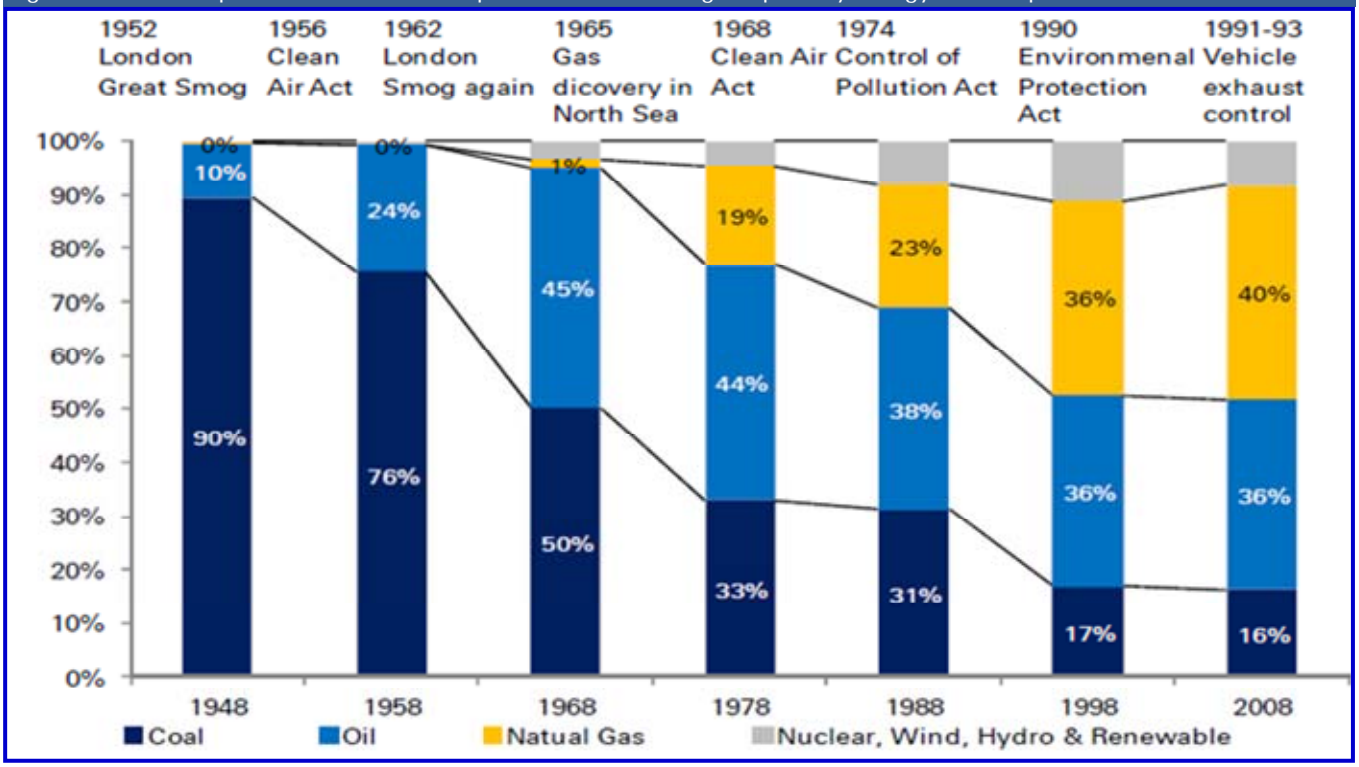
Figure 37: Primary energy consumption of UK



Source: BP Statistical Review, Deutsche Bank

In 1948, coal represented 90% of the UK's primary energy consumption. By 2008, coal represented only 16% of the UK's primary energy consumption. In terms of coal consumption, and cleaning up its environment, China seems to be roughly 55-years behind the UK. From the below figure, we can estimate that UK was most probably 80% dependent on coal sometime around 1954-1958.

Figure 38: Roadmap of UK environmental protection and change in primary energy consumption



Source: Deutsche Bank; Department of Environment and Climate Change- UK

Micro – bottoms up

Forecasting oil and oil product demand

In forecasting our China oil and oil product demand we use the following variables / drivers by product. Jun Ma is DB's Chief China Economist; Joe Liew is DB's crack Asia Airline / Transport analyst; Vincent Ha is DB's top rated China Auto analyst; and D. Hurd is DB's Asia Oil and Gas analyst.

Figure 39: Drivers of forecasting oil and oil product demand

Variable	Means of estimation	Crude oil	Diesel	Gasoline	Kerosene	LPG	Naphtha	Fuel Oil	Asphalt
Real GDP growth	Jun Ma	✓	✓			✓			
Industrial production growth	Jun Ma						✓		
Waterway freight turnover growth	David Hurd							✓	
Air passenger traffic growth	Joe Liew				✓				
Growth in total length of highways	David Hurd								✓
Vehicles growth	Vincent Ha		✓	✓					
Natural gas demand in residential sector growth	David Hurd					✓			
Natural gas demand in industry sector growth	David Hurd							✓	
Urbanization growth	David Hurd	✓							
Ethylene capacity growth	David Hurd						✓		

Source: Deutsche Bank

Growth forecasts as provided by the above analysts, and used in forecasting oil and / or oil product consumption / demand (2012-16e) are presented in Figure 40 below. Waterway freight turnover growth, total Length of Highway growth as well as urbanization growth are forecasted from past growth rates as reported by CEIC / NBS.

Figure 40: Demand divers and data sources

Variable	Real GDP growth	Industrial production growth	Air passenger traffic growth	Vehicles growth	Waterway freight turnover growth	Growth in total length of highways	Natural gas consumption in residential sector growth	Natural gas demand in industry sector growth	Urbanization growth	Ethylene capacity growth
Historical data	CEIC	Jun Ma	CEIC	CEIC	CEIC	CEIC	CEIC	CEIC	CEIC	CMAI
Estimates data	Jun Ma	Jun Ma	Joe Liew	Vincent Ha	David Hurd	David Hurd	David Hurd	David Hurd	David Hurd	David Hurd
2006	12.70	16.60	13.41	17.02	11.70	79.07	29.19	16.78	3.69	21.04
2007	14.20	18.50	14.04	17.88	15.86	3.67	39.73	24.92	4.02	12.99
2008	9.60	12.90	3.51	17.01	(21.81)	4.09	18.65	10.83	2.92	1.78
2009	9.20	11.00	16.49	23.16	14.51	3.50	4.44	8.71	3.38	7.91
2010	10.40	15.70	13.89	24.22	18.89	3.82	27.71	17.83	3.82	35.13
2011	9.30	13.90	8.69	19.92	10.22	(3.34)	16.52	23.36	3.14	4.27
2012E	7.80	10.00	10.00	16.50	10.78	1.88	15.00	15.00	4.20	4.09
2013E	8.20	11.00	10.00	15.78	11.33	1.98	15.00	15.00	4.20	10.94
2014E	8.90	12.50	10.00	14.96	12.30	2.15	15.00	15.00	4.20	12.47
2015E	8.10	11.00	10.00	14.06	11.19	1.95	15.00	15.00	4.20	11.53
2016E	7.70	10.50	10.00	14.06	10.64	1.86	15.00	15.00	4.20	21.55

Source: Deutsche Bank; CEIC

Crude oil demand

- Forecasting crude oil demand in China

We use the following regression equation to forecast crude oil demand in China:

*Crude oil demand growth = (2.285) + 1.152 * Urbanization growth + 0.386 * Real GDP growth*

Interpreting the equation-

1. The intercept of the regression equation suggests what the oil demand growth is when both urbanization growth and real GDP growth rates are zero. Therefore, according to the equation, when urbanization growth and real GDP growth rates are zero, oil demand will fall by 2.3%

   Holding all the other independent variables constant;

2. When urbanization increases by 1%, oil demand will increase by 1.2%. There's a direct/ positive relationship between the oil demand growth and urbanization growth rate.

3. Similarly, when real GDP increases by 1%, oil demand will increase by 0.4%

Using the regression equation above, we are forecasting an average oil demand growth rate of 5.7% for 2012-16e. This compares to an oil demand growth rate of 6.5% from 2007-11.

Figure 41: Historical and forecasted oil demand (1997-16E)

Year	Crude oil demand (million tons)	Crude oil demand growth (%)	Real gross domestic product growth (%)	Urbanization growth (%)
1997	173.67	9.5	9.3	5.8
1998	173.57	-0.1	7.8	5.5
1999	189.49	9.2	7.6	5.1
2000	212.32	12.0	8.4	4.9
2001	213.43	0.5	8.3	4.7
2002	225.44	5.6	9.1	4.5
2003	249.22	10.5	10.0	4.3
2004	287.49	15.4	10.1	3.6
2005	300.86	4.7	11.3	3.6
2006	322.45	7.2	12.7	3.7
2007	340.32	5.5	14.2	4.0
2008	354.98	4.3	9.6	2.9
2009	381.29	7.4	9.2	3.4
2010	428.75	12.4	10.4	3.8
2011	440.32	2.7	9.3	3.1
2012E	464.81	5.6	7.8	4.2
2013E	491.39	5.7	8.2	4.2
2014E	520.81	6.0	8.9	4.2
2015E	550.38	5.7	8.1	4.2
2016E	580.78	5.5	7.7	4.2

Source: CEIC, Reuters, Deutsche Bank

Figure 42: Regression statistics and correlation data

Regression statistics of oil demand growth against IP growth	
Multiple R	**0.506**
R Square	**0.256**
Adjusted R Square	**0.173**
Standard Error	**1.444**
Observations	**21**

Correlation of oil demand growth with	
GDP growth rate	**13.5%**
Urbanization growth rate	**21.5%**

Source: Deutsche Bank

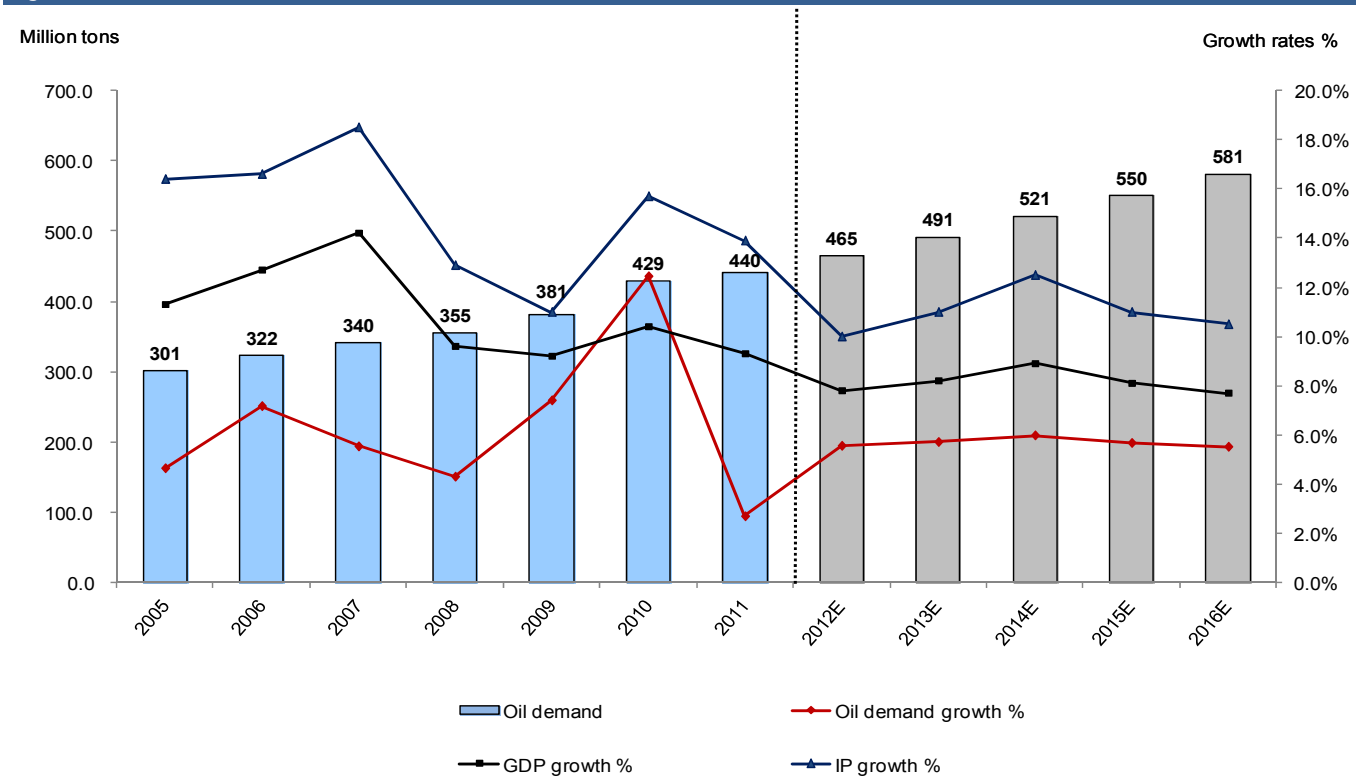
We ran the regression using historical data from 1991 to 2011. For correlation analysis we used data from 1987 to 2011.

Figure 43: China oil demand elasticity

	Oil demand elasticity with	
Year	**GDP growth**	**IP growth**
2000	1.43	1.06
2001	0.06	0.05
2002	0.62	0.45
2003	1.05	0.62
2004	1.52	0.92
2005	0.41	0.28
2006	0.57	0.43
2007	0.39	0.30
2008	0.45	0.33
2009	0.81	0.67
2010	1.20	0.79
2011	0.29	0.19
2012E	0.71	0.56
2013E	0.70	0.52
2014E	0.67	0.48
2015E	0.70	0.52
2016E	0.72	0.53
AVG (1981 - 2010)	**0.53**	**n.a**
AVG (1990 - 2010)	**0.66**	**n.a**
AVG (2000 - 2010)	**0.77**	**0.54**
AVG (2005 - 2010)	**0.64**	**0.47**
AVG (2011 - 2016E)	**0.63**	**0.47**

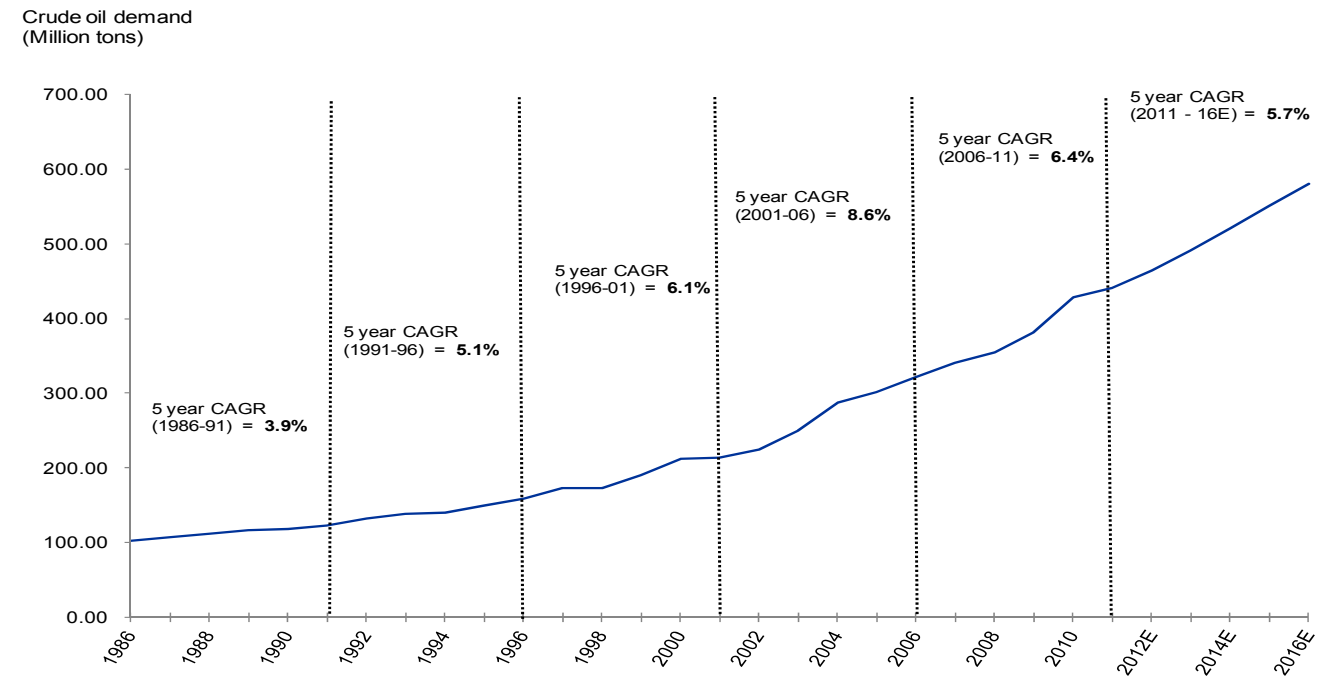
Source: CEIC, Reuters, Deutsche Bank

Figure 44: Oil demand and demand drivers (2005-16E)



Source: CEIC, Reuters, Deutsche Bank

Figure 45: Crude oil demand and 5-year CAGR's



Source: CEIC, Reuters, Deutsche Bank

Diesel demand

- Forecasting diesel demand in China

We use the following regression equation to forecast diesel demand in China:

*Diesel demand growth = 5.538 + 1.134 * Real GDP growth + (0.539) * Vehicles growth rate*

Interpreting the equation-

1. The intercept of the equation suggests that the diesel demand will increase by 5.5% when real GDP growth and vehicles growth rates are zero.

   Holding all the other independent variables constant;

2. When real GDP increases by 1%, diesel demand will increase by 1.1%.

3. In contrary, when vehicles growth increases by 1%, diesel demand will fall by -0.5%

Using the regression equation above, we are forecasting an average diesel demand growth rate of 6.7% pa for 2012-16e. This compares to a diesel demand growth rate of 7.2% pa from 2007-11.

Figure 46: Historical and forecasted diesel demand (1997-16E)

Year	Diesel demand (million tons)	Diesel demand growth (%)	Real gross domestic product growth (%)	Vehicles growth (%)
1997	52.79	9.4	9.3	10.8
1998	53.10	0.6	7.8	8.2
1999	62.04	16.8	7.6	10.1
2000	68.06	9.7	8.4	10.7
2001	71.58	5.2	8.3	12.0
2002	76.67	7.1	9.1	13.9
2003	84.09	9.7	10.0	16.1
2004	98.96	17.7	10.1	13.0
2005	109.72	10.9	11.3	17.3
2006	118.35	7.9	12.7	17.0
2007	124.97	5.6	14.2	17.9
2008	135.33	8.3	9.6	17.0
2009	137.57	1.7	9.2	23.2
2010	146.34	6.4	10.4	24.2
2011	167.17	14.2	9.3	19.9
2012E	176.36	5.5	7.8	16.5
2013E	187.53	6.3	8.2	15.8
2014E	201.73	7.6	8.9	15.0
2015E	216.16	7.2	8.1	14.1
2016E	230.63	6.7	7.7	14.1

Source: CEIC, Reuters, Deutsche Bank

Figure 47: Regression statistics and correlation data	
Regression statistics of diesel demand growth against IP growth	
Multiple R	**0.679**
R Square	**0.461**
Adjusted R Square	**0.342**
Standard Error	**1.271**
Observations	**12**
Correlation of diesel demand growth with	
GDP growth rate	**31.2%**
Vehicles growth rate	**-5.6%**

Source: Deutsche Bank

We ran the regression using historical data from 2000 to 2011. For correlation analysis we used data from 1987 to 2011.

Figure 48: China diesel demand elasticity

Year	Diesel demand elasticity with	
	GDP growth	IP growth
2000	1.16	0.85
2001	0.62	0.52
2002	0.78	0.56
2003	0.97	0.57
2004	1.75	1.06
2005	0.96	0.66
2006	0.62	0.47
2007	0.39	0.30
2008	0.86	0.64
2009	0.18	0.15
2010	0.61	0.41
2011	1.53	1.02
2012E	0.70	0.55
2013E	0.77	0.58
2014E	0.85	0.61
2015E	0.88	0.65
2016E	0.87	0.64
AVG (1986 - 2010)	**0.86**	**n.a**
AVG (1990 - 2010)	**0.81**	**n.a**
AVG (2000 - 2010)	**0.81**	**0.56**
AVG (2005 - 2010)	**0.61**	**0.44**
AVG (2012E - 2016E)	**0.82**	**0.60**

Source: CEIC, Reuters, Deutsche Bank

Diesel demand trends

Figure 49 below depicts the makeup of diesel demand in China since 1993. Diesel into "Transport" has been growing at the expense of "Farming" and "Industry". We suspect that urbanization is driving lower diesel consumption in the farming community as the agricultural process in China becomes more efficient – more industrialized. The decline in "Industry" diesel consumption can only be explained by the increase in natural gas consumption though out China. As explained earlier in this report we view "Residential" diesel consumption as an oddity and we suspect that "Residential" consumption of diesel may have more to do with "Transport" and "Farming" than with home generators for the provision of electricity.

Figure 49: Diesel demand from different segments

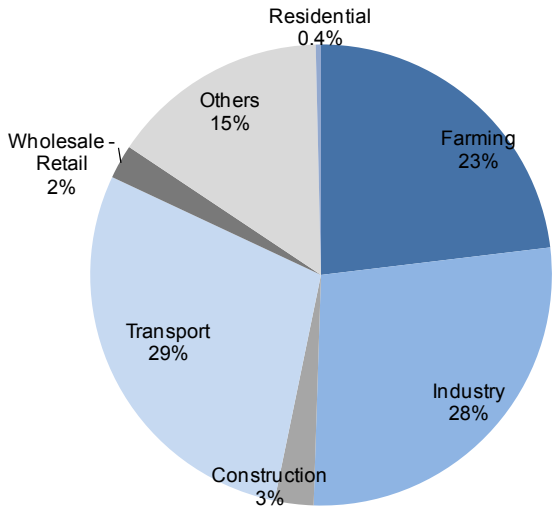
Year	Farming	Industry	Construction	Transport	Wholesale - Retail	Others	Residential
1993	25.6%	23.8%	2.9%	27.9%	3.7%	15.9%	0.2%
1994	24.6%	28.9%	3.0%	26.2%	2.2%	14.9%	0.3%
1995	23.2%	27.5%	2.7%	28.8%	2.4%	14.9%	0.4%
1996	10.6%	23.2%	3.3%	46.9%	1.9%	12.0%	2.3%
1997	10.1%	31.8%	2.8%	40.2%	1.6%	11.3%	2.3%
1998	10.6%	23.1%	2.9%	49.2%	1.6%	9.9%	2.7%
1999	10.1%	24.9%	3.0%	47.9%	1.5%	9.8%	2.7%
2000	10.2%	24.9%	3.0%	48.4%	1.4%	9.4%	2.6%
2001	10.4%	25.1%	3.1%	47.8% I	1.4%	9.4%	2.8% I
2002	10.7% D	24.5% D	3.2%	47.8% N	1.4%	9.7%	2.8% N
2003	11.2% E	22.8% E	3.3%	49.2% C	1.3%	9.4%	2.9% C
2004	11.0% C	21.1% C	3.4%	50.4% R	1.1%	9.3%	3.8% R
2005	11.7% L	18.1% L	3.5%	53.7% E	1.1%	8.2%	3.7% E
2006	11.5% I	16.6% I	3.6%	55.3% A	1.1%	7.9%	4.0% A
2007	9.8% N	15.8% N	3.5% F	57.5% S	1.1% F	8.1% F	4.4% S
2008	8.1% I	18.6% I	2.7% L	56.5% I	1.1% L	8.5% L	4.4% I
2009	8.2% N	17.1% N	3.0% A	57.4% N	1.3% A	8.2% A	4.7% N
2010	8.2% G	14.8% G	3.3% T	58.2% G	1.3% T	8.8% T	5.3% G

Source: CEIC, Deutsche Bank

Segmental contribution-

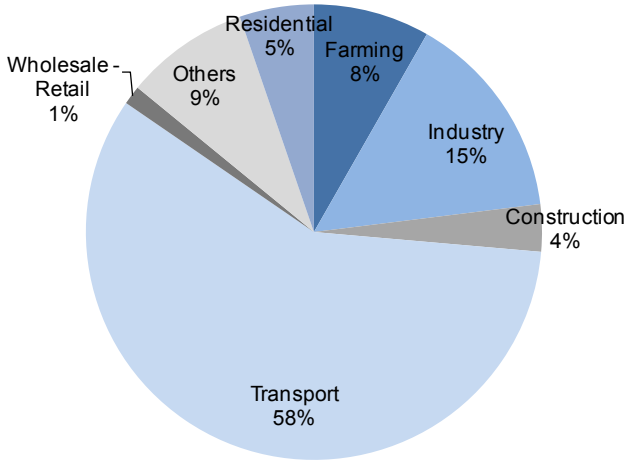
Diesel into "Transport" expands, while diesel into "Industrial" and "Farming" contracts. The pie chart progression (Figures 50-51) below reads "developing country X moving towards developed country status". We suspect the diesel-to-transport trend will continue to expand into the future, particularly once the NBS figures out that its "Residential" consumption of diesel is going into automobiles/ trucks and/ or farm equipment.

