COMMERZBANK

Commodity Spotlight Energy

03 March 2014

No rapid transformation on the power exchange

Electricity is costing the consumer more and more, but power prices on the exchange have been under pressure for three years now. This has happened because of a sharp fall in coal prices, lower carbon prices and the expansion of renewable energy. We expect the slide to end soon, as carbon prices in emission trading are starting to rise, and growth of renewable energy is loosing some of its pace. No strong rally seems likely though in the near term, given that coal remains cheap for some time, and its prices will probably only recover gradually in view of ample supplies.

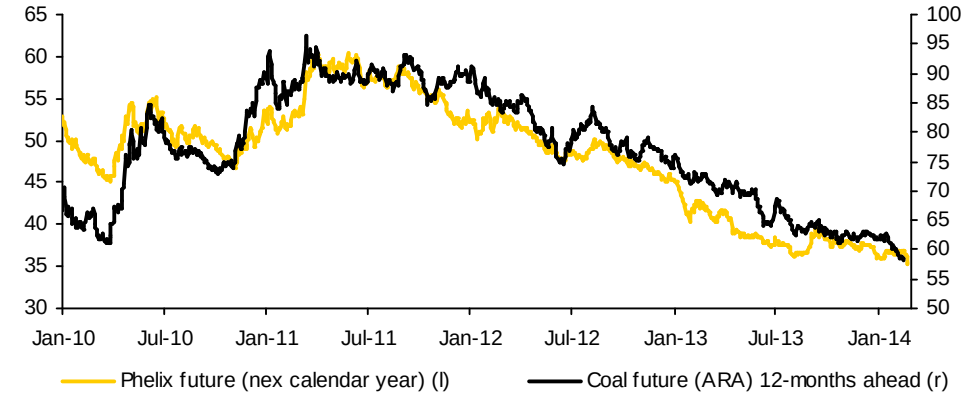
While electricity prices for German private households are soaring to ever new record highs and are now on average more than twice as high as they were in 2000, wholesale prices on the power exchange EEX in Leipzig are sliding from one low to the next. Futures contracts for baseload next year are now trading at only just over €35 per MWh, the lowest level since 2007 and some 40% lower than three years ago (chart 1): It is well known that consumers are having to pay more and more for electricity on account of rising taxes and surcharges, whereas the reasons for falling prices on the energy exchange are largely supply-side induced.

Four factors hitting electricity price on exchange

The main determinant of power prices is the marginal cost of the power generation plant last used to cover demand, and the cost of producing electricity from (thermal) coal plays a key role here. This might seem surprising at first glance, given that only one fifth of German gross power generation is coal-fired. The fact that production costs in coal-fired power plants are nevertheless so significant can be explained by the major importance of coal-fired power plants in the merit order of power plants (see box 2). Coal-fired power plants occupy an intermediate position in the merit order. It often makes up for fluctuations in loads due to their medium level of variable costs and their mid-scale flexibility (chart 2, page 2).

The cost of producing electricity from coal has in fact fallen considerably over the past three years. The main variable cost factors in this production technology are the input factor coal and the cost of carbon emissions.

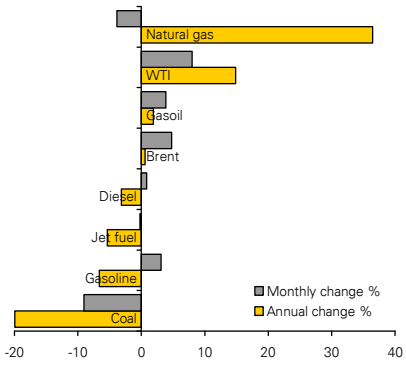
CHART 1: **Power and coal prices together on a downtrend**
Euro per MWh and Euro per ton



Source: ICE; EEX, Bloomberg, Commerzbank Corporates & Markets

Commerzbank Forecasts

	Q2 14	Q3 14	Q4 14
Brent Blend	105	105	107
WTI	99	100	102
Diesel	920	910	960
Gasoline (95)	950	970	940
Jet fuel	970	960	1000
Natural gas	4.5	4.5	4.5
Coal (API #2)	75	75	78
EUA (€ per t)	6.5	7.0	7.5
Phelix (€ per MWh)	35	36	37