Figure 50: Segmental consumption of diesel- 1995



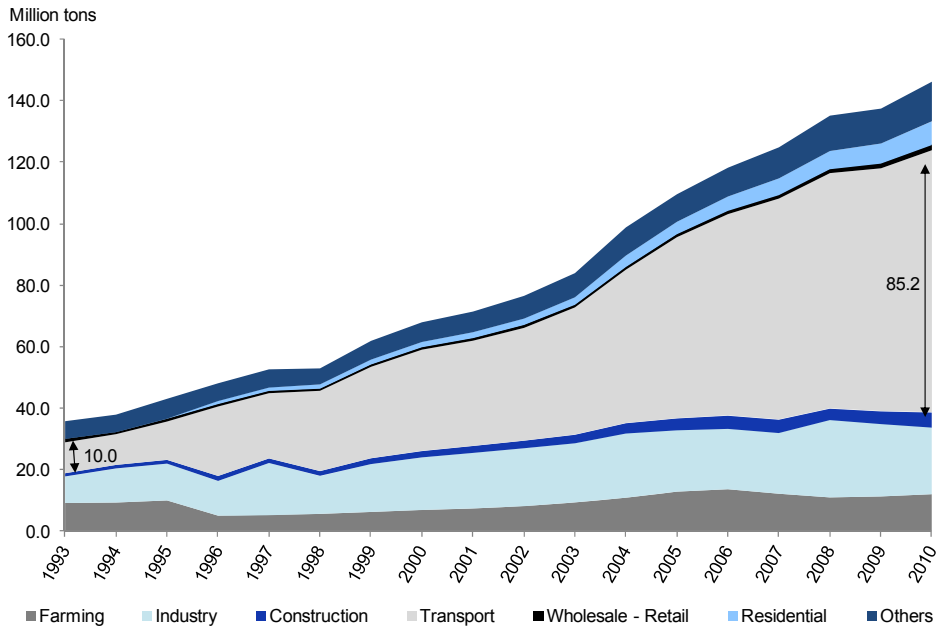
Source: CEIC, Deutsche Bank

Figure 51: Segmental consumption of diesel- 2010



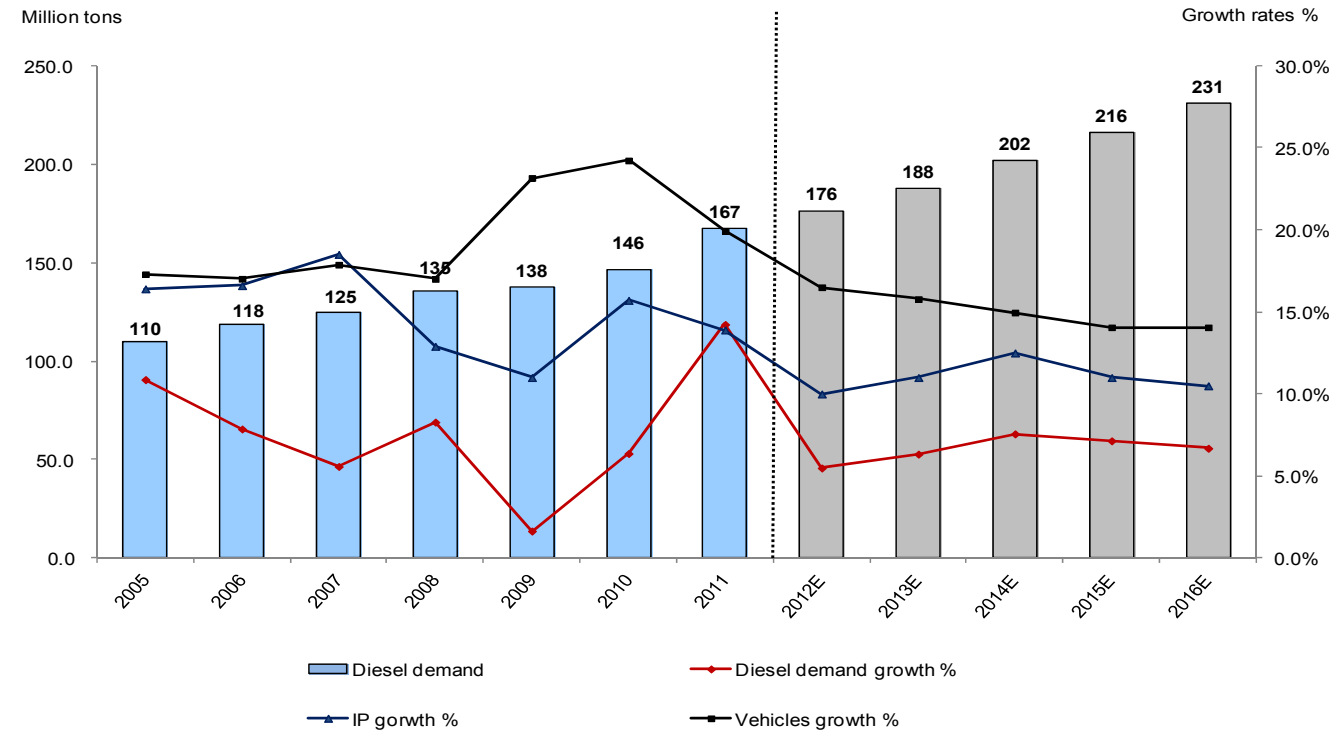
Source: CEIC, Deutsche Bank

Figure 52: Diesel consumption trends



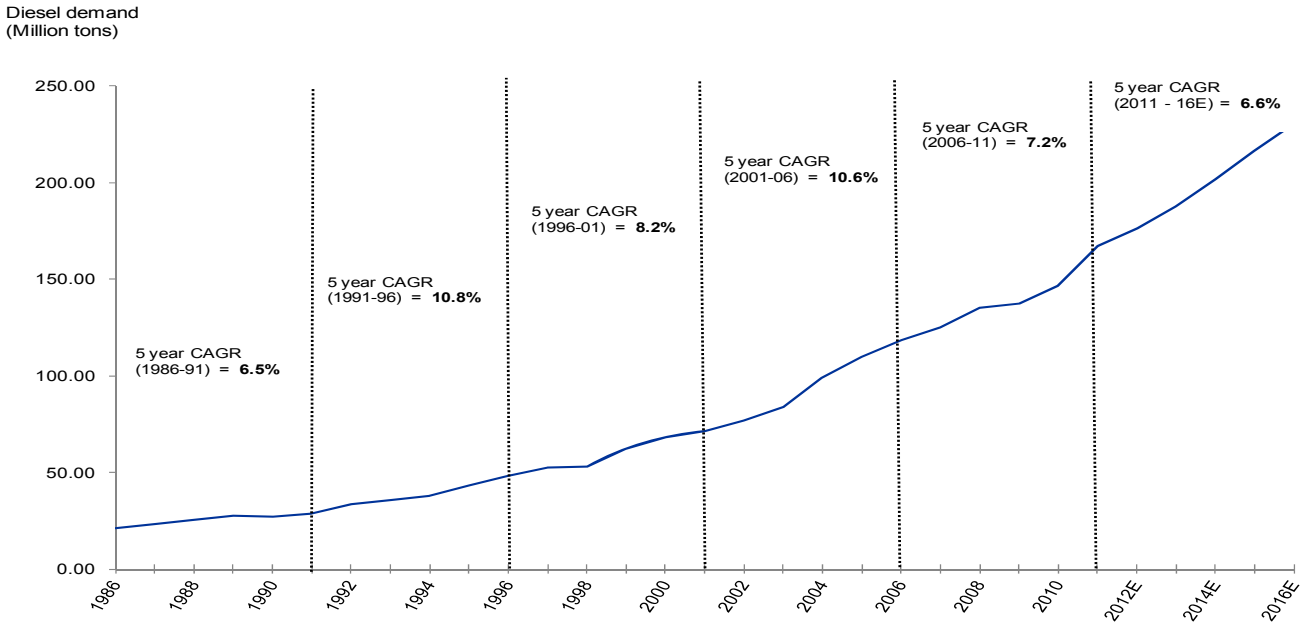
Source: CEIC, Deutsche Bank

Figure 53: Diesel demand and demand drivers (2005-16E)



Source: CEIC, Reuters, Deutsche Bank

Figure 54: China diesel demand and 5- year CAGR's



Source: CEIC, Reuters, Deutsche Bank

Gasoline demand

- Forecasting gasoline demand in China

We use the following regression equation to forecast gasoline demand in China:

*Gasoline demand growth = (0.520) + 0.446 * Vehicles growth*

Interpreting the equation-

1. The intercept of the equation suggests that when the growth of vehicle demand is zero, gasoline demand will fall by 0.5%.

   Holding all the other independent variables constant;

2. When the number of vehicles increases by 1%, gasoline demand will increase by 0.4%.

Using the regression equation above, we are forecasting an average gasoline demand growth rate of 6.2% pa for 2012-16e. This compares to a gasoline demand growth rate of 8.0% pa from 2007-11.

Figure 55: Historical and forecasted gasoline demand 1997-16E

Year	Gasoline demand (million tons)	Gasoline demand growth (%)	Vehicles growth (%)
1997	32.44	2.5	10.8
1998	33.07	1.9	8.2
1999	33.89	2.5	10.1
2000	35.05	3.4	10.7
2001	35.98	2.7	12.0
2002	37.49	4.2	13.9
2003	40.72	8.6	16.1
2004	46.96	15.3	13.0
2005	48.55	3.4	17.3
2006	52.43	8.0	17.0
2007	55.19	5.3	17.9
2008	61.46	11.4	17.0
2009	61.73	0.4	23.2
2010	68.86	11.6	24.2
2011	76.75	11.5	19.9
2012E	82.00	6.8	16.5
2013E	87.35	6.5	15.8
2014E	92.72	6.2	15.0
2015E	98.05	5.8	14.1
2016E	103.69	5.8	14.1

Source: CEIC, Reuters, Deutsche Bank

Figure 56: Regression statistics and correlation data	
Regression statistics of gasoline demand growth against vehicles growth	
Multiple R	**0.764**
R Square	**0.583**
Adjusted R Square	**0.541**
Standard Error	**1.460**
Observations	**12**
Correlation of gasoline demand growth with	
Vehicles growth rate	**14.5%**

Source: Deutsche Bank

We ran the regression using historical data from 2000 to 2011. For correlation analysis we used data from 1987 to 2011.

Figure 57: China gasoline demand elasticity

Year	Gasoline demand elasticity with	
	GDP growth	IP growth
2000	0.40	0.30
2001	0.32	0.27
2002	0.46	0.33
2003	0.86	0.51
2004	1.52	0.92
2005	0.30	0.21
2006	0.63	0.48
2007	0.37	0.29
2008	1.18	0.88
2009	0.05	0.04
2010	1.11	0.74
2011	1.23	0.82
2012E	0.88	0.68
2013E	0.79	0.59
2014E	0.69	0.49
2015E	0.71	0.52
2016E	0.75	0.55
AVG (1986 - 2010)	**0.68**	**n.a**
AVG (1990 - 2010)	**0.65**	**n.a**
AVG (2000 - 2010)	**0.66**	**0.45**
AVG (2005 - 2010)	**0.61**	**0.44**
AVG (2012E - 2016E)	**0.76**	**0.57**

Source: CEIC, Reuters, Deutsche Bank

Gasoline demand trends

Figure 58 below shows the makeup of gasoline demand in China since 1993. Gasoline into "Transport" has been growing at the expense "Industry" and "Others". The decline in China's "Industry" gasoline consumption might be explained by 1) the increase in natural gas consumption in China, and 2) better reporting lines at NBS. Typically, diesel rather than gasoline is used by industry. As explained earlier in this report we view "Residential" gasoline consumption as an oddity and suspect that the NBS' residential consumption of gasoline may have more to do with "Transport" than anything else. Although, we discussed this point with CEIC, we made little progress in determining exactly what residents were using gasoline for except to fill up their automobiles.

Figure 58: Gasoline demand from different segments

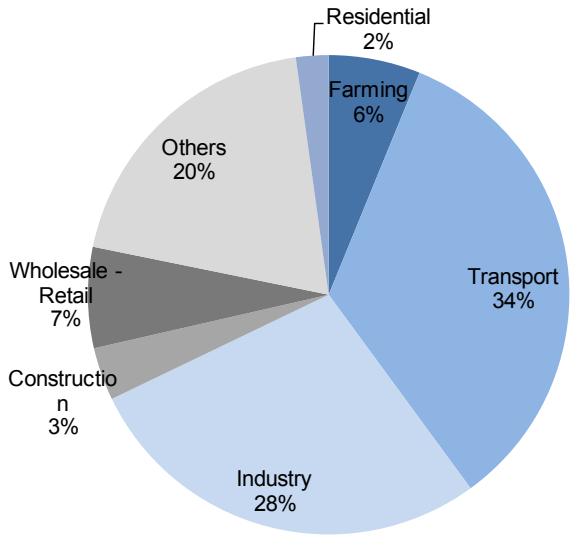
Year	Farming	Industry	Construction	Transport	Wholesale - Retail	Others	Residential
1993	4.8%	27.4%	4.4%	29.0%	5.4%	27.5%	1.5%
1994	5.6%	27.8%	3.9%	33.4%	4.6%	22.6%	2.1%
1995	6.2%	27.9%	3.6%	33.8%	6.8%	19.6%	2.2%
1996	2.1%	15.7%	3.4%	50.3%	1.9%	21.1%	5.7%
1997	2.3%	16.1%	3.3%	48.8%	2.1%	21.4%	6.0%
1998	2.4%	17.5%	3.4%	46.9%	2.2%	21.3%	6.3%
1999	2.5%	18.5%	3.4%	44.5%	2.0%	22.7%	6.5%
2000	2.5%	19.5%	3.3%	43.6%	2.0%	22.6%	6.5%
2001	2.6%	19.6%	3.2%	43.5% I	1.9%	22.4%	6.8% I
2002	2.7%	19.1% D	3.0%	42.8% N	2.0%	23.1% D	7.3% N
2003	2.9%	15.5% E	2.8%	47.0% C	1.9%	21.5% E	8.3% C
2004	2.9%	10.8% C	3.3%	49.7% R	2.6%	21.0% C	9.7% R
2005	3.3%	9.1% L	3.5%	50.1% E	2.7%	20.6% L	10.8% E
2006	3.2%	9.5% I	3.4%	49.4% A	2.4%	20.3% I	11.7% A
2007	3.1% F	9.5% N	3.2% F	47.3% S	2.4% F	20.3% N	14.1% S
2008	2.6% L	9.5% I	3.2% L	50.3% I	2.2% L	18.3% I	13.9% I
2009	2.7% A	10.9% N	3.8% A	46.7% N	2.4% A	17.3% N	16.2% N
2010	2.5% T	10.0% G	4.0% T	46.5% G	2.4% T	16.9% G	17.6% G

Source: CEIC, Deutsche Bank

Segmental contribution-

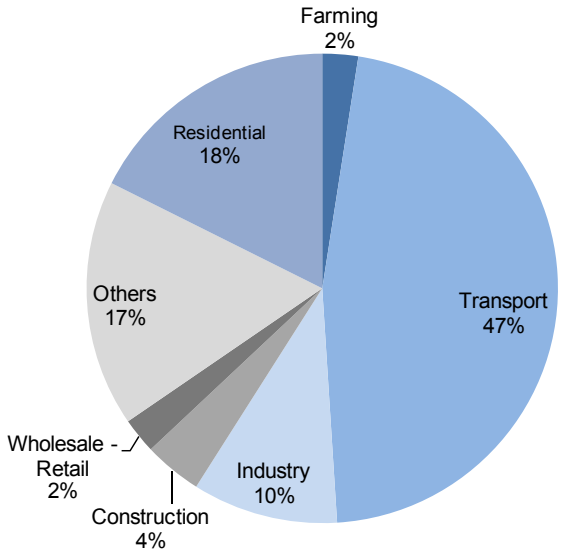
Gasoline into "Transport" expands, while gasoline into "Industrial" and "Farming" contracts. The pie chart progression (Figures 59-60) below reads "developing country X moving towards developed country status". We suspect the gasoline-to-transport trend will continue to expand into the future, particularly once the NBS figures out that its "Residential" consumption of diesel is going into automobiles rather than anything else.

Figure 59: Segmental consumption of gasoline- 1995



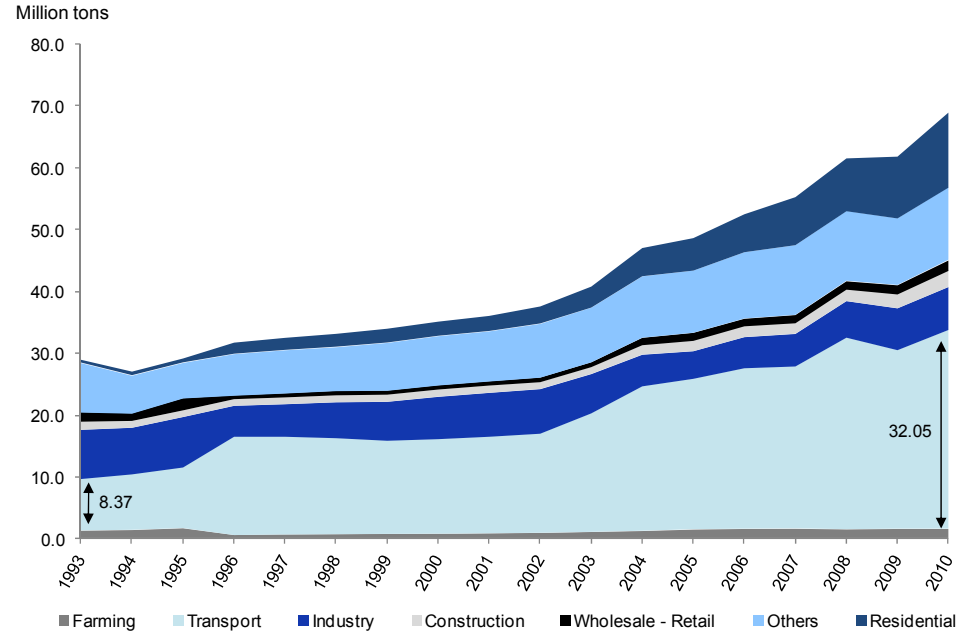
Source: CEIC, Deutsche Bank

Figure 60: Segmental consumption of gasoline- 2010



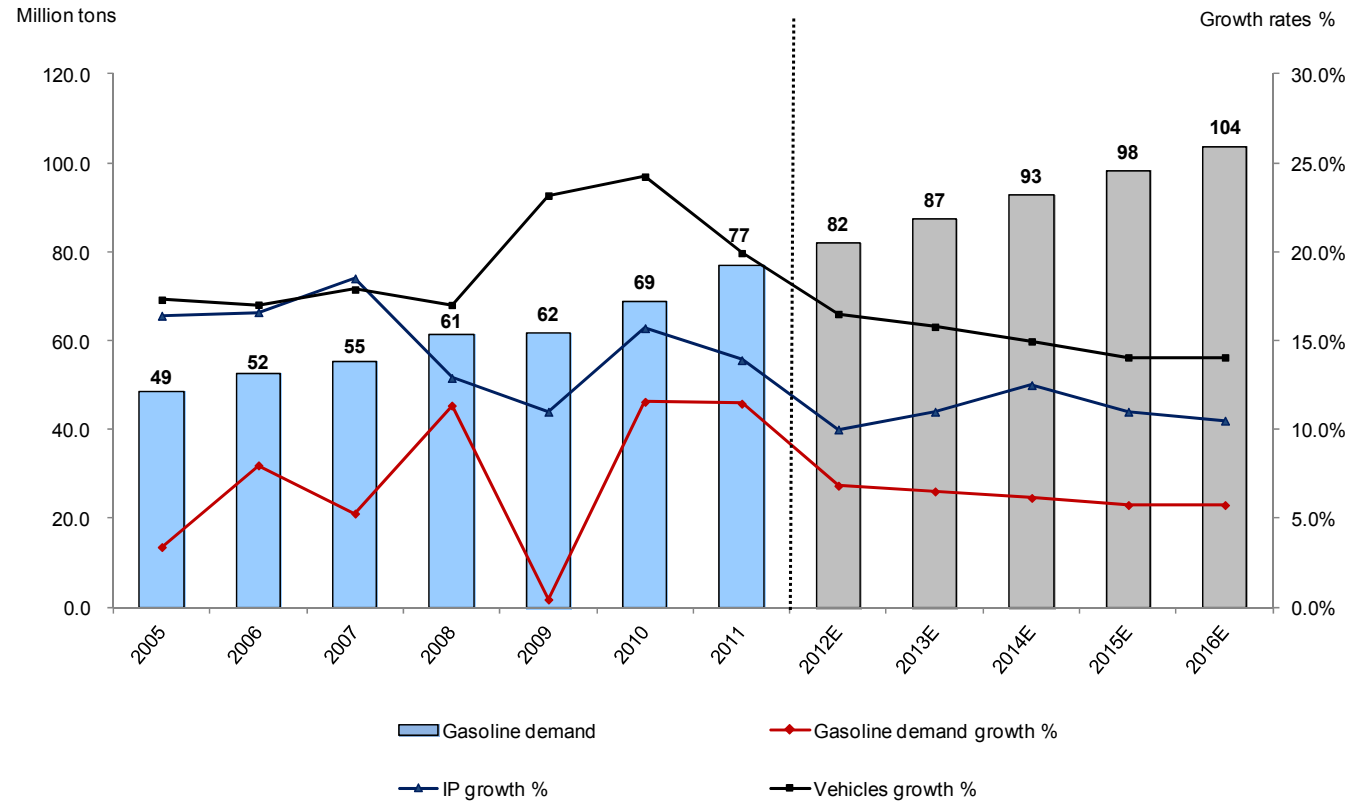
Source: CEIC, Deutsche Bank

Figure 61: Gasoline consumption trends



Source: CEIC, Deutsche Bank

Figure 62: Gasoline demand and demand drivers (2005-16E)



Source: CEIC, Reuters, Deutsche Bank

Vehicle ownership and gasoline demand

Gasoline is the principal fuel consumed by passenger vehicles in China. Other than the Hummer as a status symbol, recreational trucks owned by individuals are a rare sight in China. Since 1985, passenger vehicles in China have grown at a faster clip than commercial (diesel) trucks (Figure 63). The following table shows DB forecasts of passenger and commercial vehicle growth past and future.

Figure 63: Passenger and commercial vehicles growth estimates

Deutsche Bank estimates	2010	2011	2012E	2013E	2014E
Total passenger vehicles growth	***33.2%***	***5.2%***	***7.3%***	***11.5%***	***9.5%***
Sedans	*27.0%*	*6.6%*	*6.7%*	*10.9%*	*9.6%*
MPVs	*78.9%*	*11.7%*	*-0.5%*	*10.3%*	*8.8%*
SUVs	*101.3%*	*20.2%*	*25.4%*	*16.2%*	*11.9%*
Mini-cars	*27.8%*	*-9.4%*	*-1.2%*	*10.7%*	*9.5%*
Total commercial vehicles growth	***29.9%***	***-6.3%***	***-6.0%***	***10.3%***	***9.4%***
Heavy-duty trucks, tractor trailers	*59.9%*	*-13.4%*	*-27.9%*	*11.4%*	*9.3%*
Medium trucks	*4.9%*	*7.4%*	*-3.2%*	*10.4%*	*9.6%*
Light trucks	*30.4%*	*-7.2%*	*-2.5%*	*10.3%*	*9.5%*
Mini-trucks	*7.0%*	*-9.9%*	*9.0%*	*9.6%*	*9.2%*
Buses	*25.1%*	*10.1%*	*3.0%*	*9.8%*	*9.2%*

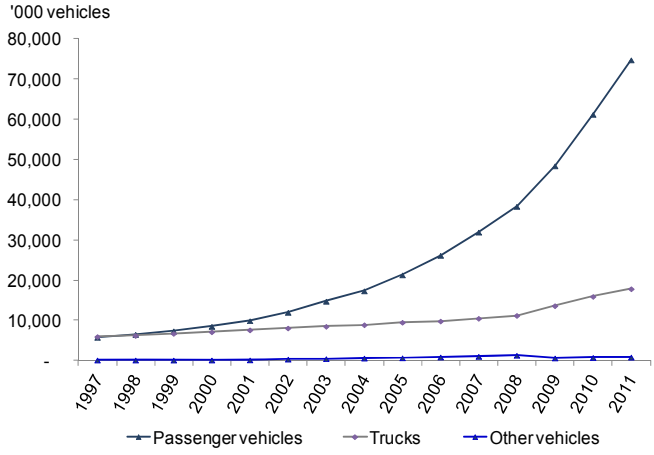
Source: China Association of Automobile Manufacturers (CAAM), Deutsche Bank estimates

Figure 64: Historical growth rates of vehicles

Period	Demand CAGR's				Simple AVG growth			
	Total	Passenger	Trucks	Others	Total	Passenger	Trucks	Others
5- Years								
1985 - 1990	11.4%	15.3%	10.5%	n.a	13%	20%	12%	n.a
1990 - 1995	13.5%	20.8%	9.7%	15.6%	13%	19%	9%	15%
1995 - 2000	9.1%	15.4%	4.1%	0.0%	9%	16%	4%	3%
2000 - 2005	14.5%	20.1%	5.9%	32.9%	14%	19%	6%	33%
2005 - 2010	19.8%	23.5%	10.8%	2.3%	19%	23%	10%	8%
10-Years								
1985 - 1995	12.5%	18.1%	10.1%	n.a	13%	20%	11%	n.a
1990 - 2000	11.3%	18.1%	6.9%	7.5%	11%	17%	7%	8%
1995 - 2005	11.8%	17.7%	5.0%	15.3%	17%	21%	8%	22%

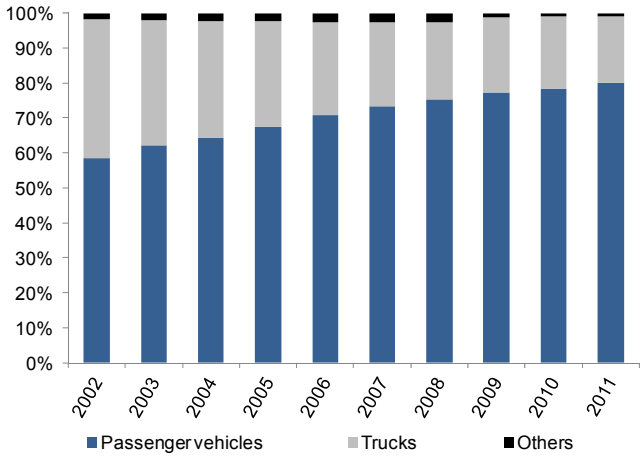
Source: CEIC, Deutsche Bank

Figure 65: Size of different types of vehicles



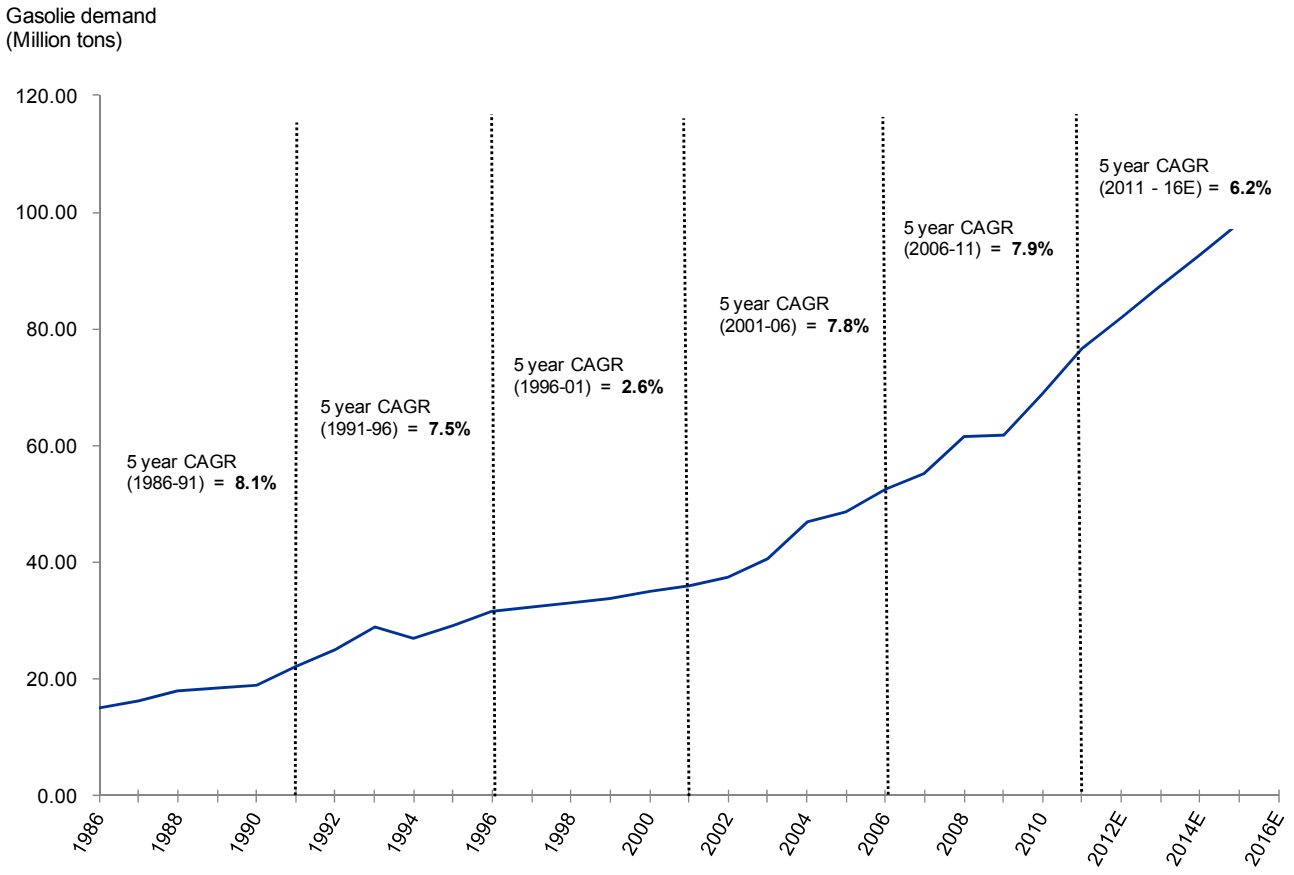
Source: CEIC, Deutsche Bank

Figure 66: Breakdown of the total vehicle fleet



Source: CEIC Deutsche Bank

Figure 67: China gasoline demand and 5-year CAGR's



Source: CEIC, Reuters, Deutsche Bank

Fuel oil demand

- Forecasting fuel oil demand in China

We use the following regression equation to forecast fuel oil demand in China:

*Fuel oil demand growth = (0.486) + 0.474 * Waterway freight turnover growth + (3.57) * Natural gas demand in industry sector*

Interpreting the equation-

1. The intercept of the equation suggests that when the waterway freight turnover growth rate and the growth in natural gas demand in industry sector are zero, fuel oil demand will fall by 0.5%

   Holding all the other independent variables constant;

2. When waterway freight turnover increases by 1%, fuel oil demand will increase by 0.5%.

3. When natural gas demand from the industry sector increases by 1%, fuel oil demand will fall by 3.6%

Using the regression equation above, we are forecasting an average fuel oil demand growth rate of -0.5% pa for 2012-16e. This compares to a negative FO demand growth rate of -3.7% pa from 2007-11. Fuel oil demand in China is declining due to the increase of natural gas consumption in China. Natural gas is replacing fuel oil principally as a source of industrial energy and space heating.

Figure 68: Historical and forecasted fuel oil demand 1997-16E

Year	Fuel oil demand (million tons)	Fuel oil demand growth (%)	Waterway freight turnover growth (%)	Growth in natural gas demand in industry (%)
1997	36.93	1.7	7.7	7.5
1998	38.29	3.7	0.9	0.3
1999	39.34	2.8	9.6	4.5
2000	38.73	(1.6)	11.6	12.3
2001	38.50	(0.6)	9.5	7.9
2002	38.74	0.6	5.9	3.6
2003	42.21	8.9	4.4	17.2
2004	47.83	13.3	44.3	6.8
2005	42.42	(11.3)	19.9	18.0
2006	43.68	3.0	11.7	16.8
2007	41.57	(4.8)	15.9	24.9
2008	32.37	(22.1)	(21.8)	10.8
2009	28.28	(12.6)	14.5	8.7
2010	37.58	32.9	18.9	17.8
2011	33.21	(11.6)	10.2	23.4
2012E	32.97	(0.7)	10.8	15.0
2013E	32.82	(0.5)	11.3	15.0
2014E	32.81	(0.0)	12.3	15.0
2015E	32.64	(0.5)	11.2	15.0
2016E	32.38	(0.8)	10.6	15.0

Source: CEIC, Reuters, Deutsche Bank

Figure 69: Regression statistics and correlation data

Regression statistics of fuel oil demand growth against waterway freight turnover growth and growth in natural gas demand in industry	
Multiple R	**0.509**
R Square	**0.260**
Adjusted R Square	**0.195**
Standard Error	**9.073**
Observations	**26**

Correlation of fuel oil demand growth with	
Waterway freight turnover growth	**43.0%**
Growth in natural gas demand in industry	**-16.7%**

Source: Deutsche Bank

We ran the regression using historical data from 1986 to 2011. For correlation analysis we used data from 1986 to 2011.

Figure 70: China fuel oil demand elasticity

Year	Fuel oil demand elasticity with	
	GDP growth	IP growth
2000	(0.19)	(0.14)
2001	(0.07)	(0.06)
2002	0.07	0.05
2003	0.89	0.53
2004	1.32	0.80
2005	(1.00)	(0.69)
2006	0.23	0.18
2007	(0.34)	(0.26)
2008	(2.31)	(1.72)
2009	(1.37)	(1.15)
2010	3.16	2.10
2011	(1.25)	(0.84)
2012E	(0.09)	(0.07)
2013E	(0.06)	(0.04)
2014E	(0.00)	(0.00)
2015E	(0.07)	(0.05)
2016E	(0.10)	(0.08)
AVG (1986 - 2010)	**0.18**	**n.a**
AVG (1990 - 2010)	**0.09**	**n.a**
AVG (2000 - 2010)	**0.04**	**(0.03)**
AVG (2005 - 2010)	**(0.27)**	**(0.26)**
AVG (2011 - 2016E)	**(0.26)**	**(0.18)**

Source: CEIC, Reuters, Deutsche Bank

Fuel oil demand trends

Figure 71 below shows the makeup of fuel oil demand in China since 1993. Fuel oil into "Transport" has been growing at the expense "Industry". Fuel oil ("bunker") is typically used to power ships / vessels carrying bulk commodities and / or commercial freight. Recent complaints surrounding the discharge air pollutants by vessels while in port have us wondering if LNG (natural gas) might soon start to displace fuel oil into ships. In addition, fuel oil in China is being replaced by natural gas as a product for industrial fuel and space heating (electricity). China's tea-pot refineries have in the past been a source of demand for fuel oil. If and when the PRC government ever takes steps to integrate China's tea-pots into its mainstream refining system, fuel oil demand would collapse – crude oil demand would surge. We suspect the PRC government has absolutely no desire to see its demand for crude oil surge. We believe that there is only one-way for the demand of fuel oil to go in China, and that would be down (Figure 70 and 76).

Figure 71: Fuel oil demand from different segments

Year	Industry	Transport	Construction	Wholesale - Retail	Others
1993	93.4%	5.6%	0.3%	0.1%	0.6%
1994	92.6%	6.3%	0.5%	0.1%	0.4%
1995	92.2%	6.2%	0.4%	0.2%	0.8%
1996	73.1%	26.0%	0.4%	0.1%	0.4%
1997	69.5%	29.3%	0.5%	0.2%	0.5%
1998	76.7%	22.1%	0.4%	0.2%	0.6%
1999	77.5%	21.4%	0.4%	0.3%	0.5%
2000	76.8%	21.9%	0.4%	0.3%	0.5%
2001	76.6%	22.2%	0.4%	0.3%	0.4%
2002	76.7%	22.0%	0.5%	0.3%	0.5%
2003	76.7%	22.3%	0.4%	0.3%	0.3%
2004	74.6%	24.1%	0.4%	0.5%	0.3%
2005	68.9%	29.7%	0.3%	0.6%	0.3%
2006	64.9%	33.9%	0.4%	0.5%	0.3%
2007	56.0%	42.3%	0.7%	0.6%	0.3%
2008	63.0%	35.3%	1.2%	0.2%	0.3%
2009	53.8%	44.2%	1.2%	0.3%	0.4%
2010	63.3%	35.3%	0.8%	0.2%	0.4%

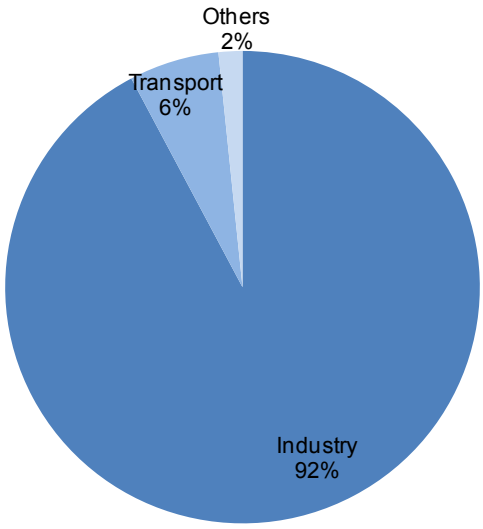
DEUTSCHE BANK AG/HONG KONG

Source: CEIC, Deutsche Bank

Segmental contribution-

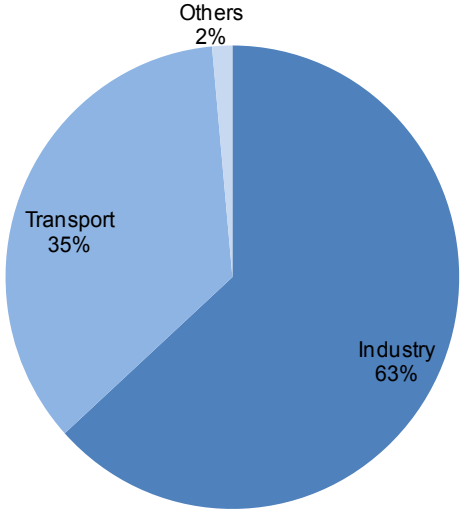
Fuel oil into "Transport" expands, while fuel oil into "Industry" contracts. The pie chart progression (Figures 72-73) below reads two things: 1) China's export boom is being seen in its fuel oil consumption numbers; and 2) China is becoming wealthier which shows up in a shift by industry away from high polluting fuel oil towards more efficient, but more costly fuels such as diesel and natural gas. Going forward, we suspect that the trend toward less industry and more transport use of fuel oil will continue in China.

Figure 72: Segmental consumption of fuel oil- 1995



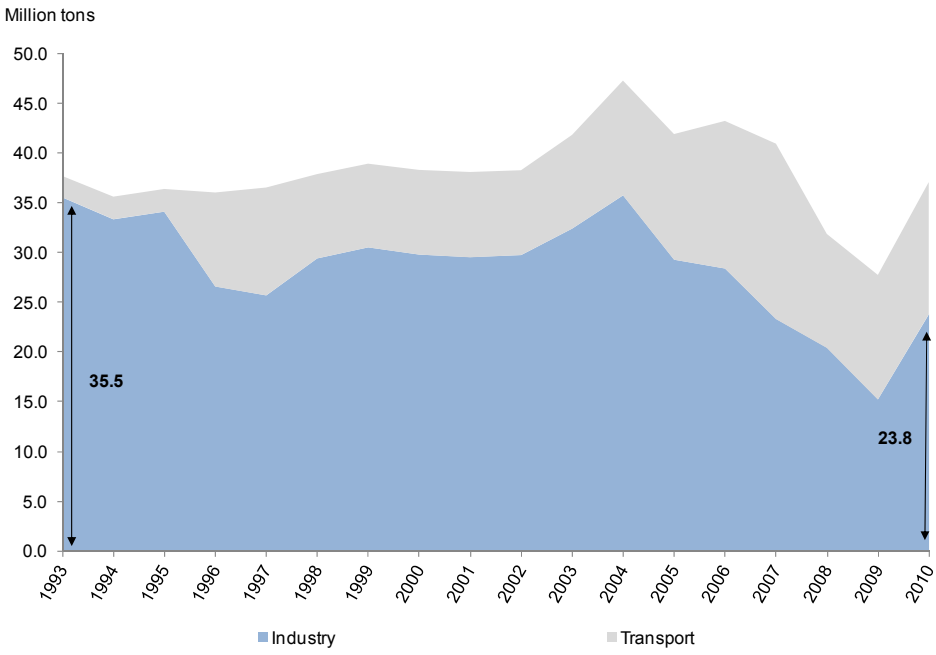
Source: CEIC, Deutsche Bank

Figure 73: Segmental consumption of fuel oil- 2010



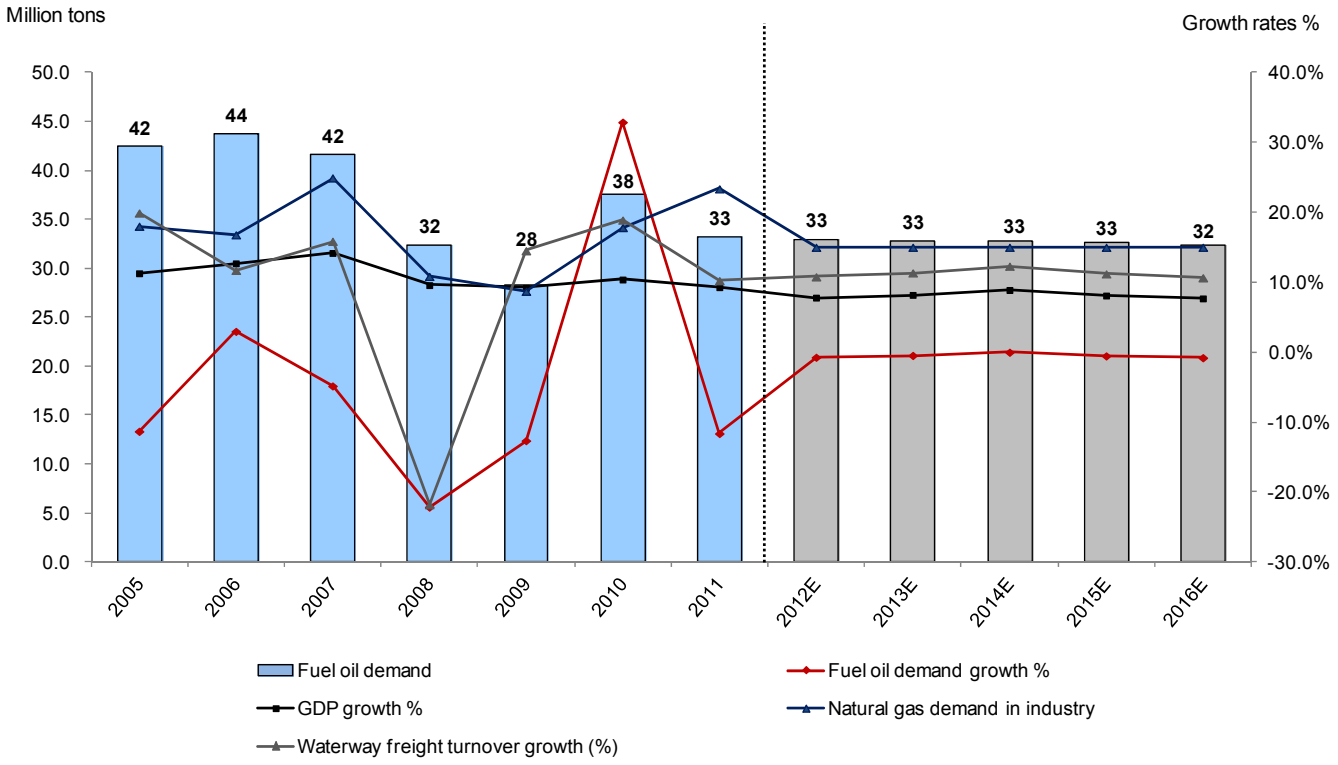
Source: CEIC, Deutsche Bank

Figure 74: Fuel oil consumption trends



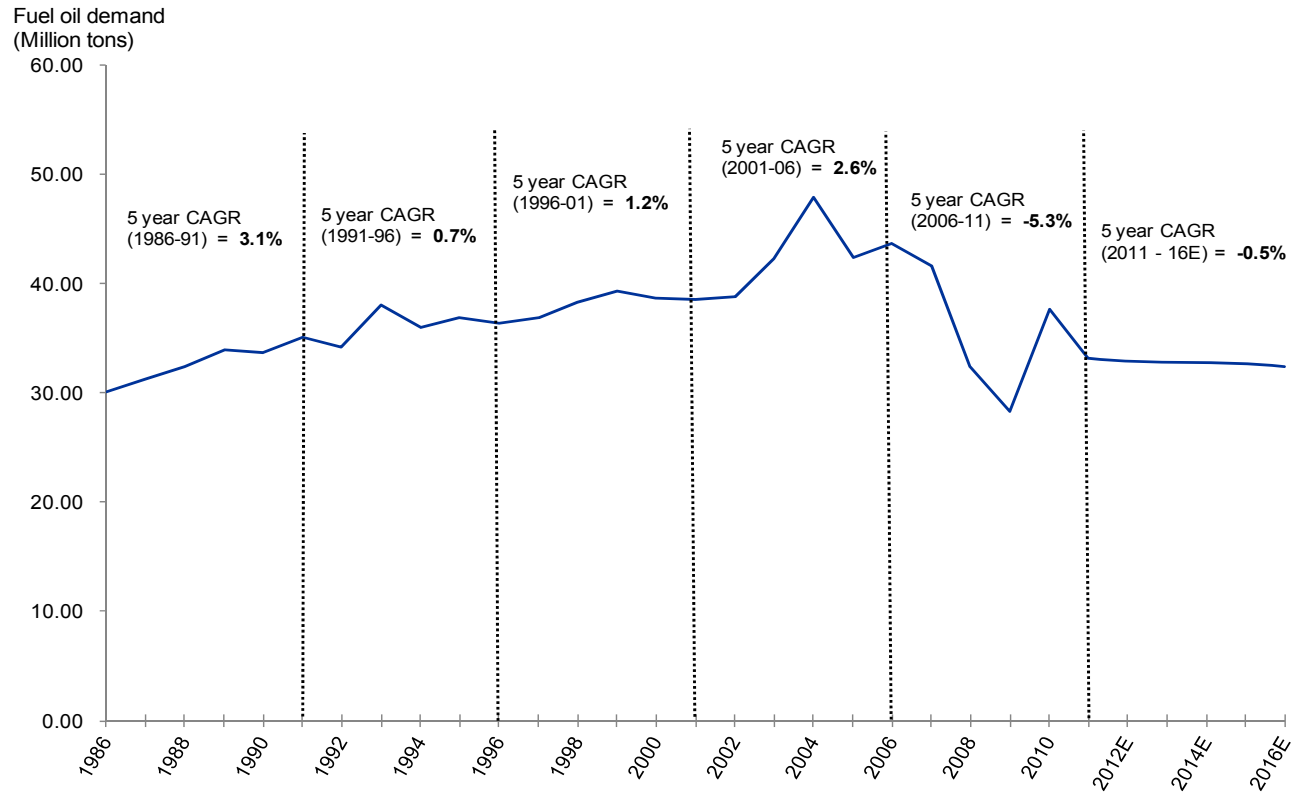
Source: CEIC, Deutsche Bank

Figure 75: Fuel oil demand and demand drivers (2005-16E)



Source: CEIC, Reuters, Deutsche Bank

Figure 76: China fuel oil demand and 5-year CAGR's

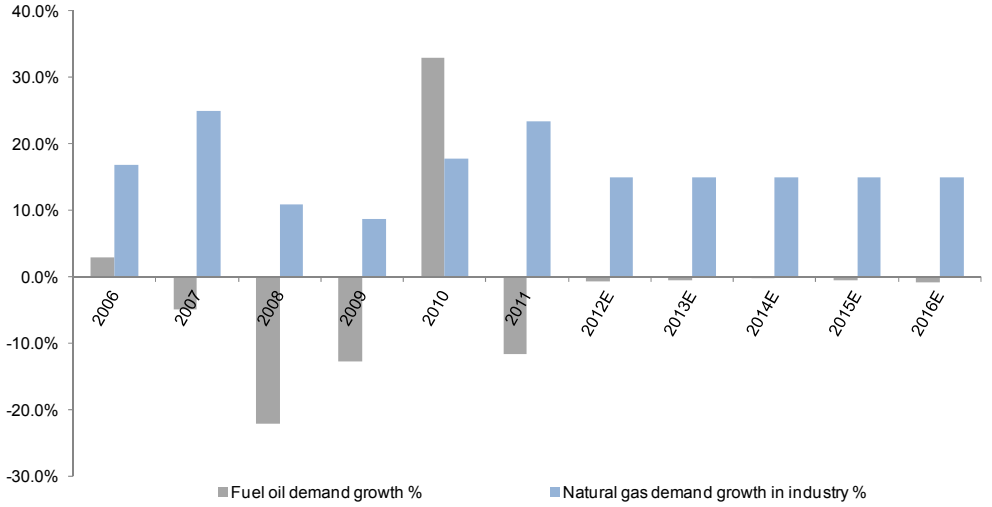


Source: CEIC, Reuters, Deutsche Bank

China's increasing natural gas consumption poses a threat to fuel oil demand

Figure 77 below depicts the negative relationship between fuel oil demand and natural gas demand.

Figure 77: Fuel oil demand growth vs. natural gas demand growth



Source: CEIC Deutsche Bank

Kerosene demand

- Forecasting kerosene demand in China

We use the following regression equation to forecast kerosene demand in China:

*Kerosene demand growth = 2.927 + 0.423 * Air passenger traffic growth*

Interpreting the equation-

1. The intercept of the equation suggests that when air passenger traffic growth rate is zero, kerosene demand will increase by 2.9%

   Holding all the other variables constant;

2. When air passenger traffic increases by 1%, kerosene demand will increase by 0.4%.

Using the regression equation above, we are forecasting an average kerosene demand growth rate of 7.2% pa for 2012-16e. This compares to a kerosene demand growth rate of 10.4% pa from 2007-11.

Figure 78: Historical and forecasted kerosene demand 1997-16E

Year	Kerosene demand (million tons)	Kerosene demand growth (%)	Air passenger traffic growth (%)
1997	6.82	22.7	1.3
1998	7.06	3.6	2.2
1999	8.44	19.5	5.6
2000	8.72	3.2	9.3
2001	8.90	2.1	10.7
2002	9.19	3.2	12.4
2003	9.22	0.3	1.9
2004	10.61	15.1	27.7
2005	10.77	1.5	12.3
2006	11.25	4.4	13.4
2007	12.44	10.6	14.0
2008	12.94	4.0	3.5
2009	14.39	11.2	16.5
2010	17.44	21.2	13.9
2011	18.34	5.2	8.7
2012E	19.65	7.2	10.0
2013E	21.06	7.2	10.0
2014E	22.56	7.2	10.0
2015E	24.18	7.2	10.0
2016E	25.91	7.2	10.0

Source: CEIC, Reuters, Deutsche Bank

Figure 79: Regression statistics and correlation data	
Regression statistics of kerosene demand growth against air passenger growth	
Multiple R	**0.417**
R Square	**0.174**
Adjusted R Square	**0.105**
Standard Error	**6.464**
Observations	**14**
Correlation of kerosene demand growth with	
Air passenger growth	**15.4%**

Source: Deutsche Bank

We ran the regression using historical data from 1999 to 2011. For correlation analysis we used data from 1997 to 2011.

Figure 80: China kerosene demand elasticity

Year	Kerosene demand elasticity with	
	GDP growth	IP growth
2000	0.39	0.28
2001	0.26	0.22
2002	0.36	0.26
2003	0.03	0.02
2004	1.50	0.90
2005	0.13	0.09
2006	0.35	0.27
2007	0.74	0.57
2008	0.42	0.31
2009	1.22	1.02
2010	2.04	1.35
2011	0.55	0.37
2012E	0.92	0.72
2013E	0.87	0.65
2014E	0.80	0.57
2015E	0.88	0.65
2016E	0.93	0.68
AVG (1986 - 2010)	**0.64**	**n.a**
AVG (1990 - 2010)	**0.79**	**n.a**
AVG (2000 - 2010)	**0.68**	**0.48**
AVG (2005 - 2010)	**0.82**	**0.60**
AVG (2011 - 2016E)	**0.83**	**0.61**

Source: CEIC, Reuters, Deutsche Bank

Kerosene demand trends

Kerosene is widely used to power jet engines principally in commercial airlines. In less developed countries kerosene is still used as a source of cooking and lighting and often subsidized by governments. In certain countries (Japan) and rural areas lacking natural gas pipeline infrastructure, kerosene is still used for home heating purposes.

Figure 81 below shows the makeup of kerosene demand in China since 1993. Kerosene into "Transport" has been growing at the expense of "Industry" and "Other". Kerosene into "Industry" in China is in decline as the country promotes natural gas. We suspect that the rather dramatic 2002 decline in "Other" kerosene use was a reporting issue uncovered by NBS. Kerosene into China "Transport" is being driven by rather dramatic increases in air passenger traffic growth (Figure 78). We suspect that the trend of more kerosene into "Transport" has run its course in China, although the double-digit growth rates should persist as China's growing middle class takes to the skies.

Figure 81: Kerosene demand from different segments

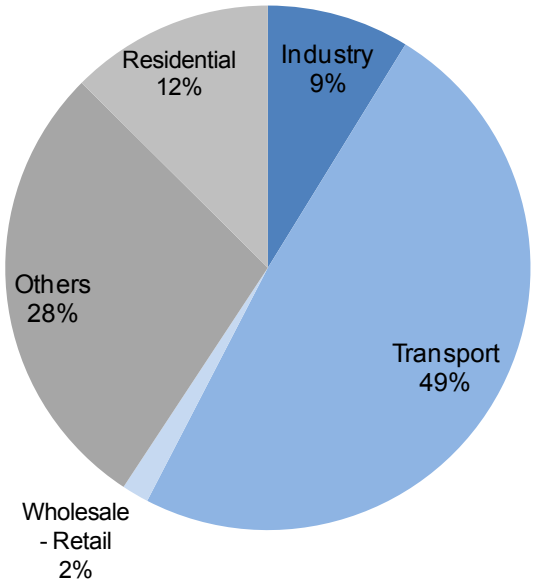
Year	Farming	Construction	Transport	Industry	Wholesale - Retail	Others	Residential
1993	0.6%	0.5%	41.3%	6.5%	0.6%	34.0%	16.4%
1994	0.5%	0.4%	44.2%	6.3%	0.8%	32.4%	15.2%
1995	0.7%	0.7%	48.8%	8.8%	1.7%	26.8%	12.5%
1996	0.3%	0.9%	53.8%	7.8%	1.5%	24.1%	11.6%
1997	0.2%	0.6%	61.6%	6.8%	1.3%	20.2%	9.2%
1998	0.2%	0.5%	60.2%	7.4%	1.3%	20.0%	10.3%
1999	0.2%	0.5%	62.3%	9.3%	1.4%	18.1%	8.4%
2000	0.2%	0.5%	61.5%	9.6%	1.6%	18.4%	8.3%
2001	0.2%	0.4%	63.0% I	9.7%	1.4%	17.0%	8.4%
2002	0.2%	0.0%	78.0% N	11.7% D	1.4%	4.4% D	4.4% D
2003	0.1%	0.0%	80.5% C	9.5% E	1.2%	4.7% E	3.9% E
2004	0.1%	0.0%	86.7% R	5.7% C	0.3%	4.5% C	2.6% C
2005	0.1%	0.0%	88.4% E	5.3% L	0.3%	3.4% L	2.4% L
2006	0.1%	0.0%	89.8% A	4.3% I	0.3%	3.4% I	2.0% I
2007	0.1% F	0.0% F	90.9% S	3.6% N	0.4% F	3.5% N	1.6% N
2008	0.1% L	0.7% L	90.8% I	3.8% I	1.6% L	2.0% I	1.0% I
2009	0.1% A	0.7% A	91.3% N	2.2% N	2.0% A	2.3% N	1.3% N
2010	0.1% T	0.5% T	91.8% G	2.3% G	2.0% T	2.2% G	1.1% G

Source: CEIC, Deutsche Bank

Segmental contribution-

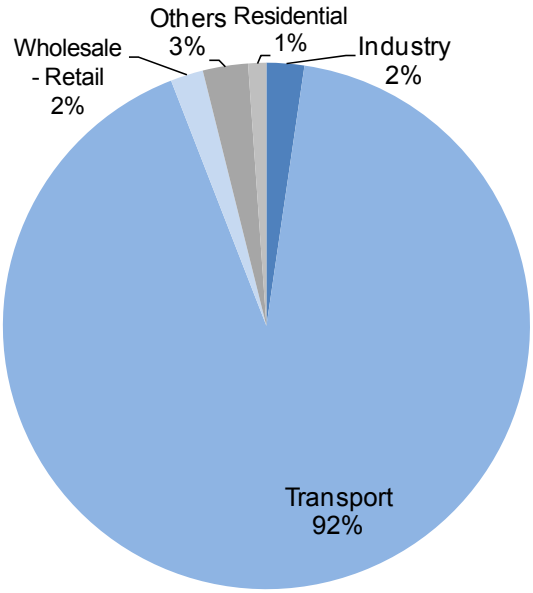
China does not subsidize kerosene and as a result, the product is rarely used for residential cooking and / or space heating. Coal briquettes are more commonly used for space heating than kerosene. We suspect that the dramatic decline in kerosene use by "Others" in 2002 was a NDS' reporting error. The progression of kerosene use into "Transport" as show in Figures 82 to 83 only makes sense. We expect the growth of kerosene (2012-16e) to continue at double digit rates, although the trend into more and more transport has pretty well played itself out.