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Pricing on the electricity market

Only a limited amount of electricity can be stored, but the demand for it varies enormously. When load fluctuation occurs, the number of power stations on the grid (or their capacity utilisation) has to be adapted. The cost structures of power plants determines which ones are hooked up to the grid and when. Those with the lowest variable costs are connected up first, and those with the highest last of all. This is known as the merit order. In Germany, nuclear power is the cheapest (conventional) technology in terms of variable costs, and the very few remaining oil-fired power plants are the most expensive. Coal-fired power plants are somewhere in the middle of the merit order.
Renewable energy also has low variable costs close to zero. The bigger the supply of renewable energies, the further the supply curve shifts to the right (see chart 3). At times when a large amount of electricity generated from renewable sources is fed to the grid, it is the power plants with lower variable costs that set the prices, so that with the same supply the price is lower (merit order effect). The increased use of renewable energy thus leads to lower whole sale prices on the energy exchange.

1. Falling coal prices

The price of coal has been falling steadily for three years (chart 1, p.1). The current price on the futures market, due next month, has just fallen below $75 or just under €55 a ton. This is some 45% less than in March 2011 and the lowest level for almost four years.

2. Falling carbon prices

At roughly the same time, emission trading prices have come under enormous pressure: The price for an EU emission allowance fell from May 2011 to early 2013 from over €16 to under €3. Given that coal-fired power generation has become so much cheaper, it is hardly surprising that gross coal-fired power generation rose by no less than 4.2% in 2013.

3. Strongly advancing renewable energy

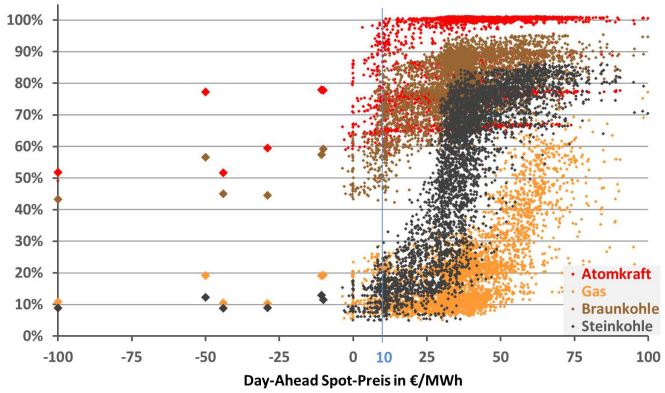
The advance of renewable energy is also reining in electricity prices (see box). These sources meanwhile account for roughly a quarter of all gross power generation. Since they are highly dependent on the wind and the sun and therefore on weather conditions, the influence on power prices is mainly short term; the higher the supply of renewables, the lower the power price which is pushing other suppliers out of the grid. Indeed, the number of low-prices hours below €10 per MWh has accordingly seen a sharp rise. According to the Fraunhofer Institute, in terms of day-ahead prices it was four times as high during the first half of 2013 as a year ago.

Yet supplies of wind and solar energy are also pushing down long-term prices. The decisive factor in this case, though, is not so much actual output, but potential supplies based on installed capacities. The latter dictates the mid-term expectations, which may well differ from the actual supply level on account of the weather dependence of renewable energies. For instance, at just above 50 billion kWh, the actual amount of wind power generated in 2013 was only slightly higher than in the previous year, despite the fact that the installed wind power capacity – at 32.5 GW – was already almost 9% higher in the autumn of 2013 than it was at the end of 2012.

4. Ailing economy

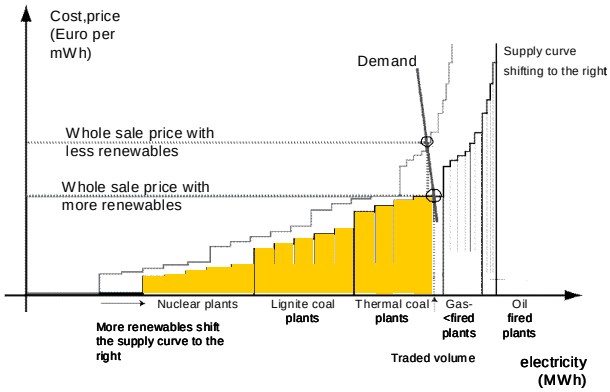
However, in addition to the supply-side factor there are demand-side factors affecting prices. While the structural trend of more energy efficiency is dampening power consumption for years now, the sluggish German economy has had an additional negative impact on demand, and power consumption has dropped sharply over the last three years; in 2013, it was over 3% lower than in 2010. Weak demand will no doubt also have hit margins of utilities.