Figure 82: Segmental consumption of kerosene- 1995



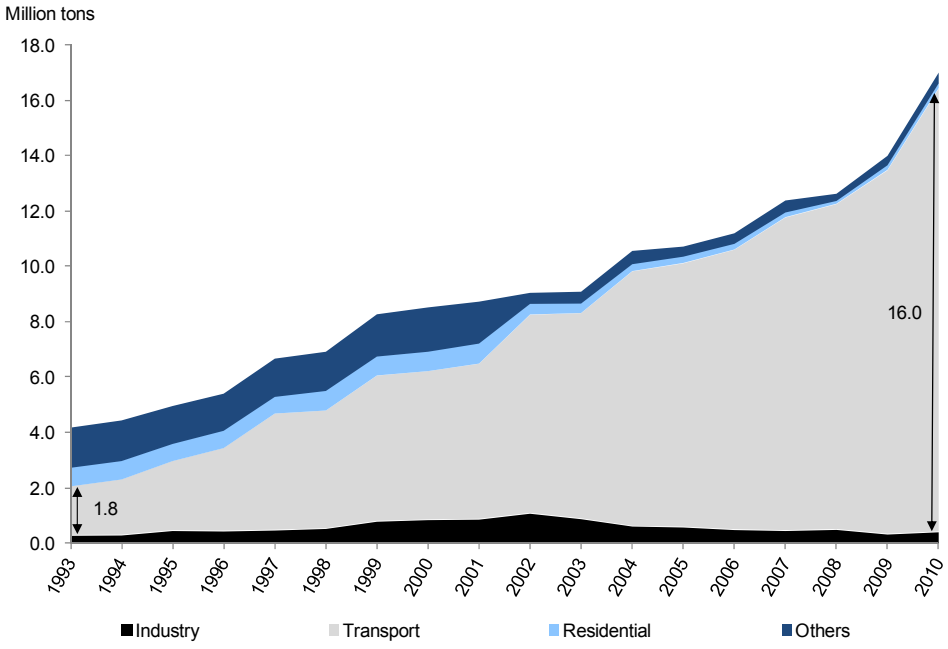
Source: CEIC, Deutsche Bank

Figure 83: Segmental consumption of kerosene- 2010



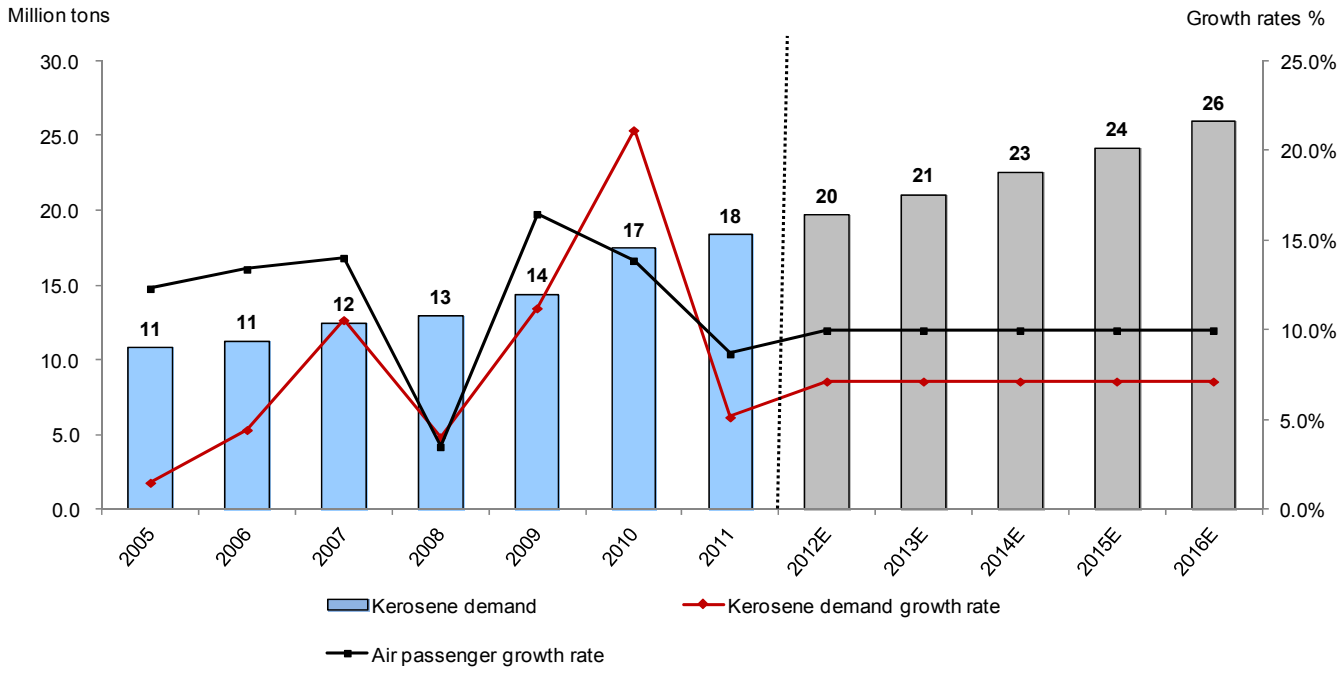
Source: CEIC, Deutsche Bank

Figure 84: Kerosene consumption trends



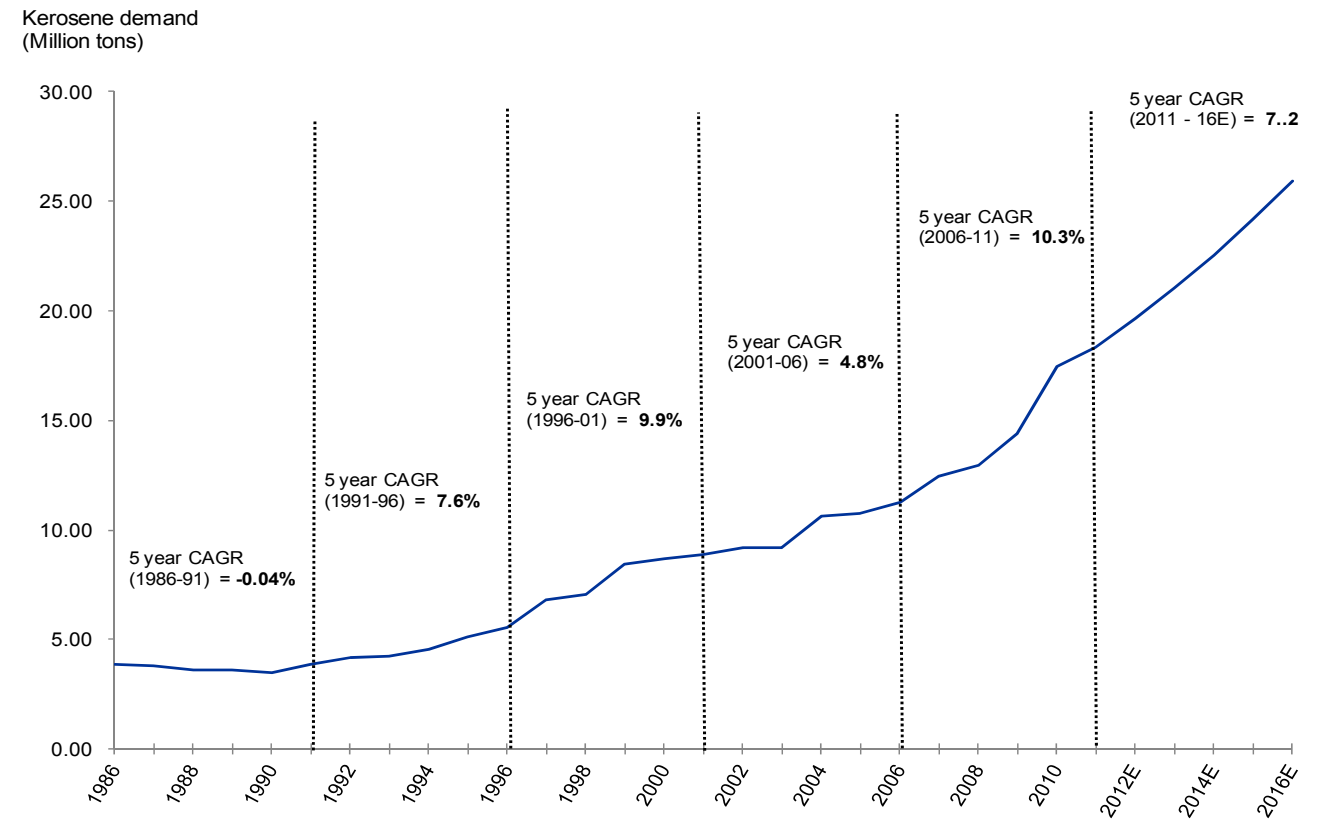
Source: CEIC, Deutsche Bank

Figure 85: Kerosene demand and demand drivers (2005-16E)



Source: CEIC, Reuters, Deutsche Bank

Figure 86: China kerosene demand and 5-year CAGR's



Source: CEIC, Reuters, Deutsche Bank

LPG demand

- Forecasting LPG demand in China

We use the following regression equation to forecast LPG demand in China:

*LPG demand growth = (8.409) + 1.036 * GDP growth + (0.024) * Natural gas consumption in residential sector*

Interpreting the equation-

1. The intercept of the equation suggests that when real GDP growth rate and growth in natural gas consumption in residential sector are zero, LPG demand will fall by -8.4%

   Holding all the other independent variables constant;

2. When real GDP increases by 1%, LPG demand will increases by 1.0%.

3. When residential consumption of natural gas increases by 1%, LPG demand will decline by -0.02%.

Using the regression equation above, we are forecasting an average LPG demand growth rate of -0.3% pa for 2012-16e. This compares to LPG demand growth of 2.0% pa from 2007-11.

Figure 87: Historical and forecasted LPG demand 1997-16E

Year	LPG demand (million tons)	LPG demand growth (%)	Real gross domestic product growth (%)	Naural gas consumption by residential sector- growth (%)
1997	10.10	8.4	9.3	2.4
1998	11.86	17.5	7.8	13.7
1999	11.78	(0.6)	7.6	6.6
2000	13.90	17.9	8.4	25.7
2001	14.11	1.5	8.3	30.3
2002	16.25	15.2	9.1	9.6
2003	17.97	10.5	10.0	12.4
2004	20.16	12.2	10.1	29.5
2005	20.46	1.5	11.3	18.2
2006	22.08	7.9	12.7	29.2
2007	23.28	5.4	14.2	39.7
2008	21.19	(9.0)	9.6	18.6
2009	21.53	1.6	9.2	4.4
2010	22.40	4.0	10.4	27.7
2011	24.16	7.8	9.3	16.5
2012E	23.99	(0.7)	7.8	15.0
2013E	23.93	(0.3)	8.2	15.0
2014E	24.04	0.5	8.9	15.0
2015E	23.94	(0.4)	8.1	15.0
2016E	23.75	(0.8)	7.7	15.0

Source: CEIC, Reuters, Deutsche Bank

Figure 88: Regression statistics and correlation data

Regression statistics of LPG demand growth against GDP growth and natural gas demand growth in residential sector	
Multiple R	**0.666**
R Square	**0.444**
Adjusted R Square	**0.378**
Standard Error	**9.041**
Observations	**20**

Correlation of LPG demand growth with	
GDP growth	**31.9%**
Natural gas demand growth in residential sector	**-57.2%**

Source: Deutsche Bank

We ran the regression using historical data from 1992 to 2011. For correlation analysis we used data from 1991 to 2011.

Figure 89: China LPG demand elasticity

Year	LPG demand elasticity with	
	GDP growth	IP growth
2000	2.13	1.57
2001	0.19	0.16
2002	1.67	1.20
2003	1.05	0.62
2004	1.21	0.73
2005	0.13	0.09
2006	0.62	0.47
2007	0.38	0.29
2008	(0.93)	(0.70)
2009	0.18	0.15
2010	0.39	0.26
2011	0.84	0.56
2012E	(0.09)	(0.07)
2013E	(0.03)	(0.02)
2014E	0.05	0.04
2015E	(0.05)	(0.03)
2016E	(0.10)	(0.08)
AVG (1981 - 2010)	**na**	**na**
AVG (1990 - 2010)	**1.13**	**na**
AVG (2000 - 2010)	**0.64**	**0.44**
AVG (2005 - 2010)	**0.13**	**0.09**
AVG (2012 - 2016E)	**(0.04)**	**(0.03)**

Source: CEIC, Reuters, Deutsche Bank

LPG demand trends

LPG or Liquefied Petroleum Gases – typically propane and / or butane, is principally a residential product used for cooking, heating and vehicles. Relative to other petroleum sources, LPG is an expensive, yet high heating content product. In rural part of the world, LPG provides an alternative to electricity and heating oil. LPG is most often used where there is no access to piped natural gas.

Despite China's push to increase natural gas consumption, pipeline infrastructure remains an urban comfort. From the below (Figure 90) depiction of LPG consumption in China, as well as from the growth of LPG consumption in China (Figure 95) it is obvious that urban demand for LPG remains. It's interesting to note however the collapse in LPG demand (Figure 95) in 2007-08, which in our opinion reflects its predominance of LPG as a retail product. Despite the massive fiscal expansion engineered by China (2007-08) to avoid the global financial melt-down, China's rural community evidently felt some pain. With ever increasing natural gas imports, pipeline infrastructure and the development of domestic natural gas supplies, we question the future of LPG consumption growth in China.

Figure 90: LPG demand from different segments

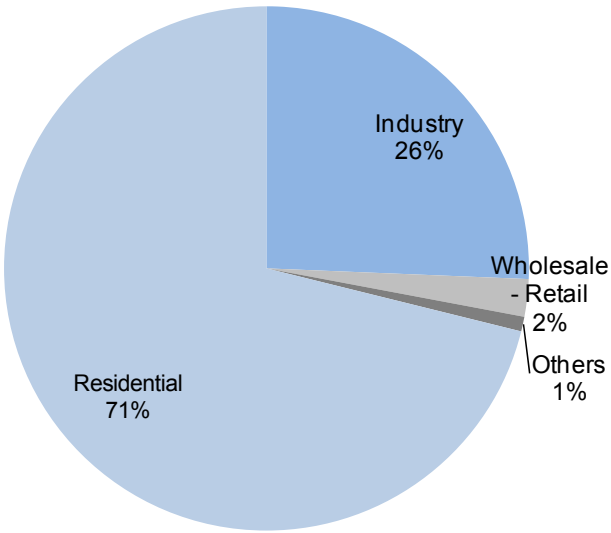
Year	Farming	Construction	Transport	Industry	Wholesale - Retail	Others	Residential
1993	0.0%	0.5%	0.1%	31.6%	6.4%	1.5%	59.7%
1994	0.0%	0.1%	0.1%	29.4%	2.2%	0.6%	67.4%
1995	0.0%	0.1%	0.1%	25.6%	2.3%	0.8%	71.1%
1996	0.0%	0.0%	0.3%	18.4%	3.6%	0.9%	76.6%
1997	0.0%	0.5%	0.3%	18.0%	4.2%	1.4%	75.5%
1998	0.0%	0.5%	0.2%	20.2%	4.2%	2.6%	72.4%
1999	0.0%	0.7%	0.2%	21.6%	4.1%	1.5%	72.0%
2000	0.0%	0.6%	1.2%	30.7%	4.0%	1.7%	61.8%
2001	0.0%	0.7%	1.2%	31.3%	4.3%	1.9%	60.7%
2002	0.0%	0.8%	1.8%	32.0%	3.9%	2.0%	59.6%
2003	0.0%	0.5%	2.0%	30.1%	3.6%	1.8%	61.9%
2004	0.2%	0.4%	1.8%	24.5%	4.5%	1.6%	67.0%
2005	0.2%	0.3%	2.4%	26.1%	4.8%	1.3%	64.9%
2006	0.2%	0.3%	2.5%	24.5%	5.2%	1.3%	66.0%
2007	0.3% F	0.3% F	2.4% F	19.6% F	5.7% F	1.5% F	70.4% F
2008	0.2% L	0.3% L	2.7% L	23.6% L	2.4% L	2.1% L	68.8% L
2009	0.2% A	0.3% A	2.6% A	22.2% A	2.9% A	2.3% A	69.5% A
2010	0.2% T	0.3% T	2.7% T	26.2% T	3.2% T	2.3% T	65.0% T

Source: CEIC, Deutsche Bank

Segmental contribution-

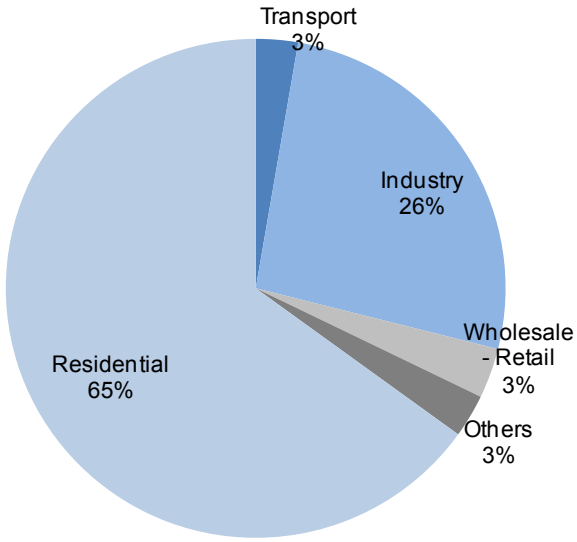
We are not convinced that the 2010 decline in residential LPG consumption to 65% is the beginning of a trend. To the contrary, we have seen this sort of number in previous years only to reverse to the upside in following years.

Figure 91: Segmental consumption of LPG- 1995



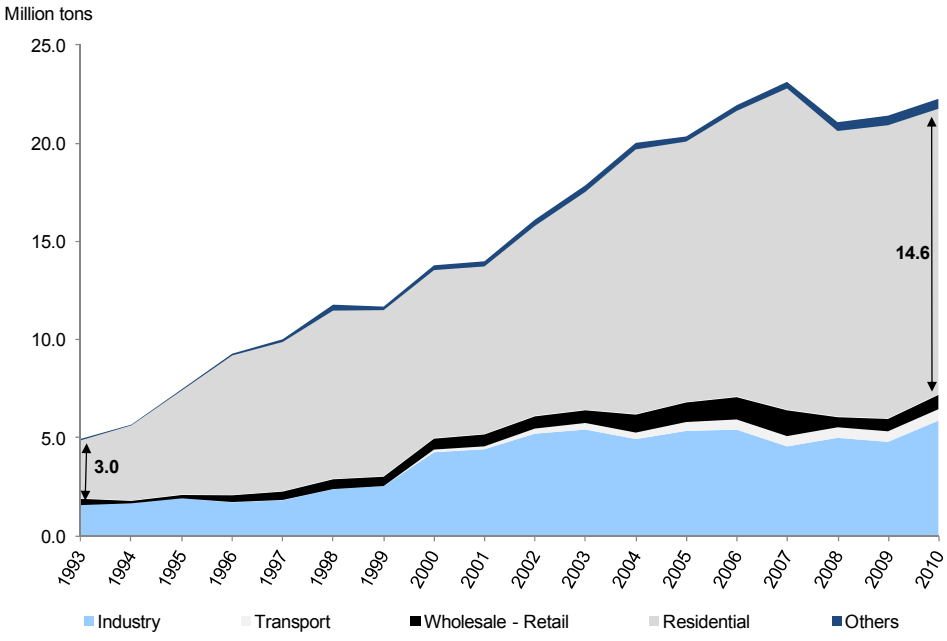
Source: CEIC, Deutsche Bank

Figure 92: Segmental consumption of LPG- 2010



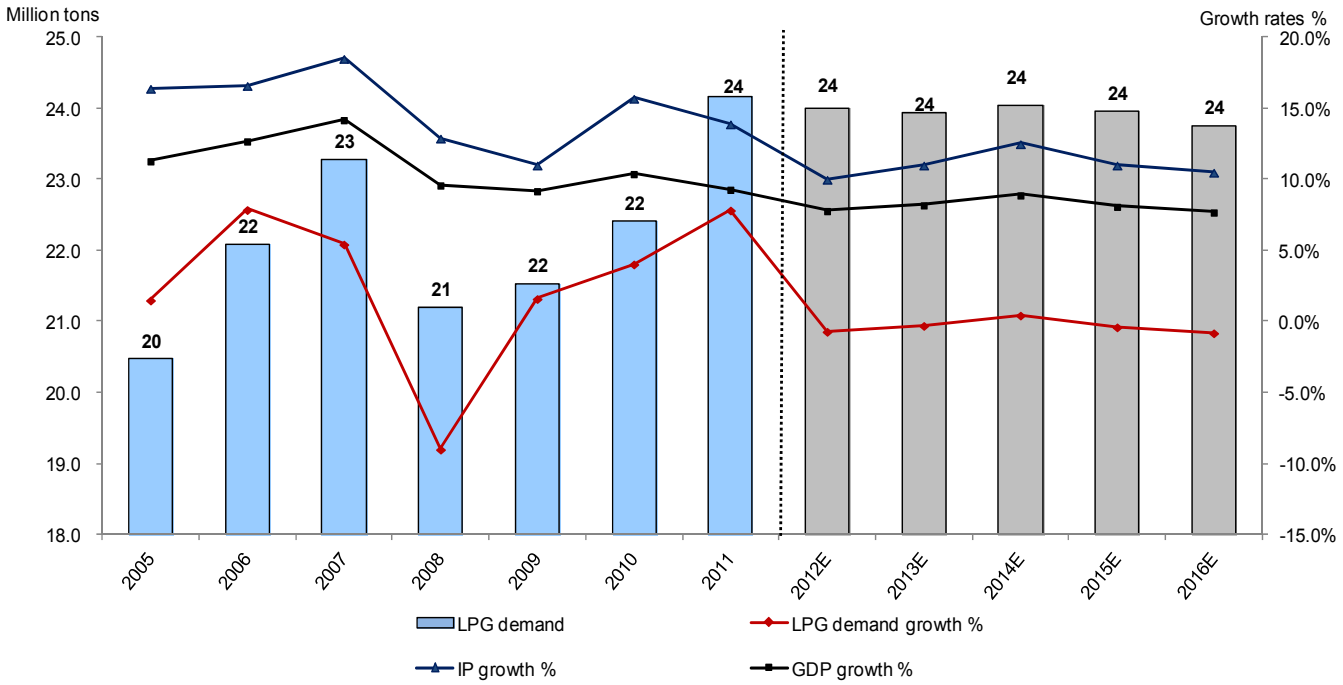
Source: CEIC, Deutsche Bank

Figure 93: LPG consumption trends



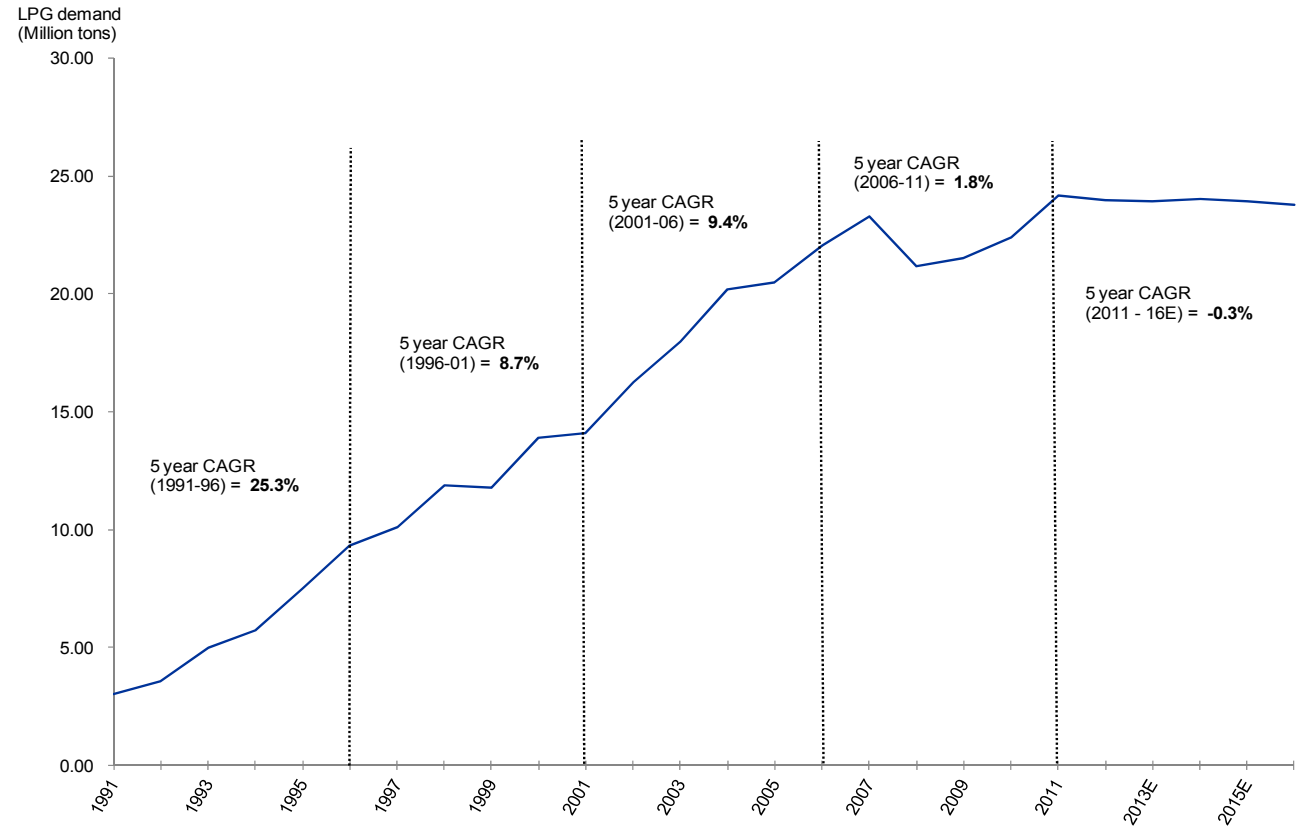
Source: CEIC, Deutsche Bank

Figure 94: LPG demand and demand drivers (2005-16E)



Source: CEIC, Reuters, Deutsche Bank

Figure 95: China LPG demand and 5-year CAGR's



Source: CEIC, Reuters, Deutsche Bank

Naphtha demand

- Forecasting naphtha demand in China

We use the following regression equation to forecast naphtha demand in China:

*Naphtha demand = (6.694) + 0.733 * IP growth + 0.685 * Ethylene capacity growth*

Interpreting the equation-

1. The intercept of the equation suggests that when all the other variables are zero, naphtha demand will fall by 6.7%

   Holding all the other independent variables constant;

2. When industrial production increases by 1%, naphtha demand will increase by 0.7%.

3. When ethylene capacity growth increases by 1%, naphtha demand will increase by 0.7%

Using the regression equation above, we are forecasting an average naphtha demand growth rate of 9.7% pa for 2012-16e. This compares to a naphtha demand growth rate of 13.7% pa from 2007-11.

Data on naphtha consumption / demand in China is not reported by the NBS. Oddly enough, naphtha consumption / demand numbers are also not reported by most Asian countries. We suspect this is because naphtha in Asia is used as a feedstock (intermediary product) for ethylene production rather than end product. Our China naphtha consumption / demand data is backed into from reported China ethylene production. The conversion rate is 0.3. In this report, the naphtha demand is apparent demand for naphtha, calculated as;

Naphtha apparent demand = (ethylene production / 0.3) + naphtha imports – naphtha exports.

Figure 96: Historical and forecasted naphtha demand 2002-16E

Year	Naphtha demand (million tons)	Naphtha demand growth (%)	Industrial production growth %	Ethylene capacity growth (%)
2002	17.43			
2003	19.50	11.9	17.0	5.4
2004	19.76	1.3	16.7	5.2
2005	23.13	17.1	16.4	23.1
2006	28.43	22.9	16.6	21.0
2007	34.39	21.0	18.5	13.0
2008	33.71	-2.0	12.9	1.8
2009	37.26	10.5	11.0	7.9
2010	47.52	27.5	15.7	35.1
2011	52.90	11.3	13.9	4.3
2012E	54.72	3.4	10.0	4.1
2013E	59.58	8.9	11.0	10.9
2014E	66.14	11.0	12.5	12.5
2015E	72.27	9.3	11.0	11.5
2016E	83.67	15.8	10.5	21.6

Source: CMAI, CEIC, Reuters, Deutsche Bank

Figure 97: Regression statistics data

Regression statistics of naphtha demand growth against IP growth and ethylene capacity growth	
Multiple R	**0.862**
R Square	**0.743**
Adjusted R Square	**0.657**
Standard Error	**5.702**
Observations	**9**

Correlation of naphtha demand growth with	
IP growth	**43.0%**
Ethylene capacity growth	**84.5%**

Source: Deutsche Bank

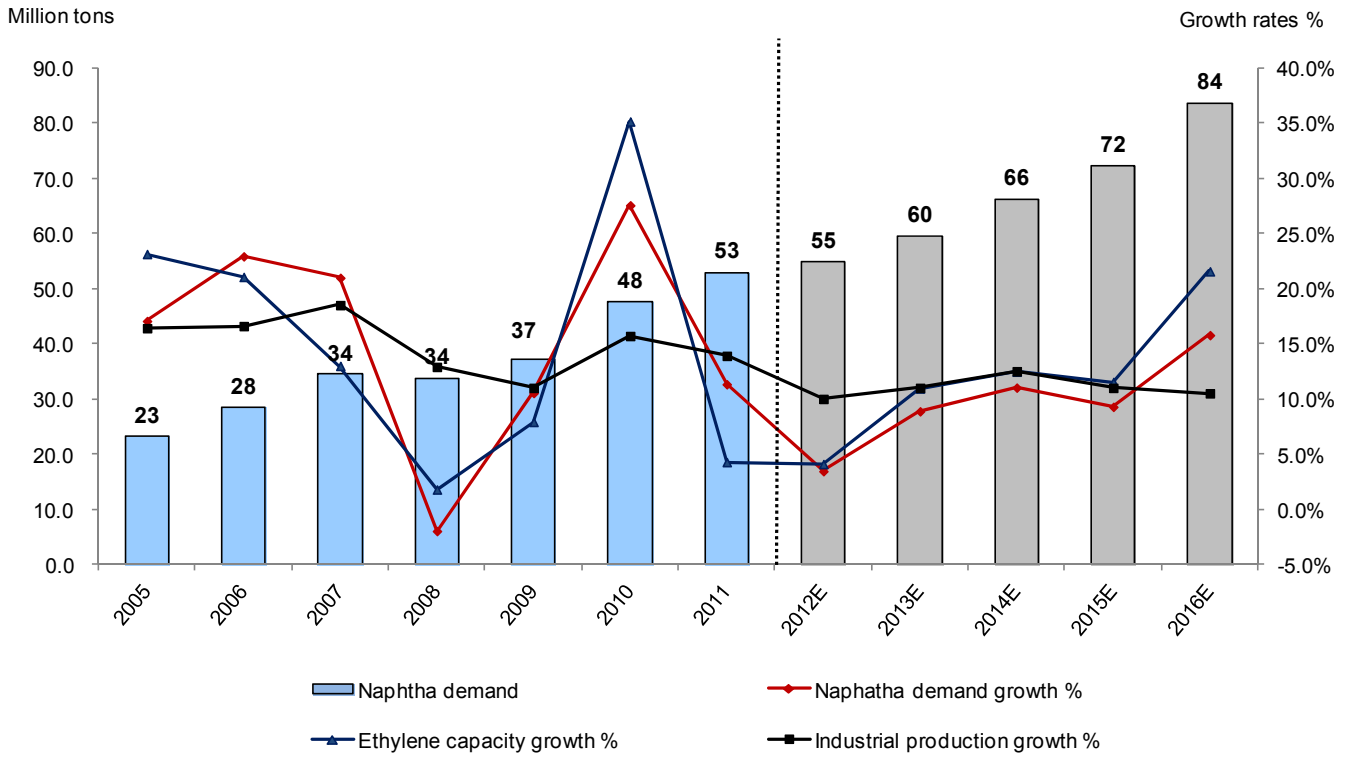
We ran the regression using historical data since 2003 to 2011. For correlation analysis we used data since 2003 to 2011

Figure 98: China naphtha demand elasticity

Year	Naphtha demand elasticity with	
	GDP growth	IP growth
2003	1.19	0.70
2004	0.13	0.08
2005	1.51	1.04
2006	1.80	1.38
2007	1.48	1.13
2008	(0.21)	(0.15)
2009	1.14	0.96
2010	2.65	1.75
2011	1.22	0.81
2012E	0.44	0.34
2013E	1.08	0.81
2014E	1.24	0.88
2015E	1.14	0.84
2016E	2.05	1.50
AVG (1981 - 2010)	**n.a**	**n.a**
AVG (1990 - 2010)	**n.a**	**n.a**
AVG (2000 - 2010)	**n.a**	**0.86**
AVG (2005 - 2010)	**1.40**	**1.02**
AVG (2011 - 2016E)	**1.20**	**0.87**

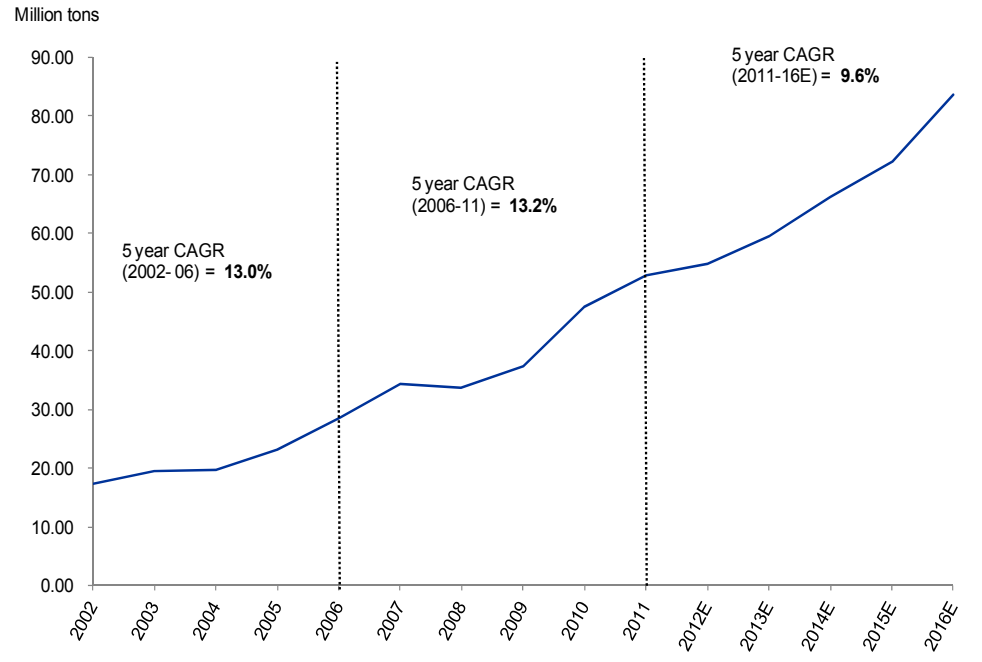
Source: CEIC, Reuters, Deutsche Bank

Figure 99: Naphtha demand and demand drivers (2005-16E)



Source: CMAI , CEIC, , Reuters, Deutsche Bank

Figure 100: China naphtha demand and 5- year CAGR's



Source: CEIC, Reuters, Deutsche Bank

Asphalt demand

- Forecasting asphalt demand in China

We use the following regression equation to forecast asphalt demand in China

*Asphalt demand = 3.672 + 2.673 * Growth in the length of highways*

Interpreting the equation-

1. The intercept of the equation suggests that when all the other variables are zero, asphalt demand will increase by 3.7%. This may be due to the demand that comes from industrial and construction sectors.

   Holding all the other independent variables constant;

2. When the length of highways increases by 1%, asphalt demand will increase by 2.7%.

Using the regression equation above, we are forecasting an average asphalt demand growth rate of 8.9% pa for 2012-16e. This compares to an asphalt demand growth rate of 22.0% pa from 2009-11.

China's National Bureau of Statistics did not start to release data on asphalt demand until 2008, which in our opinion is insufficient data to make a proper regression analysis. Notwithstanding, we need to make do with the data we have. The primary use of asphalt is in road construction. It is also used as a sealant to waterproof roofs in the construction industry.

Figure 101: Historical and forecasted asphalt demand 2008-16E

Year	Asphalt demand (million tons)	Asphalt demand growth (%)	Total length of highways growth (%)
2008	14.84		4.1
2009	23.35	57.3	3.5
2010	26.59	13.9	3.8
2011	25.19	-5.3	-3.3
2012E	27.37	8.6	1.9
2013E	29.82	9.0	2.0
2014E	32.62	9.4	2.1
2015E	35.52	8.9	2.0
2016E	38.59	8.6	1.9

Source: CEIC, Deutsche Bank

Figure 102: Regression statistics and correlation data	
Regression statistics of asphalt demand growth against growth in the length of highways	
Multiple R	1.000
R Square	1.000
Adjusted R Square	65,535
Standard Error	-
Observations	2
Correlation of asphalt demand growth with	
Growth in the length of highways	70.9%

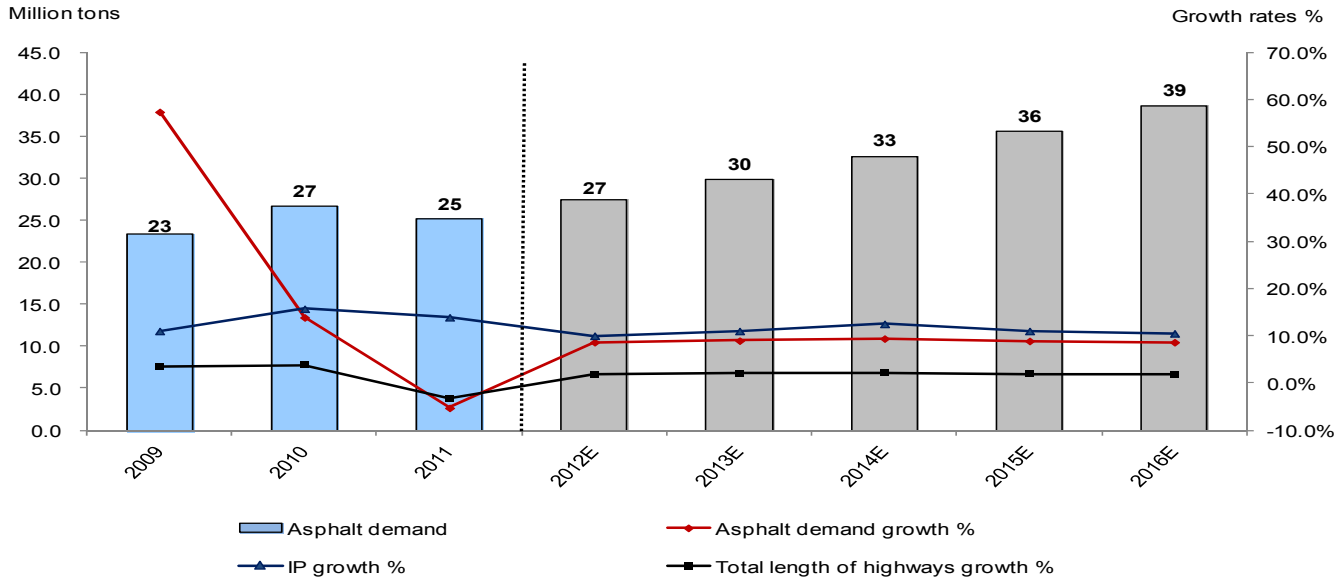
Source: Deutsche Bank

We ran the regression using historical data from 2010 to 2011. For correlation analysis we used data from 2009 to 2011

Figure 103: China asphalt demand elasticity		
Year	**Asphalt demand elasticity with**	
	GDP growth	**IP growth**
2009	6.23	5.21
2010	1.33	0.88
2011	(0.57)	(0.38)
2012E	1.12	0.87
2013E	1.09	0.81
2014E	1.06	0.75
2015E	1.10	0.81
2016E	1.12	0.82
AVG (2009 - 2011)	**2.33**	**1.91**
AVG (2012E - 2016E)	**1.10**	**0.81**

Source: Deutsche Bank

Figure 104: Asphalt demand and demand drivers (2009-16E)



Source: CEIC, Deutsche Bank

Consumption by Province

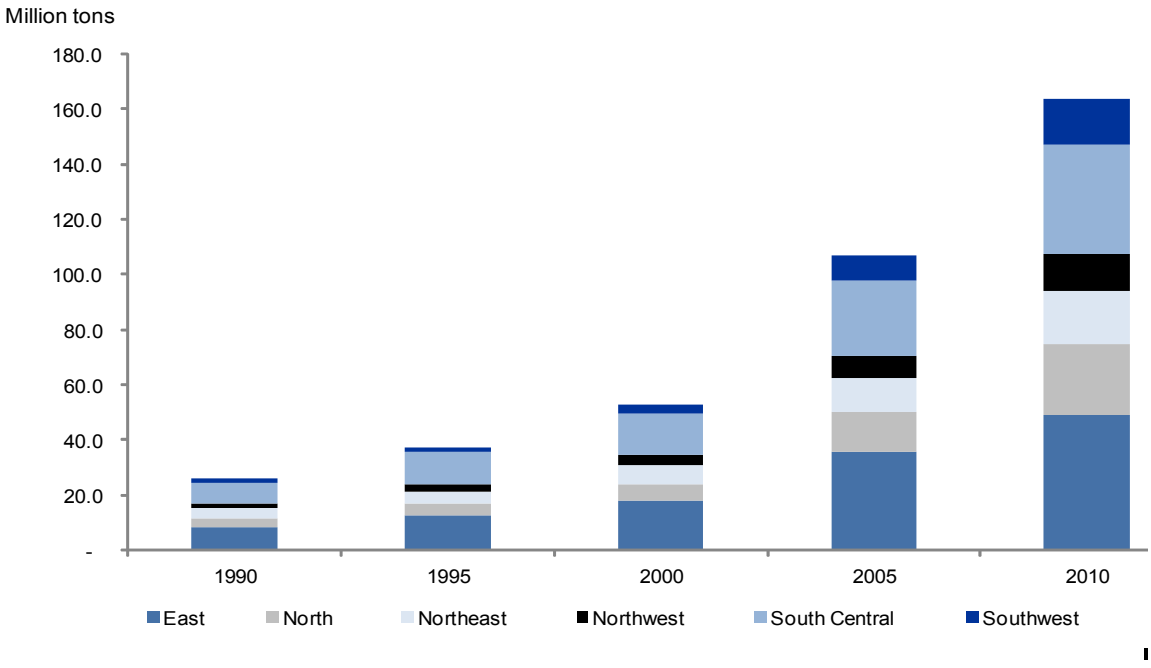
If we add individual product (gasoline, diesel, fuel oil, etc.) consumption by province as reported by NBS / CEIC and compare the totals to the product consumption / demand totals as reported by NBS / CEIC by economic segment (Figures: 46, 55, 68, 78, 87, 96 and 101) the two totals do not add up. This suggests data inconsistency in either the Provincial data and / or in the data presented by product (economic activity). Total consumption of diesel in 2010 by Province (Figure 105) was 163.7 million tons. Total consumption of diesel in 2010 by product / economic segment (Figure 46) was 146.34 million tons.

Diesel consumption

East and South Central regions continue to record the highest diesel consumption in China.

Figure 105: Diesel consumption in different geographical regions in China

Million Tons	1990	1995	2000	2005	2010
East	8.2	12.6	17.6	35.7	48.9
North	3.4	4.1	6.1	14.5	26.0
Northeast	3.4	4.4	6.8	11.9	19.3
Northwest	1.9	2.9	3.7	8.3	13.0
South Central	7.3	11.6	15.2	27.5	39.6
Southwest	1.3	1.8	3.4	8.8	16.9
Total	25.6	37.4	52.8	106.7	163.7



Source: CEIC, Deutsche Bank

Guangdong, Shandong, Zhejiang and Liaoning are the provinces with the highest diesel consumption. Guangdong continues to be the main industrial province and diesel consuming province in China.

Figure 106: Province-wise diesel consumption

Million Tons	1990	1995	2000	2005	2010
East	**8.2**	**12.6**	**17.6**	**35.7**	**48.9**
Shandong	2.3	3.1	3.4	10.6	14.5
Zhejiang	1.3	2.8	4.3	8.0	9.6
Jiangsu	1.8	2.2	3.5	5.2	7.3
Fujian	0.6	1.6	2.1	3.7	5.1
Shanghai	1.0	1.2	1.8	3.1	5.1
Jiangxi	0.5	0.6	1.0	3.0	3.7
Anhui	0.8	1.1	1.4	2.1	3.7
North	**3.4**	**4.1**	**6.1**	**14.5**	**26.0**
Inner Mongolia	0.3	0.4	0.7	3.8	8.6
Hebei	1.4	1.9	1.8	4.4	6.9
Shanxi	0.5	0.6	0.8	2.7	4.7
Tianjin	0.7	0.7	2.0	2.2	3.3
Beijing	0.5	0.5	0.8	1.4	2.4
Northeast	**3.4**	**4.4**	**6.8**	**11.9**	**19.3**
Liaoning	1.4	1.4	2.0	4.6	9.6
Heilongjiang	1.5	2.3	4.1	4.7	6.0
Jilin	0.5	0.7	0.7	2.5	3.6
Northwest	**1.9**	**2.9**	**3.7**	**8.3**	**13.0**
Shaanxi	0.5	0.7	0.9	2.8	5.3
Xinjiang	0.9	1.2	1.6	3.0	3.6
Gansu	0.4	0.7	0.9	1.1	2.1
Ningxia	0.1	0.1	0.1	0.7	1.1
Qinghai	0.1	0.1	0.2	0.6	0.9
South Central	**7.3**	**11.6**	**15.2**	**27.5**	**39.6**
Guangdong	2.8	6.0	7.7	13.1	16.7
Henan	1.4	1.3	1.6	3.3	5.6
Hunan	0.9	1.0	1.4	3.4	5.0
Guangxi	0.6	0.7	1.5	3.0	4.4
Hainan	0.1	0.4	0.5	0.6	1.4
Hubei	1.7	2.1	2.6	4.2	6.5
Southwest	**1.3**	**1.8**	**3.4**	**8.8**	**16.9**
Yunnan	0.3	0.5	0.6	2.8	5.6
Sichuan	0.7	1.0	1.6	2.9	5.3
Chongqing	n.a	n.a	0.6	1.8	3.4
Guizhou	0.3	0.3	0.6	1.3	2.6
Total	**25.6**	**37.4**	**52.8**	**106.7**	**163.7**

Source: CEIC, Deutsche Bank

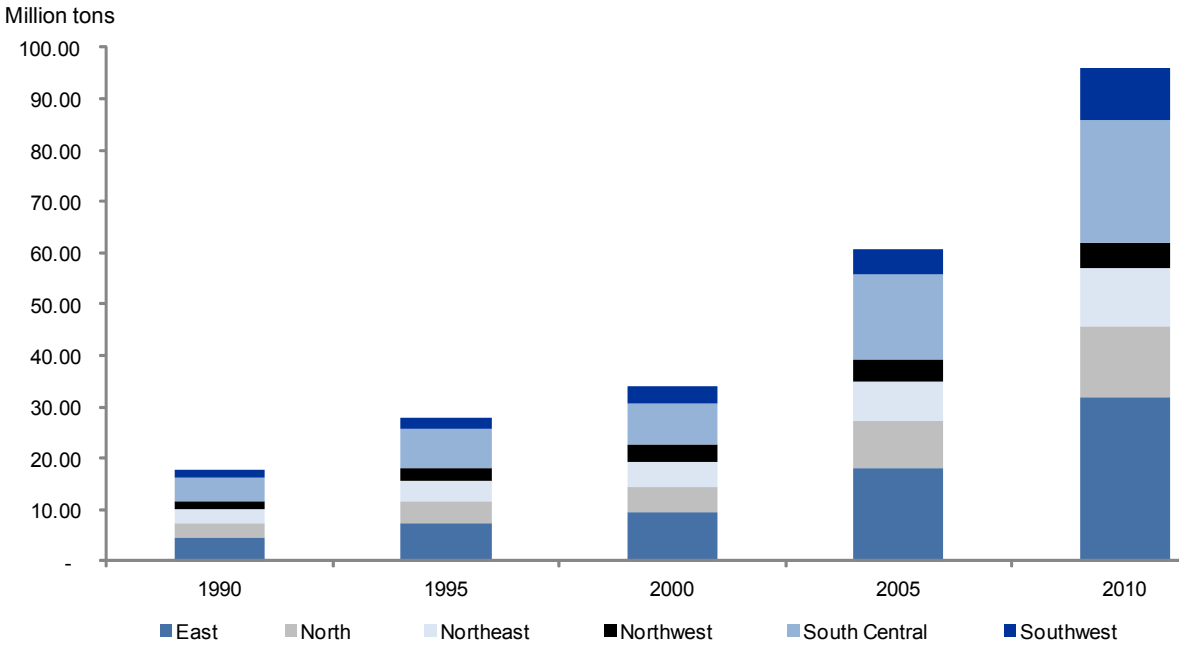
Note: Red font denotes diesel consumption of over 5 million tons

Gasoline consumption

The East and South Central regions continue to record the highest gasoline consumption in China.

Figure 107: Gasoline consumption in different geographical regions in China

Million Tons	1990	1995	2000	2005	2010
East	4.49	7.30	9.37	18.07	32.00
North	2.95	4.30	5.09	9.18	13.69
Northeast	2.52	3.87	4.84	7.80	11.24
Northwest	1.75	2.69	3.31	4.28	4.92
South Central	4.39	7.43	8.03	16.51	24.04
Southwest	1.78	2.41	3.47	4.97	10.20
Total	17.88	27.99	34.11	60.81	96.09



Source: CEIC, Deutsche Bank

Guangdong, Shandong, Jiangsu and Liaoning are the provinces with the highest gasoline consumption. Guangdong province continues to be the main gasoline consuming province.

Figure 108: Province-wise gasoline consumption

Million Tons	1990	1995	2000	2005	2010
East	**4.49**	**7.30**	**9.37**	**18.07**	**32.00**
Shandong	1.24	1.93	1.89	4.44	8.02
Zhejiang	0.58	1.24	1.96	3.69	5.87
Jiangsu	0.91	1.64	1.87	4.20	7.50
Fujian	0.40	0.69	1.05	2.00	3.33
Shanghai	0.50	0.79	1.33	2.24	4.15
Jiangxi	0.42	0.42	0.58	0.64	1.55
Anhui	0.44	0.58	0.69	0.86	1.57
North	**2.95**	**4.30**	**5.09**	**9.18**	**13.69**
Inner Mongolia	0.34	0.50	0.65	1.92	3.26
Hebei	0.97	1.32	1.36	2.22	2.39
Shanxi	0.71	0.98	0.89	1.46	2.28
Tianjin	0.37	0.75	1.12	1.23	2.05
Beijing	0.57	0.75	1.07	2.35	3.72
Northeast	**2.52**	**3.87**	**4.84**	**7.80**	**11.24**
Liaoning	1.03	1.20	1.49	3.57	5.93
Heilongjiang	0.93	1.84	2.44	3.12	3.64
Jilin	0.56	0.83	0.91	1.11	1.67
Northwest	**1.75**	**2.69**	**3.31**	**4.28**	**4.92**
Shaanxi	0.46	0.82	1.04	1.97	2.55
Xinjiang	0.69	1.02	1.02	1.07	1.31
Gansu	0.37	0.56	0.98	0.87	0.57
Ningxia	0.10	0.11	0.11	0.24	0.23
Qinghai	0.12	0.18	0.16	0.13	0.26
South Central	**4.39**	**7.43**	**8.03**	**16.51**	**24.04**
Guangdong	1.42	2.82	3.01	7.06	10.86
Henan	0.87	1.43	1.21	2.35	2.97
Hunan	0.55	1.04	1.15	2.05	2.62
Guangxi	0.33	0.41	0.66	1.40	2.48
Hainan	0.12	0.21	0.31	0.21	0.53
Hubei	1.10	1.52	1.69	3.44	4.58
Southwest	**1.78**	**2.41**	**3.47**	**4.97**	**10.20**
Yunnan	0.54	0.65	0.91	1.23	2.32
Sichuan	0.78	1.24	1.44	2.24	5.42
Chongqing	-	-	0.66	0.78	1.03
Guizhou	0.46	0.52	0.46	0.72	1.43
Total	**17.88**	**27.99**	**34.11**	**60.81**	**96.09**

Source: CEIC, Deutsche Bank

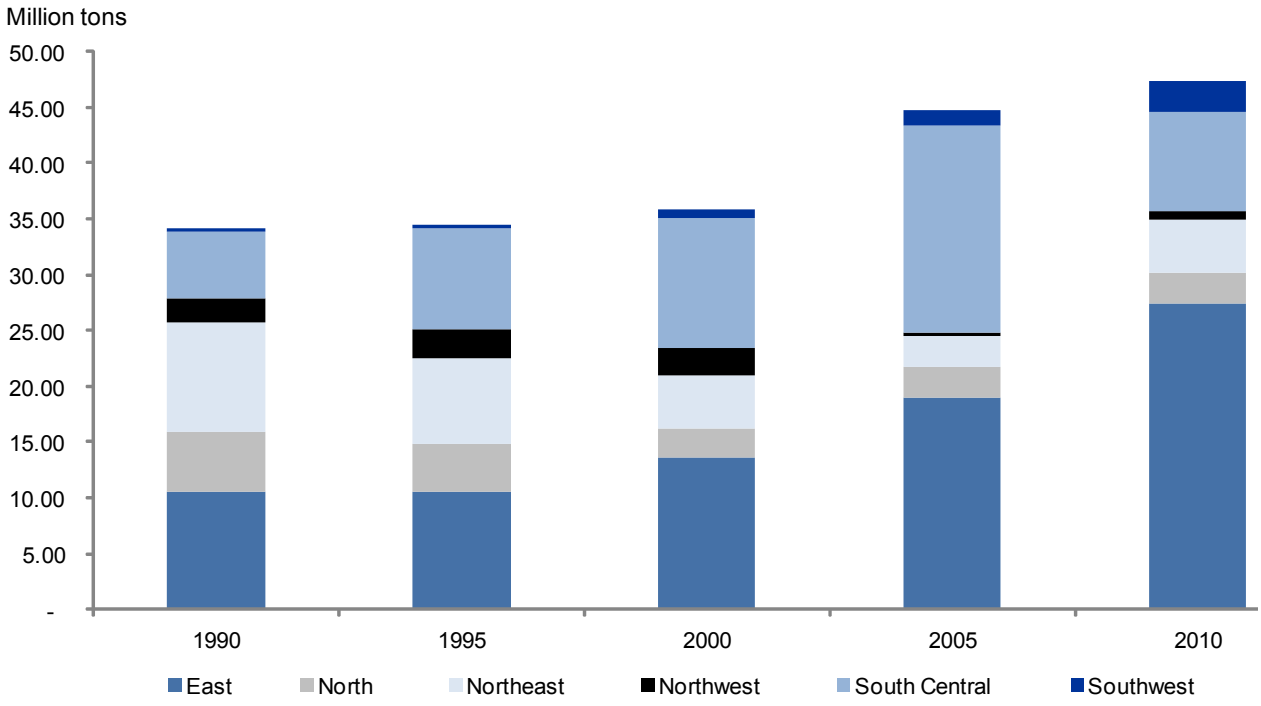
Note: Red font denotes gasoline consumption of over 3 million tons

Fuel oil consumption

The highest fuel oil consumption in China comes from the East region of the country, followed by the South Central region.

Figure 109: Fuel oil consumption in different geographical regions in China

Million Tons	1990	1995	2000	2005	2010
East	10.56	10.49	13.58	19.00	27.37
North	5.41	4.36	2.62	2.74	2.76
Northeast	9.79	7.63	4.83	2.72	4.85
Northwest	2.09	2.64	2.35	0.40	0.70
South Central	5.98	8.99	11.70	18.54	8.98
Southwest	0.31	0.41	0.73	1.37	2.71
Total	34.15	34.52	35.80	44.77	47.38



Source: CEIC, Deutsche Bank

Guangdong, Shanghai, and Shandong are the provinces with the highest fuel oil consumption. The majority of China's tea-pot refineries are based in Guangdong and Shandong.

Figure 110: Province-wise fuel oil consumption

Million Tons	1990	1995	2000	2005	2010
East	**10.56**	**10.49**	**13.58**	**19.00**	**27.37**
Shandong	2.48	3.10	3.44	3.54	12.87
Zhejiang	1.02	1.06	1.83	3.04	3.30
Jiangsu	1.90	1.62	2.02	2.58	1.58
Fujian	0.16	0.32	0.53	1.62	1.83
Shanghai	4.34	3.65	4.94	7.68	7.44
Jiangxi	0.23	0.27	0.34	0.31	0.24
Anhui	0.42	0.47	0.47	0.24	0.12
North	**5.41**	**4.36**	**2.62**	**2.74**	**2.76**
Inner Mongolia	0.26	0.16	0.31	0.25	0.15
Hebei	0.46	0.55	0.49	0.61	0.39
Shanxi	0.13	0.13	0.12	0.09	0.12
Tianjin	2.28	1.56	0.80	1.13	1.44
Beijing	2.28	1.96	0.90	0.66	0.67
Northeast	**9.79**	**7.63**	**4.83**	**2.72**	**4.85**
Liaoning	6.42	5.00	2.97	1.90	3.56
Heilongjiang	2.35	1.88	1.35	0.40	0.89
Jilin	1.01	0.76	0.51	0.42	0.40
Northwest	**2.09**	**2.64**	**2.35**	**0.40**	**0.70**
Shaanxi	0.22	0.28	0.80	0.04	0.00
Xinjiang	0.90	1.17	0.57	0.17	0.15
Gansu	0.63	0.76	0.58	0.16	0.15
Ningxia	0.24	0.28	0.33	0.02	0.40
Qinghai	0.11	0.15	0.07	0.00	0.00
South Central	**5.98**	**8.99**	**11.70**	**18.54**	**8.98**
Guangdong	3.66	6.47	9.42	16.00	6.47
Henan	0.39	0.53	0.58	0.78	0.18
Hunan	0.53	0.56	0.46	0.48	0.75
Guangxi	0.08	0.14	0.08	0.33	0.35
Hainan	0.01	0.04	0.09	0.05	0.30
Hubei	1.32	1.25	1.07	0.89	0.92
Southwest	**0.31**	**0.41**	**0.73**	**1.37**	**2.71**
Yunnan	0.06	0.09	0.19	0.29	0.47
Sichuan	0.21	0.24	0.36	0.94	1.73
Chongqing	-	-	0.08	0.12	0.42
Guizhou	0.05	0.07	0.09	0.03	0.09
Total	**34.15**	**34.52**	**35.80**	**44.77**	**47.38**

Source: CEIC, Deutsche Bank

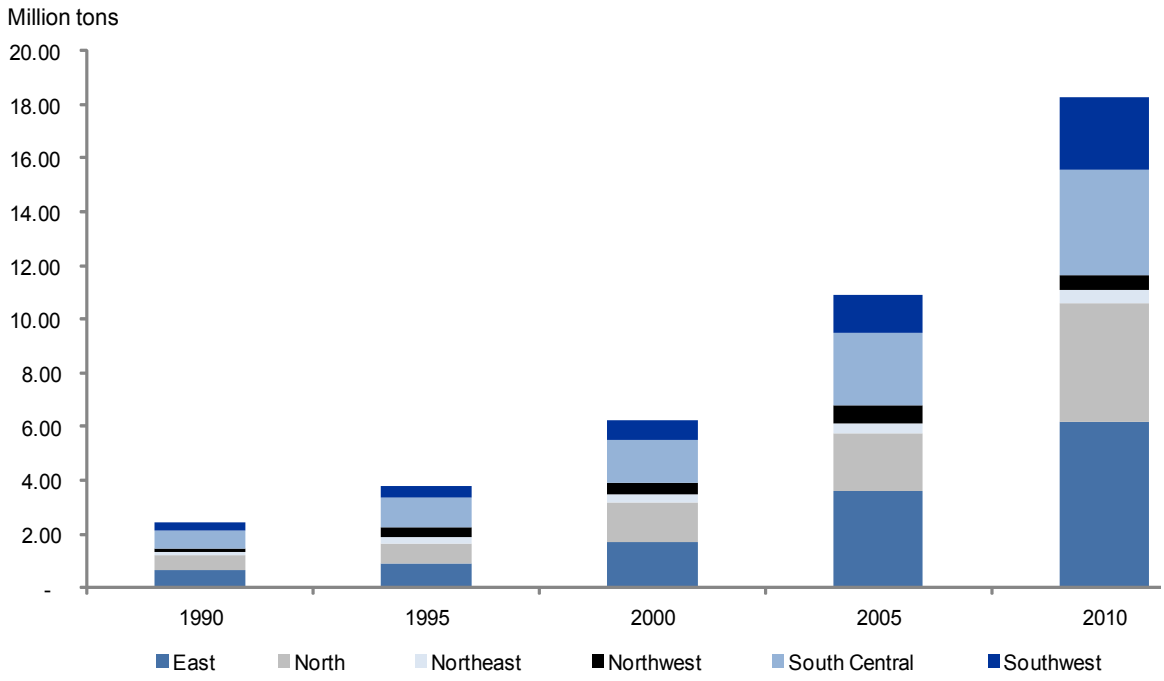
Note: Red font denotes fuel oil consumption of over 4 million tons

Kerosene consumption

The highest kerosene demand in China comes from the East region of the country, followed by the North and the South Central regions.

Figure 111: Kerosene consumption in different geographical regions in China

Million Tons	1990	1995	2000	2005	2010
East	0.68	0.90	1.67	3.58	6.17
North	0.53	0.76	1.48	2.17	4.45
Northeast	0.10	0.19	0.31	0.35	0.49
Northwest	0.17	0.37	0.45	0.68	0.53
South Central	0.66	1.14	1.62	2.74	3.94
Southwest	0.31	0.41	0.73	1.37	2.71
Total	2.46	3.77	6.25	10.88	18.29



Source: CEIC, Deutsche Bank

Shanghai, Beijing and Guangdong are the provinces with the highest kerosene consumption. This is also where China's big international airports are located.

Figure 112: Province-wise kerosene consumption

Million Tons	1990	1995	2000	2005	2010
East	**0.68**	**0.90**	**1.67**	**3.58**	**6.17**
Shandong	0.11	0.24	0.48	0.22	0.39
Zhejiang	0.07	0.07	0.11	0.41	0.70
Jiangsu	0.13	0.09	0.39	0.22	0.36
Fujian	0.03	0.05	0.08	0.33	0.57
Shanghai	0.21	0.38	0.56	2.23	3.99
Jiangxi	0.05	0.03	0.03	0.07	0.08
Anhui	0.09	0.05	0.03	0.11	0.08
North	**0.53**	**0.76**	**1.48**	**2.17**	**4.45**
Inner Mongolia	0.01	0.00	0.02	0.00	0.09
Hebei	0.04	0.04	0.03	0.03	0.07
Shanxi	0.02	0.03	0.06	0.08	0.15
Tianjin	0.02	0.04	0.19	0.15	0.21
Beijing	0.43	0.66	1.18	1.89	3.93
Northeast	**0.10**	**0.19**	**0.31**	**0.35**	**0.49**
Liaoning	0.06	0.12	0.19	0.26	0.23
Heilongjiang	0.02	0.05	0.09	0.07	0.24
Jilin	0.01	0.03	0.03	0.01	0.01
Northwest	**0.17**	**0.37**	**0.45**	**0.68**	**0.53**
Shaanxi	0.08	0.17	0.19	0.35	0.09
Xinjiang	0.05	0.16	0.21	0.26	0.33
Gansu	0.03	0.03	0.04	0.05	0.05
Ningxia	0.00	0.00	0.00	0.02	0.05
Qinghai	0.01	0.00	0.00	0.00	0.00
South Central	**0.66**	**1.14**	**1.62**	**2.74**	**3.94**
Guangdong	0.32	0.56	0.90	1.54	2.02
Henan	0.08	0.16	0.14	0.14	0.31
Hunan	0.08	0.10	0.08	0.20	0.30
Guangxi	0.06	0.06	0.04	0.07	0.03
Hainan	0.01	0.11	0.28	0.63	0.87
Hubei	0.12	0.15	0.18	0.16	0.40
Southwest	**0.31**	**0.41**	**0.73**	**1.37**	**2.71**
Yunnan	0.06	0.09	0.19	0.29	0.47
Sichuan	0.21	0.24	0.36	0.94	1.73
Chongqing	-	-	0.08	0.12	0.42
Guizhou	0.05	0.07	0.09	0.03	0.09
Total	**2.46**	**3.77**	**6.25**	**10.88**	**18.29**

Source: CEIC, Deutsche Bank

Note: Red font denotes kerosene consumption of over 1.5 million tons

Seasonal demand

Summary of our findings

China's seasonal demand patterns

In our on-going efforts to better understand oil and product demand out of China, we re-visited our analysis on seasonal consumption trends (published on 16th Sept 2011). In our 2011 analysis, China's demand for crude oil did not show strong seasonal trends. However, in this report, we show that China's crude oil demand seasonality is somewhat in line with gasoline and diesel, which continues to show a strong seasonal trend with peak and trough demand in 4Q and 1Q. China's seasonal demand for Fuel oil is counter intuitive - teapots at work. China's demand for naphtha largely depends on ethylene capacity additions.

Gasoline and diesel

China's demand for gasoline and diesel is well established (Figures 119 and 120) and in our opinion driven by peak industrial activity (3Q-4Q), the Chinese New Year holidays (Jan / Feb) and cold winter months (1Q). Gasoline represents ~20% and diesel ~40% of China's total oil product demand. China's CAGR demand for diesel has slowed 2007-12 (+6.3%) vs. 2003-12 (+8.1%). We suspect the deceleration is due to more efficient diesel consumption. In contrast, China's CAGR demand for gasoline has grown 2007-12 (+9.1%) vs. 2003-12 (+8.8%).

Fuel oil

Fuel oil is used for space heating, marine transport, industry and as a feedstock for teapot refineries. We suspect that the demand from the teapots disrupts seasonality. China's demand for fuel oil is highest in 2Q and lowest in 4Q (Figure 121). Fuel oil represents ~8% of China's total oil product demand. China's CAGR demand for fuel oil has declined 2007-12 (-4.9%) vs. 2003-12 (-2.6%). The decline in fuel oil demand growth can be explained by the increase in natural gas use throughput China and by the shift in feedstock away from fuel oil into crude oil by China's teapot refineries.

Kerosene

Kerosene is used for transport (jet fuel), and as a blending agent with fuel oil to produce low cost / low quality diesel substitutes. China's peak demand (2H) for kerosene (Figure 122) is driven by the fall harvest and peak industrial activity. Kerosene represents ~5% of China's total oil product demand. China's CAGR demand for kerosene has risen 2007-12 (10.4%) vs. 2003-12 (7.3%).

Naphtha

China's demand for naphtha (Figure 123) is driven by a growing chemicals industry. Naphtha represents ~13% of China's total oil product demand. China's CAGR demand for naphtha has dropped 2007-12 (8.9%) vs. 2003-12 (11.7%).

Demand Trends

Crude Oil - Apparent Demand (Figures 118, 124, 25)

- Over the period analyzed (2003-12) China's average nominal demand for crude oil is highest in 4Q and lowest in 1Q. However, the pattern of quarterly highs and lows (Figure 118) is not well established.
- In our first seasonality report (published 16th Sept 2011); we saw the highest crude oil demand seasonality in 3Q and the lowest in 1Q. However, strong demand in 4Q11 and 4Q12 with a Q-o-Q growth of 3.6% and 10.5% respectively, caused highest crude oil demand seasonality to shift to 4Q (lowest seasonality unchanged at 1Q). This is in line with gasoline and diesel demand seasonality, which continues to record the highest and the lowest seasonality in 4Q and 1Q, respectively
- We suspect that the highs in China's quarterly crude oil demand (4Q) are driven by the peak construction activity (3Q), peak industrial activity (3Q-4Q), stockpiling in preparation for the Chinese New Year holidays and the fall harvest. We suspect that the lows (1Q) are driven by the dearth of economic activity surrounding the Chinese New Year holidays.
- China's apparent demand for crude oil (2003-12) grew at a CAGR of 7.2%. China's apparent demand for crude oil (2007-12) grew at a CAGR of 6.6%.

Gasoline - Apparent Demand (Figures 119, 125, 27)

- Over the period analyzed (2003-12) China's average nominal demand for gasoline is highest in 4Q and lowest in 1Q. The pattern of quarterly highs and lows (Figure 119) seems well established.
- China has yet to develop a "driving season" in 4Q. We suspect that the highs in China's quarterly gasoline demand (4Q) are due to stockpiling in anticipation of Chinese New Year holidays and peak industrial activity (3Q-4Q). We suspect that the lows (1Q) are driven by cold winter months and the Chinese New Year holidays.
- China's apparent demand for gasoline (2003-12) grew at a CAGR of 8.8%. China's apparent demand for gasoline (2007-12) grew at a CAGR of 9.1%.
- Gasoline consumption represents roughly 20% of China's total product consumption.

Diesel - Apparent Demand (Figure 120, 126, 26)

- Over the period analyzed (2003-12) China's average nominal demand for diesel is highest in 4Q and lowest in 1Q. The pattern of quarterly highs and lows (Figure 120) seems well established.
- We suspect that the highs in China's quarterly diesel demand (4Q) are driven by the coming of winter, peak construction activity (3Q), peak industrial activity (3Q-4Q) and the fall harvest. We suspect that the lows (1Q) are driven by cold winter months and the Chinese New Year holidays. Diesel demand in China consistently (2003-10) hit a low in February (Figure 126) which is when China comes to a week-long standstill to celebrate the Chinese New Year. Diesel demand in China seems to regularly peak in December.

- China's apparent demand for diesel (2003-12) grew at a CAGR of 8.1%. China's apparent demand for diesel (2007-12) grew at a CAGR of 6.3%. A slowdown in diesel consumption growth 2003-12 vs. 2007-12 is counter intuitive. Might China be consuming diesel more efficiently now-a-days relative to the early years of 2003-12? - No more blue 3-wheel trucks on the road.
- Diesel consumption represents roughly 40% of China's total product consumption.

Fuel Oil Apparent Demand (Figures 121, 127, 28)

- Over the period analyzed (2003-12) China's average nominal demand for fuel oil is highest in 2Q and lowest in 4Q. The pattern of quarterly highs and lows (Figure 121) is not well established.
- The seasonality of China's fuel oil demand is counter intuitive. Fuel oil is used principally for heating. However, in China it is also demanded as a feedstock for the local teapot refiners. We suspect that demand from China's teapot refiners eliminates seasonality that might otherwise evolve around the demand for winter fuel oil.
- China's apparent demand for fuel oil for 2003-12 declined by a CAGR of -2.6% while, China's fuel oil demand for 2007-12 declined by a CAGR of -4.9%. We suspect that the increasing decline rate in China's demand for fuel oil is being driven by 1) the "gasification" of China – a process that began in 2005 with the West-to-East #1 pipeline and continues today with W2E2 and multiple LNG re-gas facilities; and 2) declining fuel oil demand from teapot refineries as they are given access to crude oil- government granted 10 mm tons crude oil import quota to ChemChina.
- Fuel oil consumption represents roughly 8% of China's total product consumption.

Kerosene Apparent Demand (Figures 122, 128, 29)

- Over the period analyzed (2003-12) China's average nominal demand for kerosene / jet-fuel is highest in 3Q and 4Q (very similar) and lowest in 1Q. The pattern of quarterly highs and lows (Figure 122) is not well established.
- Kerosene in China is principally used for transportation (jet fuel) rather than heating and cooking. However, it is also used in China as a cutting agent to upgrade heavier gas oil / fuel oil to be used as a diesel substitute. We suspect that the highs in China's quarterly kerosene demand (4Q) are driven by autumn (October) travels and lots of upgrading for the autumn harvest. We suspect that the lows (1Q) are driven by the cold winter months and lack of economic activity surrounding the Chinese New Year.
- China's apparent demand for kerosene (2003-12) grew at a CAGR of 7.3%. China's apparent demand for kerosene (2007-12) grew at a CAGR of 10.4%. The increase in the growth of kerosene demand in recent years can be attributable to 1) rising diesel prices, and 2) increasing domestic air travel.
- Kerosene consumption represents roughly 5% of China's total product consumption.

Naphtha Apparent Demand (Figures 123, 129, 30)

- Over the period analyzed (2003-12) China's average nominal demand for naphtha is highest in 4Q and lowest in 2Q. The pattern of quarterly highs and lows (Figure 123) is not well established.
- Naphtha in China serves almost exclusively as a chemical feedstock. During 2H05 and 4Q09, China added significant ethylene cracking capacity in terms of Shanghai-Secco & Yangzi-BASF and Tianjin & Zhenhai ethylene crackers. Sinopec recently completed 0.8 mm tons ethylene plant, in Wuhan, further supporting 4Q12 naphtha demand to grow by 15.1% Q-o-Q.
- The highs in China's quarterly naphtha demand (4Q) have been driven mainly by ethylene capacity additions. We suspect that the lows (2Q) are driven by seasonal maintenance turnarounds which are more often than not scheduled April-September.
- China's apparent demand for naphtha (2003-12) grew at a CAGR of 11.7%, while the apparent demand for naphtha (2007-12) grew at a CAGR of 8.9%. The slowdown in Naphtha demand growth during 2007-12 vs. 2003-12 could be attributed to the use of low cost synthetic coal gas and coal-to-liquid in refineries, reducing the dominance of naphtha in the feedstock mix.
- Naphtha consumption represents roughly 13% of China's total product consumption.

Appendix A - Valuation tables

Figure 113: Global E&P company valuations

Prices close on	8-Apr-13							P/E (x)		EV/EBITDA (x)		P/BV (x)		RoE %		Net Debt / Equity
Company	Ticker	Currency	Price	Rating	Price Target	% to target	Mkt. Cap US$bn	13F	14F	13F	14F	13F	14F	13F	14F	2012F
E&P Global :																
CNOOC Ltd	0883.HK	HKD	**14.2**	**Hold**	**15.43**	**8.5**	**82.6**	**8.6**	**7.9**	**4.5**	**3.9**	**1.4**	**1.2**	**18.0**	**16.9**	**2.0**
Cairn India	CAIL.BO	INR	286.2	Hold	355	24.1	10.2	4.7	5.1	3.3	2.7	0.9	0.8	22.1	17.4	(15.0)
ConocoPhillips	COP.N	USD	59.3	Hold	62	4.5	72.4	10.8	9.3	3.0	2.7	1.4	1.3	13.6	14.7	20.5
Anadarko Petroleum	APC.N	USD	86.6	Buy	101	16.7	44.0	20.7	13.6	6.1	4.1	1.9	1.7	9.7	12.9	40.8
Marathon Oil	MRO.N	USD	32.8	Buy	40	21.8	23.2	9.9	9.7	2.9	2.9	1.2	1.1	12.3	11.4	26.2
Canadian Natural	CNQ.TO	CAD	31.2	Hold	32	2.6	33.5	13.0	11.0	5.0	4.5	1.3	1.2	10.4	11.5	34.1
PTTEP	PTTE.BK	THB	143.0	Buy	185	29.4	19.7	9.0	8.5	3.7	3.2	1.6	1.4	18.2	17.2	11.2
Noble Energy	NBL.N	USD	115.6	Buy	124	7.3	20.7	14.7	10.7	6.5	5.4	2.2	1.8	15.9	18.8	31.1
Devon Energy	DVN.N	USD	54.4	Hold	66	21.2	22.1	13.6	6.0	4.8	2.9	1.0	0.9	7.4	16.1	38.3
Apache	APA.N	USD	74.6	Hold	90	20.6	29.3	7.3	5.8	3.0	2.5	0.9	0.8	13.0	14.5	26.9
Encana	ECA.TO	CAD	18.9	Sell	17	(9.9)	13.7	26.2	NA	7.1	NA	2.6	NA	9.9	NA	126.5
Chesapeake Energy	CHK.N	USD	19.8	Hold	20	1.3	13.2	14.0	9.1	4.8	3.9	0.9	0.9	9.7	13.1	68.8
Novatek	NVTKq.L	USD	108.5	Buy	140	29.0	33.4	12.0	10.5	7.4	6.1	2.9	2.4	26.1	24.8	25.1
Woodside Petroleum	WPL.AX	AUD	35.6	Buy	41	16.2	30.7	13.7	11.3	6.6	5.8	1.9	1.7	14.2	15.9	13.2
Mean								**13.0**	**9.2**	**4.9**	**3.9**	**1.6**	**1.3**	**14.0**	**15.7**	**34.4**
Median								**13.0**	**9.5**	**4.8**	**3.6**	**1.4**	**1.3**	**13.0**	**15.3**	**26.9**
More Oil than Gas (Mean)								**11.8**	**9.7**	**4.1**	**3.4**	**1.3**	**1.2**	**13.6**	**13.6**	**21.3**
More Gas than Oil (Mean)								**13.8**	**8.8**	**5.3**	**4.3**	**1.7**	**1.4**	**14.3**	**17.2**	**42.6**
More Shale Gas than Oil (Mean)								**15.3**	**7.0**	**4.2**	**3.1**	**1.3**	**0.8**	**10.0**	**14.6**	**65.1**

NOTES:

"More Oil than Gas" = CNOOC Ltd through Canadian Naural

"More Gas than Oil" = PTTEP through Woodside

"More Shale Gas than Oil" = Devon; Apache; Encana & Chesapeake

Red outliers are not included in averages

Source: Deutsche Bank

Figure 114: Global integrated oil & gas company valuations

Priced on	8-Apr-13							P/E (x)		EV/EBITDA (x)		P/BV (x)		RoE %		Net Debt / Equity
Company	Ticker	Trading Currency	Price	Rating	Price Target	% to TP	Mkt. Cap US$bn	13F	14F	13F	14F	13F	14F	13F	14F	2013F
Integrated Global																
Royal Dutch Shell plc	RDSa.L	GBP	2,080	Hold	2,475	19.0	205.4	7.4	7.2	2.7	2.7	1.0	0.9	14.4	14.0	8.4
BP	BP.L	GBP	448.1	Buy	520	16.1	131.6	8.0	6.5	2.7	3.1	1.0	0.9	22.0	14.2	16.6
ENI	ENI.MI	EUR	17.6	Buy	21	19.5	84.0	9.0	8.0	2.2	2.0	1.0	1.0	11.6	12.3	15.2
Total SA	TOTF.PA	EUR	36.8	Buy	44	19.7	114.4	6.3	6.0	2.4	2.3	1.0	0.9	18.9	17.4	19.1
Repsol	REP.MC	EUR	16.0	Hold	16	(0.3)	27.6	8.6	9.4	4.1	3.8	0.7	0.7	8.7	7.7	40.8
Statoil	STL.OL	NOK	139.2	Hold	160	14.9	77.2	8.0	8.3	1.7	1.8	1.3	1.2	16.9	15.2	22.5
ExxonMobil	XOM.N	USD	88.6	Hold	96	8.4	397.0	10.5	9.9	7.3	6.8	2.2	2.0	21.8	21.0	4.9
Occidental Petroleum	OXY.N	USD	81.1	Hold	80	(1.4)	65.3	11.4	10.3	4.7	4.4	1.5	1.4	13.3	13.6	11.3
Chevron	CVX.N	USD	117.8	Buy	140	18.8	228.9	9.4	9.2	4.7	4.6	1.5	1.4	16.8	15.6	(1.7)
ONGC	ONGC.BO	INR	312.5	Buy	395	26.4	57.2	**8.5**	**7.3**	**3.2**	**2.6**	**1.5**	**1.3**	**19.5**	**19.2**	**(26.8)**
Petrobras	PBR.N	USD	16.1	Hold	19	18.0	108.8	10.0	8.3	7.6	7.2	0.6	0.6	6.2	7.0	60.4
PTT	PTT.BK	THB	315.0	Hold	365	15.9	30.6	8.0	7.7	5.1	4.6	1.3	1.2	17.5	16.2	39.5
PetroChina	0857.HK	HKD	9.9	Hold	11.12	12.4	252.0	11.3	10.1	5.2	5.0	1.3	1.2	11.6	12.0	34.7
Sinopec	0386.HK	HKD	8.8	Buy	10.05	14.6	102.3	**8.4**	**7.9**	**4.8**	**4.6**	**1.1**	**1.0**	**13.7**	**13.7**	**47.9**
Mean								**8.8**	**8.2**	**4.0**	**3.8**	**1.2**	**1.1**	**15.6**	**14.5**	**17.5**
Median								**8.5**	**8.1**	**3.7**	**3.5**	**1.2**	**1.1**	**16.9**	**14.7**	**15.9**
Europe Mean								**7.9**	**7.6**	**2.6**	**2.6**	**1.0**	**0.9**	**15.4**	**13.5**	**20.4**
N. America Mean								**10.0**	**9.2**	**5.0**	**4.6**	**1.7**	**1.5**	**17.9**	**17.3**	**(3.1)**
Others Mean								**9.4**	**8.5**	**5.7**	**5.3**	**1.1**	**1.0**	**12.2**	**12.2**	**45.6**

Source: Deutsche Bank

Figure 115: Global refinery valuations

Prices close on	8-Apr-13							P/E (x)		EV/EBITDA (x)		P/BV (x)		RoE %		Net Debt / Equity
Company	Ticker	Currency	Price	Rating	Price Target	% to target	Mkt. Cap US$bn	13F	14F	13F	14F	13F	14F	13F	14F	2013F
Refiners Global																
HollyFrontier	HFC.N	USD	49.1	Buy	68	38.6	10.1	7.9	8.6	3.7	3.9	1.6	1.5	20.6	17.8	-20.8
Tesoro Corporation	TSO.N	USD	53.8	Hold	60	11.5	7.4	8.8	8.3	4.1	3.6	1.6	1.3	19.6	18.1	11.5
Valero Energy	VLO.N	USD	42.1	Hold	51	21.1	23.3	7.8	6.9	4.2	3.6	1.2	1.0	15.5	15.4	22.9
Western Refining Inc	WNR UN	USD	32.3	Hold	38	17.5	2.8	8.0	10.1	5.6	7.0	3.1	2.8	43.0	28.7	-7.8
Caltex	CTX.AX	AUD	21.0	Hold	16.8	(20.4)	5.9	12.8	11.2	7.2	6.5	2.3	1.9	18.8	18.4	22.5
S-Oil Corp	010950.KS	KRW	89,500	Hold	100,000	11.7	8.8	9.6	9.5	7.2	6.8	1.7	1.5	18.7	16.8	35.2
SK Innovation	096770.KS	KRW	152,000	Buy	190,000	25.0	12.1	7.0	5.6	5.0	4.1	0.8	0.7	11.8	13.3	25.2
Thai Oil Pcl	TOP.BK	THB	64.5	Buy	84.0	30.2	4.4	7.3	8.3	5.1	5.4	1.4	1.2	19.7	15.6	37.5
Formosa Petrochemical	6505.TW	TWD	77.2	Sell	69.6	(9.8)	24.5	29.2	26.7	16.1	14.8	3.2	3.1	11.6	11.9	79.4
Reliance Industries	**RELI.BO**	**INR**	**789.2**	**Buy**	**1,040**	**31.8**	**45.9**	**10.7**	**9.5**	**8.2**	**6.4**	**1.3**	**1.1**	**12.4**	**12.5**	**24.5**
Essar Oil Ltd	ESRO.BO	INR	79.1	Buy	100	26.4	2.8	12.1	8.7	5.8	5.2	2.8	2.1	25.6	27.5	472.6
BPCL	BPCL.BO	INR	380.3	Sell	345	(9.3)	4.9	15.7	14.9	8.0	7.4	1.5	1.4	9.9	9.7	106.2
HPCL	HPCL.BO	INR	290.4	Hold	310	6.8	1.8	10.1	9.5	5.6	5.6	0.7	0.7	7.1	7.3	145.4
Total Mean								**9.8**	**9.3**	**5.8**	**5.4**	**1.6**	**1.4**	**17.4**	**16.4**	**40.1**
N. America Mean								**8.1**	**8.5**	**4.4**	**4.5**	**1.9**	**1.7**	**24.7**	**20.0**	**1.4**
Asia Mean								**10.7**	**9.7**	**6.5**	**5.9**	**1.5**	**1.3**	**13.8**	**14.8**	**59.5**

Source: Deutsche Bank

Figure 116: Australia energy company valuations

			Exploration & Production											Refining
			WPL	ORG	STO	OSH	AUT	KAR	SXY	AWE	BRU	DLS	NXS	DTE	CTX
Price	($/sh)		35.64	12.69	12.29	7.33	3.27	4.63	0.76	1.19	2.28	1.21	0.14	0.06	21.03
Mkt cap	($m)		29,364	13,933	11,851	9,784	1,465	1,025	861	621	625	515	186	53	5,678
Recommendation			Buy	Hold	Buy	Buy	Buy	Buy	Hold	Hold	Buy	Buy	Hold	Buy	Hold
Price Target	($/sh)		41.35	13.70	15.75	8.75	3.60	8.65	0.75	1.45	3.20	2.00	0.20	0.55	16.70
NPV	($/sh)		41.77	14.11	16.33	8.82	3.95	8.70	0.74	1.49	2.32	1.94	0.19	0.54	16.68
P/NPV	(x)		0.85	0.90	0.75	0.83	0.83	0.53	1.03	0.80	0.98	0.62	0.75	0.11	1.26
EV/EBITDA	(x)	2012	6.8	9.2	6.8	28.4	9.2	-67.1	35.6	4.7	-37.1	38.7	6.6	-12.4	5.4
	(x)	2013F	6.5	9.9	6.1	28.9	4.6	-57.9	13.6	4.1	-67.6	7.6	15.8	-3.8	7.2
	(x)	2014F	5.8	9.8	5.2	22.1	3.0	-71.7	7.2	3.5	-589.0	3.3	5.6	11.2	6.5
	(x)	2015F	6.3	9.4	4.1	7.3	2.6	-70.7	6.8	2.9	11.3	3.2	4.2	2.9	6.5
EPS	(cps)	2012	251.5	82.0	62.9	11.8	14.0	-1.5	nm	2.7	nm	5.8	-2.1	-3.9	175.7
	(cps)	2013F	273.9	68.2	65.1	15.1	28.7	-3.8	3.9	3.1	-3.0	7.9	-1.5	-2.1	164.0
	(cps)	2014F	329.0	76.3	75.5	22.7	43.1	-3.8	6.6	2.3	-1.0	19.8	-0.7	-2.3	186.5
	(cps)	2015F	279.6	81.9	104.6	70.0	45.3	-4.7	6.9	2.5	10.3	21.5	0.0	-2.5	190.2
EPS growth	(%)	2012	19.9%	15.5%	28.2%	-33.8%	90.1%	91.9%	nm	192.0%	nm	nm	25.7%	-49.5%	69.9%
	(%)	2013F	8.9%	-16.9%	3.5%	28.0%	104.5%	-156.9%	81.2%	13.7%	-20.8%	37.9%	30.0%	44.9%	-6.6%
	(%)	2014F	20.1%	11.9%	15.9%	50.2%	50.4%	-0.6%	68.3%	-25.9%	67.5%	149.2%	53.6%	-9.7%	13.7%
	(%)	2015F	-15.0%	7.4%	38.7%	208.9%	5.1%	-22.7%	3.7%	7.8%	nm	9.0%	nm	-8.2%	2.0%
NPAT	($m)	2012	2,061	893	606	153	63	-3	nm	15	nm	10	-28	-30	458
	($m)	2013F	2,256	745	629	201	129	-8	45	17	-8	31	-20	-17	434
	($m)	2014F	2,710	834	729	302	194	-8	76	12	-3	86	-9	-20	495
	($m)	2015F	2,304	896	1,011	932	204	-10	79	13	28	93	1	-21	505
PER	(x)	2012	13.9	16.7	19.4	61.5	25.9	nm	31.4	52.4	-65.7	15.6	-10.1	-11.6	8.4
	(x)	2013F	13.6	17.4	18.9	50.6	13.1	nm	17.7	43.5	-89.4	17.5	-9.5	-7.0	12.2
	(x)	2014F	10.9	16.6	16.3	32.5	7.6	nm	11.4	51.5	nm	6.1	-20.2	-2.6	11.3
	(x)	2015F	12.3	15.5	11.7	10.1	7.0	-98.4	11.0	47.8	22.1	5.6	nm	-2.4	11.1
P/OpCF	(x)	2012	8.4	9.5	8.0	49.7	10.2	nm	nm	5.2	nm	26.8	13.3	-2.4	14.2
	(x)	2013F	9.0	8.8	7.9	33.6	4.5	-97.0	11.9	3.5	nm	12.0	-80.9	-3.6	6.6
	(x)	2014F	7.3	9.6	7.5	40.8	3.2	-95.9	8.2	3.7	nm	3.7	nm	-2.3	7.7
	(x)	2015F	7.9	8.3	6.4	7.6	3.2	-98.9	8.2	2.6	14.8	3.9	9.6	-3.9	14.8
DPS	(cps)	2012	130	50	30	4	-	-	-	-	1	-	-	-	40
	(cps)	2013F	137	50	30	4	-	-	-	-	-	-	-	-	39
	(cps)	2014F	164	50	30	4	-	-	-	-	-	-	-	-	42
	(cps)	2015F	140	50	32	4	5	-	-	-	-	-	-	-	47
Div Yield	(%)	2012	3.7%	3.7%	2.5%	0.6%	-	-	-	-	-	-	-	-	2.7%
	(%)	2013F	3.7%	3.9%	2.4%	0.5%	-	-	-	-	-	-	-	-	1.8%
	(%)	2014F	4.6%	3.9%	2.4%	0.5%	-	-	-	-	-	-	-	-	2.0%
	(%)	2015F	4.1%	3.9%	2.6%	0.6%	1.4%	-	-	-	-	-	-	-	2.2%
D/(D+E)	(%)	2012	11%	28%	14%	43%	42%	-61%	-70%	-4%	-132%	-47%	38%	-24%	26%
	(%)	2013F	12%	31%	31%	55%	48%	-28%	-35%	3%	-29%	18%	30%	18%	18%
	(%)	2014F	6%	35%	33%	57%	40%	-18%	-37%	10%	9%	-3%	31%	32%	17%
	(%)	2015F	11%	39%	29%	47%	32%	-11%	-57%	4%	-3%	-22%	33%	40%	19%
ROE	(%)	2012	15%	7%	7%	5%	16%	-1%	4%	1%	-9%	8%	-7%	-7%	20%
	(%)	2013F	14%	6%	7%	6%	25%	-1%	12%	2%	-6%	14%	-6%	-5%	19%
	(%)	2014F	16%	6%	7%	9%	29%	-1%	17%	1%	-2%	28%	-3%	-7%	18%
	(%)	2015F	13%	6%	10%	23%	23%	-2%	15%	1%	19%	24%	0%	-8%	16%
Total produ	(mmboe)	2012	84.9	22.5	52.1	6.4	2.6	-	-	4.7	-	0.4	3.1	-	na
	(mmboe)	2013F	93.0	23.2	55.6	6.4	5.7	-	1.3	5.1	-	1.1	2.2	0.1	na
	(mmboe)	2014F	90.6	25.2	58.8	8.5	8.6	-	1.9	6.2	0.2	2.5	3.2	0.5	na
	(mmboe)	2015F	87.6	23.7	63.9	23.9	10.2	-	1.8	6.6	0.9	2.5	3.2	0.8	na
Reserves	(mmboe)	1P	1261	na	663	338	70	-	4	na	-	5	51	na	na
	(mmboe)	2P	1544	1170	1406	552	76	-	35	54	-	19	122	8	na
EV/boe	($/boe)	1P	22.4	na	17.5	32.0	21.4	na	170.4	na	na	61.5	6.0	na	na
	($/boe)	2P	18.3	17.8	8.3	19.6	19.6	na	20.4	14.0	na	15.5	2.5	41.8	na

Source: Company data, Deutsche Bank

Notes:

1. *All figures are on an underlying basis*
2. *CTX NPAT is on a Replacement Cost Of Production (RCOP) basis*
3. *Annual figures are Dec year end for WPL, STO, OSH, CTX and AUT. Annual figures are June year end for ORG, KAR, SXY, AWE, BRU, DLS, NXS and DTE*
4. *WPL, OSH, AUT: price, market cap, price target and NPV in AUD, all other dollar figures are in USD*

Source: Deutsche Bank

Deutsche Bank AG/Hong Kong

Figure 117: Global chemical valuations

Priced on	8-Apr-13							P/E (x)		EV/EBITDA (x)		P/BV (x)		RoE %		Net Debt / Equity (%)
Company	Ticker	Trading Currency	Price	Rating	Price Target	% to target price	Mkt. Cap US$bn	13F	14F	13F	14F	13F	14F	13F	14F	2013F
Asia																
Formosa Plastics	1301.TW	TWD	69.9	Hold	76	8.7	14.3	19.0	14.7	13.3	10.1	1.8	1.7	9.5	11.6	26.0
Nan Ya Plastics	1303.TW	TWD	51.5	Sell	42	(18.1)	13.5	24.7	18.3	10.5	8.0	1.5	1.5	6.3	8.2	35.5
Formosa Chems & Fibre	1326.TW	TWD	67.1	Hold	73	8.5	12.7	18.9	17.3	10.3	10.4	1.6	1.5	8.5	8.9	46.4
Reliance Industries	**RELI.BO**	**INR**	**789.2**	**Buy**	**1,040**	**31.8**	**45.9**	**10.7**	**9.5**	**8.2**	**6.4**	**1.3**	**1.1**	**12.4**	**12.5**	**24.5**
Formosa Petrochemical	6505.TW	TWD	77.2	Sell	70	(9.8)	24.5	29.2	26.7	16.1	14.8	3.2	3.1	11.6	11.9	79.4
LG Chem	051910.KS	KRW	244,000	Buy	360,000	47.5	14.3	10.8	8.5	6.4	5.2	1.5	1.3	14.3	16.1	13.6
Lotte Chemical	011170.KS	KRW	183,000	Hold	190,000	3.8	5.4	11.2	10.2	5.9	5.6	0.9	0.8	8.3	8.3	(2.7)
Hanwha Chemical	009830.KS	KRW	17,900	Sell	15,000	(16.2)	2.2	10.5	10.2	6.4	6.3	0.5	0.5	4.9	4.8	67.3
PTT Global Chemical	PTTGC.BK	THB	68	Hold	86	26.5	10.6	7.9	7.8	5.7	5.2	1.2	1.1	16.5	15.2	34.0
Mitsui Chemicals	4183.T	JPY	199	NA	-	NA	2.1	52.1	7.6	8.8	6.3	0.5	0.5	1.0	6.4	119.7
TSRC	**2103.TW**	**TWD**	**57**	**Buy**	**70**	**24.1**	**1.5**	12.8	9.4	7.6	5.9	2.5	2.3	20.8	25.6	21.9
Huchems	**069260.KS**	**KRW**	**23,150**	**Buy**	**30,000**	**29.6**	**0.8**	**11.5**	**10.1**	**6.8**	**5.9**	**1.8**	**1.6**	**16.4**	**16.9**	**1.9**
Petronas Chemicals Group	PCGB.KL	MYR	6	Hold	6	(3.6)	16.8	10.7	10.6	6.0	5.7	2.0	1.8	20.7	17.8	(35.8)
Middle East																
SABIC	2010.SE	SAR	97.5	Buy	121	24.1	78.0	9.6	9.1	5.6	5.2	1.8	1.6	20.0	18.9	2.9
Saudi Kayan	2350.SE	SAR	11.7	Sell	10	(14.5)	4.7	11.5	9.8	11.0	9.3	1.1	1.0	10.1	10.6	173.3
Yansab	2290.SE	SAR	52.5	Hold	56	6.7	7.8	11.6	9.5	8.1	6.3	1.9	1.6	17.8	18.2	17.3
Industries Qatar	IQCD.QA	QAR	159.2	Buy	181	13.7	26.5	9.4	9.4	7.7	7.4	2.4	2.2	27.8	24.5	(14.9)
North America																
Westlake Chemical	WLK.N	USD	85.5	Hold	55	(35.7)	5.7	15.5	NA	7.0	NA	2.3	NA	16.4	NA	(12.6)
Celanese Corp	CE.N	USD	43.1	Buy	55	27.7	6.9	10.1	9.0	6.4	5.8	3.1	2.6	35.0	31.8	88.9
Dow Chemical	DOW.N	USD	30.7	Hold	35	14.1	36.9	14.6	12.5	5.8	5.3	1.6	1.5	11.1	12.2	74.1
PPG Industries	PPG.N	USD	131.5	Buy	162	23.2	18.8	17.0	14.8	9.0	8.1	4.7	4.4	28.0	31.1	71.8
Europe																
BASF	BASFn.DE	EUR	66.7	Buy	79	18.4	80.4	10.9	10.0	7.3	6.7	2.3	2.1	19.0	19.1	37.1
Arkema	AKE.PA	EUR	68.1	Buy	92	35.1	5.5	8.9	7.8	5.3	4.6	1.6	1.4	19.4	19.2	26.2
Lanxess	LXSG.DE	EUR	51.3	Buy	80	56.0	5.5	10.1	7.1	5.8	4.5	1.6	1.4	17.0	20.7	49.3
Solvay	SOLB.BR	EUR	100.1	Hold	105	4.9	11.1	13.1	11.5	6.2	5.6	1.3	1.3	8.1	9.4	14.1
Fertilizers																
Yara International ASA	YAR.OL	NOK	260.6	Hold	300	15.1	12.9	8.4	8.8	5.2	5.2	1.4	1.3	17.2	15.0	2.2
SAFCO	2020.SE	SAR	151.3	Buy	177	17.0	13.4	12.5	12.0	11.2	10.7	5.7	5.6	45.6	46.9	(43.6)
Potash Corp.	POT.N	USD	39.7	Hold	45	13.4	34.3	10.2	NA	5.4	NA	2.5	NA	28.6	NA	(0.3)
Mosaic	MOS.N	USD	58.9	Hold	64	8.6	25.1	14.6	12.0	7.6	7.0	1.9	2.0	13.7	15.5	(21.1)
Mean								**13.1**	**11.3**	**7.8**	**7.0**	**2.0**	**1.8**	**16.7**	**16.9**	**30.9**
Asia Mean								**14.8**	**12.4**	**8.6**	**7.4**	**1.6**	**1.4**	**11.6**	**12.6**	**33.2**
Middle East Mean								**10.5**	**9.5**	**8.1**	**7.1**	**1.8**	**1.6**	**18.9**	**18.1**	**44.7**
N. America Mean								**14.3**	**12.1**	**7.1**	**6.4**	**2.9**	**2.8**	**22.6**	**25.0**	**55.6**
Europe Mean								**10.8**	**9.1**	**6.1**	**5.4**	**1.7**	**1.5**	**15.9**	**17.1**	**25.8**
Fertilizers								**11.4**	**10.9**	**7.4**	**7.6**	**2.9**	**2.9**	**26.3**	**25.8**	**(15.7)**

Notes:
- Values in red are considered to be outlies and not included in averages

Source: Deutsche Bank

Appendix B – Seasonality

Figure 118: China's quarterly apparent demand for crude oil

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	62.32	71.22	73.08	80.76	85.21	91.73	85.44	104.95	114.03	120.60	88.93
2Q	62.28	72.74	76.65	81.11	87.79	91.57	96.07	111.06	113.72	119.93	91.29
3Q	64.37	72.59	74.68	80.74	88.61	91.01	102.10	114.22	110.97	111.70	91.10
4Q	64.47	75.41	75.47	79.70	84.44	90.91	104.58	109.88	114.95	123.40	92.32
Average	63.36	72.99	74.97	80.58	86.51	91.31	97.05	110.02	113.42	118.91	

Crude oil apparent demand growth Q-o-Q

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	7.7%	10.5%	-3.1%	7.0%	6.9%	8.6%	-6.0%	0.4%	3.8%	4.9%	4.1%
2Q	-0.1%	2.1%	4.9%	0.4%	3.0%	-0.2%	12.4%	5.8%	-0.3%	-0.6%	2.8%
3Q	3.4%	-0.2%	-2.6%	-0.4%	0.9%	-0.6%	6.3%	2.8%	-2.4%	-6.9%	0.0%
4Q	0.1%	3.9%	1.1%	-1.3%	-4.7%	-0.1%	2.4%	-3.8%	3.6%	10.5%	1.2%
Average	2.8%	4.1%	0.1%	1.4%	1.5%	1.9%	3.8%	1.3%	1.2%	2.0%	

Source: CEIC reported data provided by China's National Bureau of Statistics, Reuters reported data provided by Customs General Administration People's Republic of China, Deutsche Bank

Notes: Orange highlights denote annual highs.

Yellow highlights denote annual lows.

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Figure 119: China's quarterly apparent demand for gasoline

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	9.78	11.94	11.74	12.81	13.24	14.83	16.27	16.80	18.39	20.46	14.63
2Q	9.29	11.28	10.98	13.04	13.50	15.12	16.84	17.47	18.58	20.55	14.66
3Q	9.95	11.39	12.02	12.92	14.21	16.66	16.85	18.01	19.53	21.99	15.35
4Q	11.32	12.48	13.30	13.60	14.95	16.16	17.11	19.04	20.25	23.32	16.15
Average	10.09	11.77	12.01	13.09	13.97	15.69	16.77	17.83	19.19	21.58	

Gasoline apparent demand growth Q-o-Q

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	-4.0%	5.5%	-5.9%	-3.6%	-2.6%	-0.8%	0.6%	-1.8%	-3.4%	1.0%	-1.5%
2Q	-5.0%	-5.5%	-6.5%	1.8%	2.0%	2.0%	3.5%	4.0%	1.0%	0.4%	-0.2%
3Q	7.1%	1.0%	9.5%	-0.9%	5.3%	10.2%	0.0%	3.1%	5.1%	7.0%	4.7%
4Q	13.8%	9.6%	10.7%	5.2%	5.2%	-3.0%	1.6%	5.7%	3.7%	6.0%	5.8%
Average	2.9%	2.6%	1.9%	0.6%	2.4%	2.1%	1.4%	2.7%	1.6%	3.6%	

Source: CEIC, Reuters, Deutsche Bank

Figure 120: China's quarterly apparent demand for diesel

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	19.70	24.31	26.15	28.03	29.39	32.19	29.71	36.24	41.24	42.88	30.98
2Q	20.23	25.92	26.65	28.82	31.28	34.99	33.74	38.24	41.86	41.79	32.35
3Q	21.53	26.12	27.86	29.14	30.95	37.15	37.54	38.93	41.09	41.21	33.15
4Q	22.43	27.43	28.39	30.26	33.23	32.69	37.24	42.30	42.99	43.72	34.07
Average	20.97	25.94	27.26	29.06	31.21	34.26	34.56	38.93	41.79	42.40	

Diesel apparent demand growth Q-o-Q

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	1.2%	8.3%	-4.7%	-1.3%	-2.9%	-3.1%	-9.1%	-2.7%	-2.5%	-0.2%	-1.7%
2Q	2.7%	6.6%	1.9%	2.8%	6.4%	8.7%	13.6%	5.5%	1.5%	-2.5%	4.7%
3Q	6.4%	0.8%	4.5%	1.1%	-1.1%	6.2%	11.3%	1.8%	-1.8%	-1.4%	2.8%
4Q	4.2%	5.0%	1.9%	3.9%	7.4%	-12.0%	-0.8%	8.7%	4.6%	6.1%	2.9%
Average	3.6%	5.2%	0.9%	1.6%	2.5%	-0.1%	3.7%	3.3%	0.4%	0.5%	

Source: CEIC, Reuters, Deutsche Bank

Figure 121: China's quarterly apparent demand for fuel oil

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	8.99	11.65	12.46	11.32	10.41	9.33	9.14	8.08	9.93	8.91	10.02
2Q	10.21	14.25	11.38	12.62	13.07	10.19	10.10	9.83	8.38	8.08	10.81
3Q	12.68	10.75	11.20	12.68	11.84	7.68	7.87	7.77	6.87	7.78	9.71
4Q	11.17	13.02	11.02	10.08	8.60	8.33	6.50	8.48	8.02	9.31	9.45
Average	10.76	12.42	11.51	11.67	10.98	8.88	8.40	8.54	8.30	8.52	

Fuel oil apparent demand growth Q-o-Q

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	-6.8%	4.3%	-4.3%	2.7%	3.3%	8.5%	9.7%	24.3%	17.1%	11.1%	7.0%
2Q	13.5%	22.3%	-8.7%	11.5%	25.6%	9.2%	10.5%	21.7%	-15.7%	-9.4%	8.1%
3Q	24.2%	-24.6%	-1.6%	0.4%	-9.4%	-24.6%	-22.1%	-20.9%	-18.0%	-3.7%	-10.0%
4Q	-11.9%	21.1%	-1.6%	-20.5%	-27.3%	8.5%	-17.4%	9.1%	16.8%	19.7%	-0.4%
Average	4.7%	5.8%	-4.0%	-1.5%	-2.0%	0.4%	-4.8%	8.6%	0.1%	4.4%	

Source: CEIC, Reuters, Deutsche Bank

Figure 122: China's quarterly apparent demand for kerosene

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	2.65	2.65	2.60	3.00	2.95	3.17	3.33	3.78	4.49	4.70	3.33
2Q	2.50	2.50	2.54	2.94	3.02	3.18	3.49	4.11	4.20	4.46	3.29
3Q	2.74	2.74	2.77	3.03	3.16	3.23	4.25	4.44	4.78	5.26	3.64
4Q	2.72	2.72	2.57	2.72	3.11	3.11	3.90	5.15	4.88	5.62	3.65
Average	2.65	2.65	2.62	2.92	3.06	3.17	3.74	4.37	4.59	5.01	

Kerosene apparent demand growth Q-o-Q

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	9.3%	-2.5%	-4.3%	17.1%	8.4%	2.0%	7.1%	-3.0%	-12.9%	-3.5%	1.8%
2Q	-5.9%	-5.9%	-2.4%	-2.0%	2.1%	0.2%	5.0%	8.7%	-6.4%	-5.3%	-1.2%
3Q	9.9%	9.9%	9.0%	2.8%	4.8%	1.7%	21.6%	7.9%	13.9%	18.0%	10.0%
4Q	-0.9%	-0.9%	-7.4%	-10.0%	-1.6%	-3.9%	-8.2%	16.1%	2.0%	7.0%	-0.8%
Average	3.1%	0.2%	-1.3%	2.0%	3.4%	0.0%	6.3%	7.4%	-0.9%	4.0%	

Source: CEIC, Reuters, Deutsche Bank

Figure 123: China's quarterly apparent demand for naphtha

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	4.84	5.26	5.09	6.98	8.91	8.61	8.41	9.96	13.78	13.99	8.58
2Q	4.57	5.22	4.95	6.90	8.72	8.54	8.28	10.83	13.14	12.60	8.38
3Q	4.93	4.32	6.36	6.88	8.29	8.44	9.76	13.03	12.21	12.18	8.64
4Q	5.16	4.95	6.73	7.65	8.47	8.11	10.81	13.70	13.75	14.01	9.34
Average	4.88	4.94	5.78	7.11	8.60	8.43	9.31	11.88	13.22	13.20	

Naphtha apparent demand growth Q-o-Q

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Avg 2003-12
1Q	-1.8%	1.8%	2.8%	3.8%	16.4%	1.7%	3.7%	-7.8%	0.6%	1.7%	2.3%
2Q	-5.5%	-0.7%	-2.8%	-1.1%	-2.1%	-0.8%	-1.5%	8.7%	-4.7%	-10.0%	-2.1%
3Q	7.9%	-17.2%	28.6%	-0.3%	-5.0%	-1.2%	17.9%	20.3%	-7.1%	-3.3%	4.1%
4Q	4.7%	14.6%	5.8%	11.2%	2.2%	-4.0%	10.7%	5.2%	12.6%	15.1%	7.8%
Average	1.3%	-0.4%	8.6%	3.4%	2.9%	-1.1%	7.7%	6.6%	0.4%	0.9%	

Source: CEIC, Reuters, Deutsche Bank

Figure 124: China's monthly apparent demand for crude oil

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	22.22	24.10	22.61	28.40	29.48	29.66	28.32	33.85	39.34	40.45
Feb	19.08	23.90	24.11	25.22	26.44	29.17	25.44	33.40	35.78	39.54
Mar	21.03	23.22	26.36	27.14	29.29	32.90	31.69	37.70	38.90	40.62
Apr	20.92	23.95	25.81	26.50	29.68	29.42	31.40	37.24	38.21	39.10
May	19.89	23.64	25.52	28.00	28.50	32.23	32.65	34.80	38.93	42.73
Jun	21.46	25.16	25.31	26.62	29.62	29.92	32.02	39.02	36.58	38.10
Jul	20.62	24.07	25.71	25.78	30.23	29.70	35.34	36.05	36.53	38.65
Aug	20.84	23.96	23.79	26.63	29.65	31.28	34.24	38.08	38.03	35.74
Sep	22.91	24.56	25.18	28.33	28.73	30.02	32.53	40.09	36.41	37.31
Oct	20.89	23.70	26.36	25.51	27.95	32.21	35.23	33.89	37.36	41.25
Nov	20.70	25.48	24.22	28.29	28.64	29.05	32.37	37.85	39.02	40.64
Dec	22.88	26.22	24.89	25.90	27.86	29.66	36.97	38.14	38.57	41.52

Crude oil apparent demand growth M-o-M

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	20.5%	5.3%	-13.8%	14.1%	13.8%	6.5%	-4.5%	-8.4%	3.1%	4.9%
Feb	-14.1%	-0.8%	6.6%	-11.2%	-10.3%	-1.7%	-10.2%	-1.3%	-9.0%	-2.2%
Mar	10.2%	-2.9%	9.3%	7.6%	10.8%	12.8%	24.6%	12.9%	8.7%	2.7%
Apr	-0.5%	3.2%	-2.1%	-2.4%	1.3%	-10.6%	-0.9%	-1.2%	-1.8%	-3.7%
May	-4.9%	-1.3%	-1.1%	5.7%	-4.0%	9.5%	4.0%	-6.6%	1.9%	9.3%
Jun	7.9%	6.4%	-0.8%	-4.9%	3.9%	-7.2%	-1.9%	12.2%	-6.0%	-10.8%
Jul	-3.9%	-4.3%	1.6%	-3.1%	2.1%	-0.7%	10.4%	-7.6%	-0.1%	1.4%
Aug	1.1%	-0.4%	-7.5%	3.3%	-1.9%	5.3%	-3.1%	5.7%	4.1%	-7.5%
Sep	9.9%	2.5%	5.8%	6.4%	-3.1%	-4.0%	-5.0%	5.3%	-4.2%	4.4%
Oct	-8.8%	-3.5%	4.7%	-10.0%	-2.7%	7.3%	8.3%	-15.5%	2.6%	10.6%
Nov	-0.9%	7.5%	-8.1%	10.9%	2.5%	-9.8%	-8.1%	11.7%	4.4%	-1.5%
Dec	10.6%	2.9%	2.8%	-8.4%	-2.7%	2.1%	14.2%	0.8%	-1.2%	2.2%

Source: CEIC, Reuters, Deutsche Bank

Figure 125: China's monthly apparent demand for gasoline

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	3.64	4.43	4.03	4.39	4.88	5.02	5.05	5.62	6.28	7.17
Feb	2.81	3.72	3.97	4.09	4.00	4.58	5.05	5.48	5.94	6.71
Mar	3.34	3.80	3.74	4.33	4.36	5.22	6.17	5.70	6.17	6.58
Apr	3.39	3.71	3.66	4.37	4.27	4.83	5.45	5.42	6.17	6.86
May	3.05	3.84	3.69	4.32	4.69	4.98	5.98	5.98	6.52	6.98
Jun	2.86	3.73	3.63	4.36	4.54	5.31	5.41	6.07	5.89	6.71
Jul	3.22	3.75	3.96	4.33	4.78	5.86	6.10	6.05	6.24	7.32
Aug	3.39	3.80	3.69	4.23	4.79	5.60	5.48	6.06	6.74	7.31
Sep	3.34	3.84	4.37	4.37	4.64	5.20	5.27	5.90	6.55	7.36
Oct	3.68	4.12	4.43	4.45	4.86	5.24	5.77	6.23	6.70	7.39
Nov	3.82	4.07	4.46	4.47	4.85	5.42	5.84	6.28	6.55	7.71
Dec	3.82	4.29	4.40	4.68	5.24	5.51	5.50	6.54	7.00	8.22

Gasoline apparent demand growth M-o-M

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	8.9%	15.9%	-6.0%	-0.3%	4.2%	-4.1%	-8.3%	2.2%	-4.0%	2.4%
Feb	-22.8%	-16.0%	-1.3%	-6.8%	-18.0%	-8.9%	-0.1%	-2.5%	-5.4%	-6.3%
Mar	19.0%	2.1%	-6.0%	5.7%	9.1%	14.1%	22.2%	4.0%	4.0%	-2.0%
Apr	1.5%	-2.2%	-2.1%	0.9%	-2.0%	-7.6%	-11.7%	-4.9%	-0.1%	4.4%
May	-10.2%	3.4%	0.8%	-1.1%	9.7%	3.2%	9.8%	10.3%	5.8%	1.7%
Jun	-6.2%	-2.9%	-1.4%	0.8%	-3.3%	6.7%	-9.5%	1.5%	-9.7%	-3.9%
Jul	12.7%	0.6%	9.0%	-0.7%	5.4%	10.3%	12.7%	-0.4%	6.0%	9.1%
Aug	5.3%	1.4%	-7.0%	-2.3%	0.2%	-4.5%	-10.2%	0.2%	8.0%	-0.1%
Sep	-1.5%	0.9%	18.4%	3.3%	-3.2%	-7.1%	-3.8%	-2.7%	-2.9%	0.6%
Oct	10.1%	7.4%	1.5%	1.9%	4.7%	0.7%	9.5%	5.6%	2.3%	0.4%
Nov	4.0%	-1.2%	0.7%	0.4%	0.0%	3.5%	1.2%	0.8%	-2.3%	4.3%
Dec	-0.2%	5.2%	-1.3%	4.8%	7.9%	1.6%	-5.9%	4.1%	6.9%	6.6%

Source: CEIC, Reuters, Deutsche Bank

Figure 126: China's monthly apparent demand for diesel

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	6.50	8.08	8.67	9.49	10.03	11.23	9.61	12.31	14.17	14.75
Feb	6.27	8.00	8.34	8.96	9.15	9.47	9.49	11.50	13.39	14.00
Mar	6.93	8.23	9.14	9.58	10.22	11.49	10.61	12.43	13.67	14.14
Apr	6.98	8.33	8.77	9.67	10.08	11.00	10.31	12.24	13.87	13.94
May	6.50	8.78	9.12	9.66	10.52	11.48	11.61	12.85	14.37	14.47
Jun	6.74	8.80	8.75	9.49	10.68	12.52	11.82	13.15	13.62	13.38
Jul	7.18	8.69	9.21	9.78	10.43	12.76	12.64	13.06	13.97	13.73
Aug	7.35	8.87	9.22	9.64	10.35	12.77	12.37	12.98	13.81	13.68
Sep	7.00	8.56	9.42	9.71	10.18	11.63	12.53	12.89	13.31	13.80
Oct	7.44	8.69	9.37	9.87	10.46	11.75	12.31	13.29	13.91	14.35
Nov	7.26	8.88	9.43	10.09	10.73	10.90	12.12	14.09	14.20	14.65
Dec	7.74	9.86	9.59	10.31	12.04	10.04	12.81	14.93	14.87	14.72

Diesel apparent demand growth M-o-M

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	-1.9%	4.5%	-12.1%	-1.1%	-2.7%	-6.7%	-4.2%	-3.9%	-5.0%	-0.9%
Feb	-3.5%	-1.1%	-3.8%	-5.6%	-8.8%	-15.7%	-1.3%	-6.6%	-5.5%	-5.1%
Mar	10.6%	2.9%	9.6%	6.9%	11.7%	21.3%	11.9%	8.1%	2.0%	1.0%
Apr	0.7%	1.2%	-4.0%	0.9%	-1.4%	-4.2%	-2.8%	-1.5%	1.5%	-1.4%
May	-7.0%	5.4%	4.0%	-0.1%	4.4%	4.3%	12.6%	5.0%	3.7%	3.8%
Jun	3.8%	0.2%	-4.0%	-1.8%	1.5%	9.0%	1.8%	2.4%	-5.3%	-7.6%
Jul	6.5%	-1.3%	5.2%	3.0%	-2.4%	1.9%	6.9%	-0.7%	2.6%	2.7%
Aug	2.3%	2.0%	0.1%	-1.4%	-0.8%	0.1%	-2.1%	-0.6%	-1.2%	-0.4%
Sep	-4.7%	-3.4%	2.1%	0.7%	-1.6%	-8.9%	1.3%	-0.7%	-3.6%	0.8%
Oct	6.3%	1.5%	-0.6%	1.6%	2.8%	1.1%	-1.8%	3.1%	4.5%	4.0%
Nov	-2.4%	2.2%	0.6%	2.2%	2.6%	-7.3%	-1.5%	6.0%	2.1%	2.1%
Dec	6.6%	11.1%	1.8%	2.2%	12.1%	-7.9%	5.7%	5.9%	4.7%	0.5%

Source: CEIC, Reuters, Deutsche Bank

Figure 127: China's monthly apparent demand for fuel oil

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	3.33	3.52	4.70	3.78	3.87	2.80	2.67	2.07	3.33	2.40
Feb	2.71	4.09	3.66	3.66	3.03	3.06	3.33	2.79	3.14	3.05
Mar	2.95	4.04	4.10	3.88	3.51	3.47	3.14	3.21	3.46	3.47
Apr	2.88	5.26	3.94	3.68	4.40	3.46	3.43	3.33	2.72	2.81
May	3.53	4.28	3.17	4.06	4.13	3.93	3.43	3.05	2.74	2.72
Jun	3.79	4.71	4.26	4.88	4.53	2.80	3.25	3.45	2.92	2.55
Jul	4.28	3.75	3.75	4.83	4.84	2.99	3.17	2.44	2.50	2.72
Aug	4.10	3.70	3.69	4.60	3.82	2.27	2.20	2.64	2.44	1.97
Sep	4.29	3.30	3.75	3.24	3.17	2.42	2.50	2.70	1.92	3.09
Oct	3.68	3.83	3.56	3.85	2.96	2.16	1.97	2.73	2.59	2.96
Nov	3.54	4.90	3.40	3.28	2.88	2.57	2.02	2.81	2.50	2.94
Dec	3.96	4.29	4.06	2.95	2.76	3.60	2.51	2.94	2.94	3.42

Fuel oil apparent demand growth M-o-M

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	-7.5%	-11.1%	9.5%	-6.8%	31.1%	1.2%	-25.7%	-17.4%	13.4%	-18.3%
Feb	-18.7%	16.3%	-22.0%	-3.2%	-21.7%	9.5%	24.6%	34.6%	-5.7%	26.9%
Mar	9.0%	-1.3%	11.8%	5.9%	16.0%	13.4%	-5.7%	15.3%	10.3%	13.9%
Apr	-2.3%	30.2%	-3.7%	-5.0%	25.5%	-0.4%	9.1%	3.5%	-21.4%	-19.1%
May	22.5%	-18.6%	-19.6%	10.2%	-6.2%	13.6%	0.0%	-8.3%	0.6%	-3.1%
Jun	7.3%	10.0%	34.3%	20.1%	9.7%	-28.8%	-5.2%	13.2%	6.7%	-6.1%
Jul	13.0%	-20.5%	-12.0%	-0.9%	6.8%	6.7%	-2.4%	-29.4%	-14.2%	6.7%
Aug	-4.2%	-1.3%	-1.5%	-4.8%	-21.0%	-23.9%	-30.6%	8.1%	-2.5%	-27.8%
Sep	4.7%	-10.6%	1.6%	-29.6%	-17.1%	6.5%	13.6%	2.4%	-21.2%	56.9%
Oct	-14.4%	15.9%	-5.2%	18.7%	-6.8%	-10.5%	-21.2%	1.3%	34.5%	-4.1%
Nov	-3.7%	27.9%	-4.4%	-14.7%	-2.5%	18.8%	2.5%	2.9%	-3.4%	-0.7%
Dec	11.8%	-12.5%	19.2%	-10.1%	-4.2%	39.8%	24.2%	4.4%	17.4%	16.3%

Source: CEIC, Reuters, Deutsche Bank

Figure 128: China's monthly apparent demand for kerosene

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	0.63	0.93	0.87	1.14	1.01	1.11	0.98	1.29	1.77	1.71
Feb	0.67	0.85	0.81	0.72	0.97	0.97	1.20	1.42	1.53	1.35
Mar	0.85	0.87	0.93	1.15	0.98	1.09	1.15	1.07	1.19	1.65
Apr	0.80	0.83	0.86	0.90	0.97	1.15	1.07	1.43	1.49	1.40
May	0.47	0.76	0.79	0.96	1.13	1.00	1.29	1.44	1.43	1.64
Jun	0.50	0.90	0.89	1.09	0.91	1.02	1.13	1.23	1.28	1.42
Jul	0.61	0.84	0.85	0.82	1.09	1.00	1.42	1.38	1.40	1.74
Aug	0.84	0.81	1.09	1.11	1.02	1.15	1.42	1.46	1.67	1.60
Sep	0.95	1.09	0.83	1.10	1.06	1.09	1.40	1.60	1.71	1.93
Oct	0.93	0.98	0.93	1.13	1.16	1.21	1.45	1.71	1.41	1.90
Nov	0.75	0.87	0.84	0.84	1.06	0.87	1.43	1.71	1.85	1.85
Dec	0.56	0.86	0.79	0.75	0.88	1.03	1.02	1.73	1.61	1.88

Kerosene apparent demand growth M-o-M

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	4.8%	67.5%	1.0%	43.9%	34.8%	26.2%	-5.0%	26.5%	2.2%	5.7%
Feb	6.8%	-8.7%	-7.6%	-37.3%	-3.6%	-12.8%	22.3%	9.8%	-13.9%	-21.1%
Mar	25.9%	2.8%	15.0%	60.1%	0.7%	13.0%	-3.9%	-24.3%	-22.0%	22.6%
Apr	-5.6%	-4.4%	-7.3%	-21.7%	-0.3%	5.5%	-7.1%	33.7%	25.3%	-15.5%
May	-42.0%	-8.9%	-7.6%	6.9%	15.8%	-13.0%	20.9%	0.6%	-4.4%	17.6%
Jun	8.3%	18.8%	12.4%	13.2%	-19.2%	1.7%	-12.5%	-14.5%	-10.1%	-13.6%
Jul	20.3%	-6.5%	-4.8%	-24.9%	19.4%	-2.0%	25.7%	11.9%	9.6%	22.5%
Aug	38.9%	-3.4%	28.7%	36.1%	-6.7%	14.8%	0.1%	5.7%	19.0%	-8.2%
Sep	13.0%	33.3%	-23.8%	-1.0%	3.9%	-5.2%	-1.6%	9.6%	2.2%	20.6%
Oct	-2.7%	-9.4%	11.9%	3.1%	10.4%	10.8%	3.5%	6.8%	-17.2%	-1.3%
Nov	-19.0%	-11.3%	-9.5%	-25.5%	-8.6%	-27.6%	-1.4%	0.1%	30.6%	-2.9%
Dec	-25.9%	-1.2%	-5.7%	-11.6%	-17.3%	18.0%	-28.6%	1.4%	-12.6%	1.8%

Source: CEIC, Reuters, Deutsche Bank

Figure 129: China's monthly apparent demand for naphtha

Million tons	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	1.70	1.80	1.75	2.31	3.08	2.97	2.81	3.37	4.70	4.82
Feb	1.52	1.63	1.66	2.28	2.78	2.64	2.72	3.22	4.35	4.57
Mar	1.62	1.83	1.67	2.39	3.04	3.00	2.88	3.36	4.73	4.60
Apr	1.47	1.77	1.55	2.35	2.77	2.99	3.02	3.73	4.48	4.18
May	1.71	1.86	1.63	2.33	3.08	2.92	2.73	3.53	4.46	4.38
Jun	1.39	1.59	1.76	2.22	2.87	2.63	2.53	3.57	4.20	4.03
Jul	1.58	1.40	2.15	2.36	2.73	2.91	3.03	4.00	4.48	4.22
Aug	1.71	1.47	2.07	2.29	2.75	2.87	3.12	4.74	4.08	4.00
Sep	1.64	1.46	2.14	2.23	2.80	2.66	3.62	4.29	3.66	3.95
Oct	1.76	1.74	2.11	2.56	2.83	2.92	3.62	4.67	4.43	4.46
Nov	1.69	1.62	2.21	2.40	2.78	2.61	3.48	4.57	4.65	4.76
Dec	1.71	1.59	2.42	2.70	2.85	2.57	3.71	4.47	4.68	4.79

Naphtha apparent demand growth M-o-M

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Jan	0.5%	5.5%	10.5%	-4.3%	14.2%	4.1%	9.2%	-9.2%	5.2%	3.0%
Feb	-10.5%	-9.5%	-5.3%	-1.5%	-9.8%	-11.2%	-3.3%	-4.4%	-7.6%	-5.1%
Mar	6.4%	12.1%	0.7%	5.1%	9.4%	13.9%	6.0%	4.3%	8.9%	0.7%
Apr	-9.2%	-3.1%	-7.3%	-2.0%	-8.9%	-0.6%	5.0%	11.0%	-5.4%	-9.1%
May	16.3%	5.3%	5.2%	-0.7%	11.0%	-2.1%	-9.8%	-5.5%	-0.5%	4.7%
Jun	-18.6%	-14.9%	7.8%	-4.6%	-6.7%	-9.9%	-7.4%	1.2%	-5.7%	-7.9%
Jul	13.7%	-12.1%	22.3%	6.3%	-4.9%	10.4%	19.8%	12.1%	6.5%	4.7%
Aug	7.9%	5.6%	-4.1%	-3.2%	0.8%	-1.3%	3.1%	18.3%	-8.8%	-5.2%
Sep	-3.8%	-1.1%	3.8%	-2.5%	1.8%	-7.3%	15.9%	-9.4%	-10.3%	-1.3%
Oct	7.4%	19.7%	-1.7%	14.6%	1.1%	9.9%	0.0%	8.7%	21.0%	12.9%
Nov	-4.2%	-7.0%	4.6%	-6.3%	-1.8%	-10.8%	-3.8%	-2.1%	5.1%	6.7%
Dec	1.0%	-2.1%	9.5%	12.8%	2.6%	-1.3%	6.7%	-2.1%	0.6%	0.5%

Source: CEIC, Reuters, Deutsche Bank

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Appendix 1

Important Disclosures

Additional information available upon request

Disclosure checklist

Company	Ticker	Recent price*	Disclosure
PetroChina	0857.HK	9.98 (HKD) 11 Apr 13	1,7,17,SD11
Sinopec	0386.HK	8.89 (HKD) 11 Apr 13	1
CNOOC Ltd	0883.HK	14.26 (HKD) 11 Apr 13	1,6
MIE Holdings Corp	1555.HK	1.83 (HKD) 11 Apr 13	1
China Oilfield Services	2883.HK	16.26 (HKD) 11 Apr 13	1

*Prices are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is sourced from Deutsche Bank and subject companies

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Disclosures marked with an asterisk may also be required by at least one jurisdiction in addition to the United States. See Important Disclosures Required by Non-US Regulators and Explanatory Notes.

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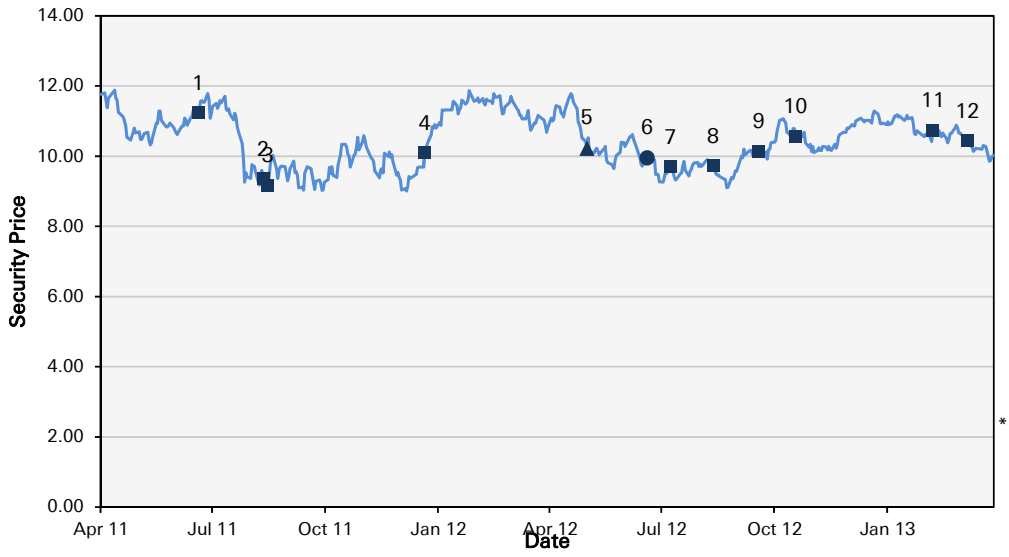
Analyst Certification

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst about the subject issuers and the securities of those issuers. In addition, the undersigned lead analyst has not and will not receive any compensation for providing a specific recommendation or view in this report. David Hurd

Historical recommendations and target price: PetroChina (0857.HK)

(as of 4/11/2013)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

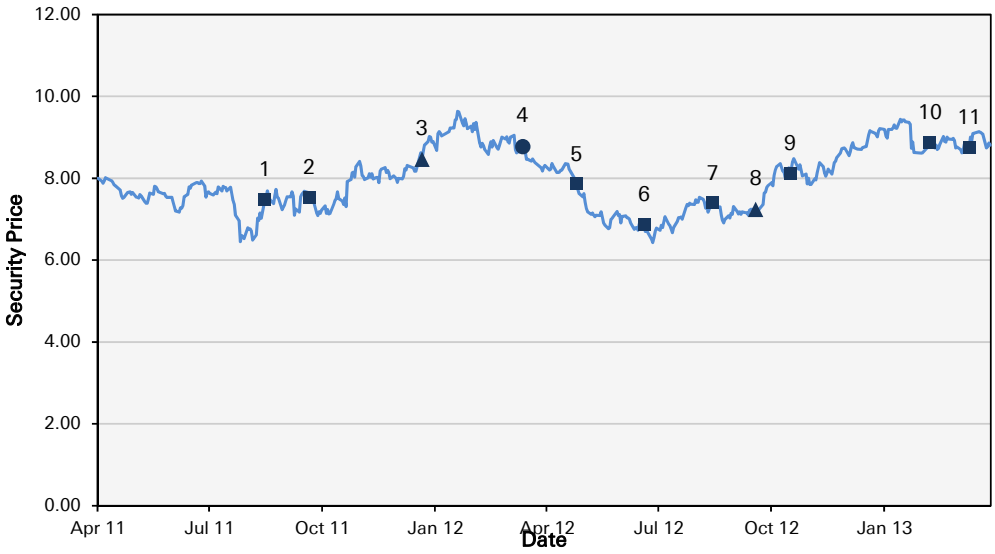
Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure as of September 9,2002

1. 03/07/2011: Hold, Target Price Change HKD12.20
2. 25/08/2011: Hold, Target Price Change HKD10.72
3. 29/08/2011: Hold, Target Price Change HKD10.19
4. 04/01/2012: Hold, Target Price Change HKD10.86
5. 15/05/2012: Upgrade to Buy, Target Price Change HKD12.03
6. 03/07/2012: Downgrade to Hold, Target Price Change HKD10.85
7. 22/07/2012: Hold, Target Price Change HKD10.45
8. 26/08/2012: Hold, Target Price Change HKD10.75
9. 02/10/2012: Hold, Target Price Change HKD11.34
10. 01/11/2012: Hold, Target Price Change HKD11.28
11. 21/02/2013: Hold, Target Price Change HKD11.69
12. 21/03/2013: Hold, Target Price Change HKD11.12

Historical recommendations and target price: Sinopec (0386.HK)

(as of 4/11/2013)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

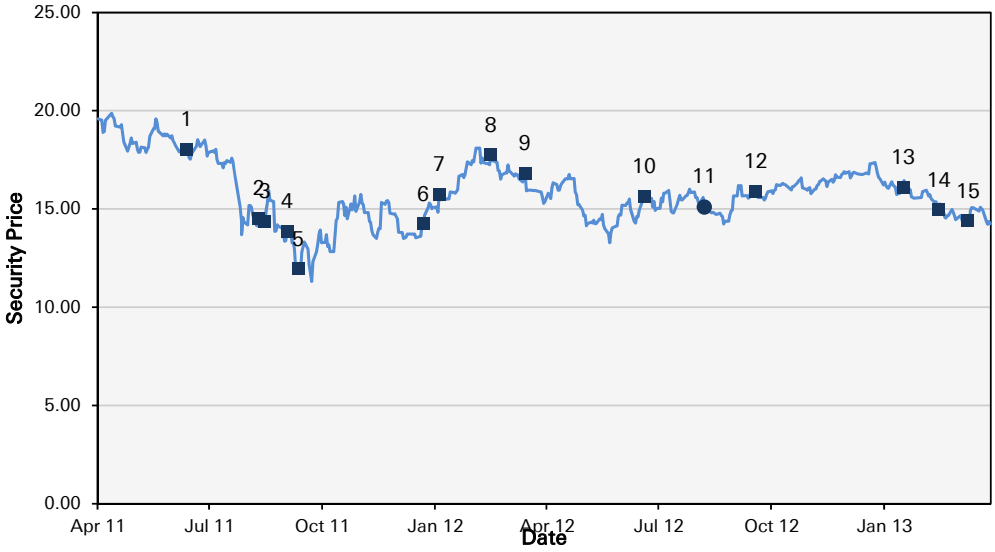
Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure as of September 9,2002

1. 29/08/2011: Hold, Target Price Change HKD8.40
2. 04/10/2011: Hold, Target Price Change HKD8.51
3. 04/01/2012: Upgrade to Buy, Target Price Change HKD10.94
4. 26/03/2012: Downgrade to Hold, Target Price Change HKD9.54
5. 09/05/2012: Hold, Target Price Change HKD8.61
6. 03/07/2012: Hold, Target Price Change HKD7.65
7. 28/08/2012: Hold, Target Price Change HKD8.21
8. 02/10/2012: Upgrade to Buy, Target Price Change HKD9.08
9. 30/10/2012: Buy, Target Price Change HKD9.06
10. 21/02/2013: Buy, Target Price Change HKD9.51
11. 25/03/2013: Buy, Target Price Change HKD10.05

Historical recommendations and target price: CNOOC Ltd (0883.HK)

(as of 4/11/2013)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

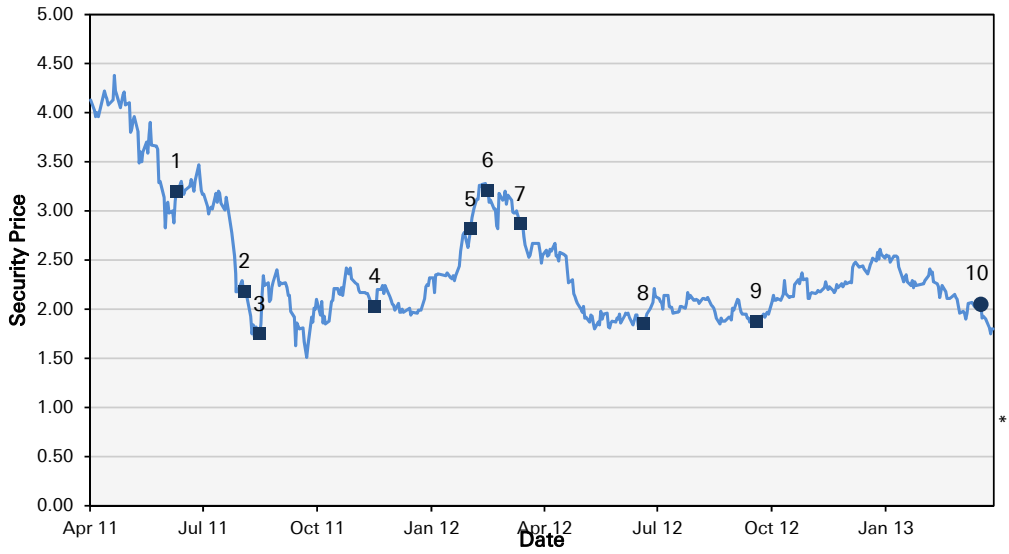
Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure as of September 9,2002

1. 26/06/2011: Buy, Target Price Change HKD21.49
2. 24/08/2011: Buy, Target Price Change HKD21.12
3. 29/08/2011: Buy, Target Price Change HKD20.90
4. 16/09/2011: Buy, Target Price Change HKD20.82
5. 25/09/2011: Buy, Target Price Change HKD20.85
6. 05/01/2012: Buy, Target Price Change HKD20.87
7. 18/01/2012: Buy, Target Price Change HKD20.65
8. 29/02/2012: Buy, Target Price Change HKD20.80
9. 28/03/2012: Buy, Target Price Change HKD20.17
10. 03/07/2012: Buy, Target Price Change HKD18.00
11. 21/08/2012: Downgrade to Hold, Target Price Change HKD16.80
12. 02/10/2012: Hold, Target Price Change HKD16.92
13. 30/01/2013: Hold, Target Price Change HKD17.62
14. 28/02/2013: Hold, Target Price Change HKD16.30
15. 24/03/2013: Hold, Target Price Change HKD15.43

Historical recommendations and target price: MIE Holdings Corp (1555.HK)

(as of 4/11/2013)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

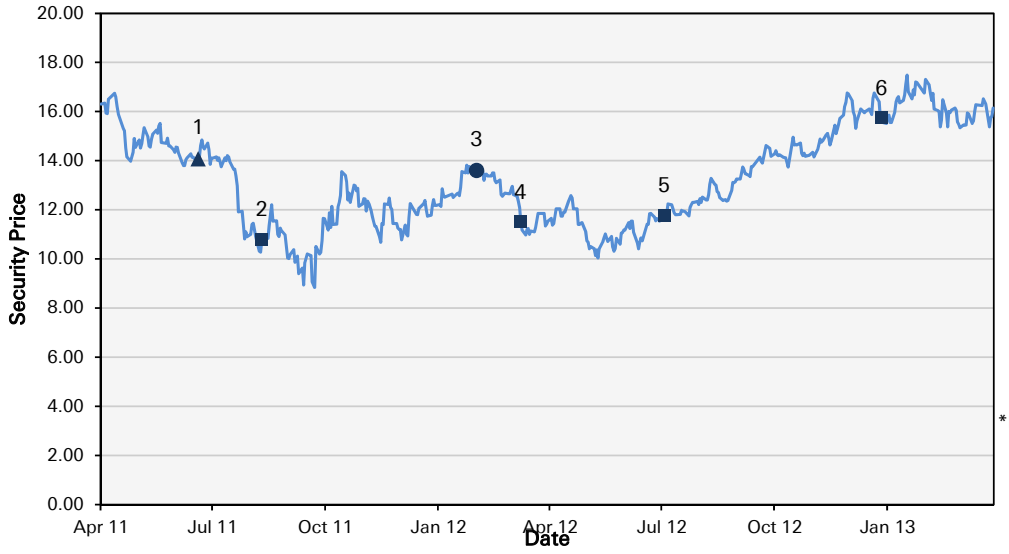
Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure as of September 9,2002

1. 23/06/2011: Buy, Target Price Change HKD4.14
2. 17/08/2011: Buy, Target Price Change HKD3.50
3. 29/08/2011: Buy, Target Price Change HKD3.59
4. 30/11/2011: Buy, Target Price Change HKD3.58
5. 15/02/2012: Buy, Target Price Change HKD3.71
6. 29/02/2012: Buy, Target Price Change HKD3.64
7. 26/03/2012: Buy, Target Price Change HKD3.55
8. 03/07/2012: Buy, Target Price Change HKD2.15
9. 02/10/2012: Buy, Target Price Change HKD2.44
10. 01/04/2013: Downgrade to Hold, Target Price Change HKD2.15

Historical recommendations and target price: China Oilfield Services (2883.HK)

(as of 4/11/2013)



Previous Recommendations

Strong Buy
Buy
Market Perform
Underperform
Not Rated
Suspended Rating

Current Recommendations

Buy
Hold
Sell
Not Rated
Suspended Rating

*New Recommendation Structure as of September 9,2002

1. 03/07/2011: Upgrade to Buy, Target Price Change HKD16.40
2. 24/08/2011: Buy, Target Price Change HKD16.43
3. 15/02/2012: Downgrade to Hold, Target Price Change HKD14.90
4. 22/03/2012: Hold, Target Price Change HKD12.68
5. 17/07/2012: Hold, Target Price Change HKD12.70
6. 10/01/2013: Hold, Target Price Change HKD15.73

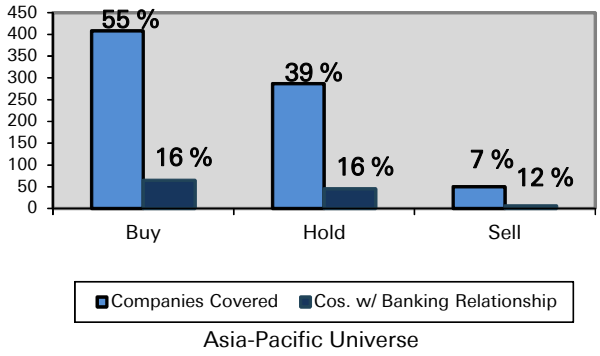
Equity rating key

Buy: Based on a current 12- month view of total share-holder return (TSR = percentage change in share price from current price to projected target price plus pro-jected dividend yield) , we recommend that investors buy the stock.
Sell: Based on a current 12-month view of total share-holder return, we recommend that investors sell the stock
Hold: We take a neutral view on the stock 12-months out and, based on this time horizon, do not recommend either a Buy or Sell.
Notes:

1. Newly issued research recommendations and target prices always supersede previously published research.
2. Ratings definitions prior to 27 January, 2007 were:

Buy: Expected total return (including dividends) of 10% or more over a 12-month period
Hold: Expected total return (including dividends) between -10% and 10% over a 12-month period
Sell: Expected total return (including dividends) of -10% or worse over a 12-month period

Equity rating dispersion and banking relationships



Asia-Pacific Universe

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1. Important Additional Conflict Disclosures

Aside from within this report, important conflict disclosures can also be found at https://gm.db.com/equities under the "Disclosures Lookup" and "Legal" tabs. Investors are strongly encouraged to review this information before investing.

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Deutsche Bank equity research analysts sometimes have shorter-term trade ideas (known as SOLAR ideas) that are consistent or inconsistent with Deutsche Bank's existing longer term ratings. These trade ideas can be found at the SOLAR link at http://gm.db.com.

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