CHART 2: **Coal-fired plants used to cover load fluctuations**
As a % of capacity (y-axis), power prices (black = coal, red = nuclear, brown = lignite, yellow = gas)



Source: Fraunhofer Institut

CHART 3: **Merit order effect weighing on power prices**



Source: SolarenergieFörderverein, Commerzbank Corporates & Markets

Specification of model variables
We have estimated the influence of the three price determinants of power prices with the aid of a model. This explains the price of electricity (baseload in the next calendar year) in terms of the price of coal and of emission trading, a trend variable for installed capacities for renewable energy sources and a constant. Weekly data show a stable long-term relationship for the past four years (see chart 4). The time series we took for coal is the price of ARA coal in 12 months (converted into euros). It is not only the relevant cost factor for power supplies generated in coal-fired plants next year from a theoretical standpoint, but is also less susceptible to fluctuations than the nearby monthly future. The price of coal goes a long way to providing an explanation of electricity prices.

Model confirms price of coal as main determinant of electricity price

High influence of coal prices

We have built a model to estimate the influence of the three parameters on the supply side (see box). It shows that a rise of €1 in the price of a ton of coal pushes up the price of electricity by an average of almost 50 cents per MWh, all other things being equal (ceteris paribus). This is rather more than the production technology should suggest, since on average 375g of coal are needed to produce 1 kWh, meaning that the cost per one MWh would only rise by just under 40 cents. In contrast, the effect of the carbon price appears to be lower than the technology would imply. According to the model, an increase of €1 in the price of carbon would only put up the price of electricity by 40 cents. However, on average a coal-fired power plant still emits just short of 900g of CO_2 per kWh (chart 5). The influence may be under-estimated because the eroding effect of falling emission prices on electricity prices in the observation period in question may be also covered in part from the trend variable of the expansion of renewable energies. It is also worth noting that the price of coal is doing best at explaining power prices.

Outlook: end to slump, but no significant price rally

What happens to the four price factors will largely determine future power prices on the German energy exchange:

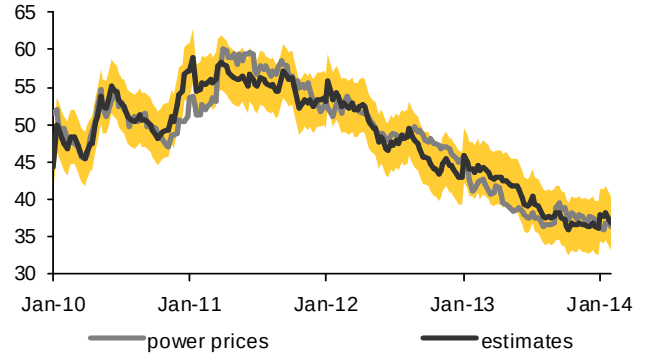
- Renewable energy still advancing, but at slightly slower pace

Reform of EEG dampens the advance of renewable energies slightly

The “Energiewende”, the transition of the German energy mix, is being pursued. The merit order effect will continue to weigh on wholesale electricity prices (see box p.2). However, with the reform of the Renewable Energy Act (EEG), there are signs of the pace of expansion slowing down a little. According to the keynote paper EEG 2.0, certain expansion ranges are to be set which in some segments are lower than their latest dynamics. Prices will probably also tend to be depressed by the fact that renewable energy producers will to a growing extent have to market their electricity directly, and the feed-in tariffs will be further cut. The reform of the EEG should become effective in August. It is difficult, though, to say when the retarding effect will kick in. However, even if short-term projects were to be brought forward to ensure producers higher feed-in tariffs, the pace of expansion seems likely to ease off somewhat in the medium term.

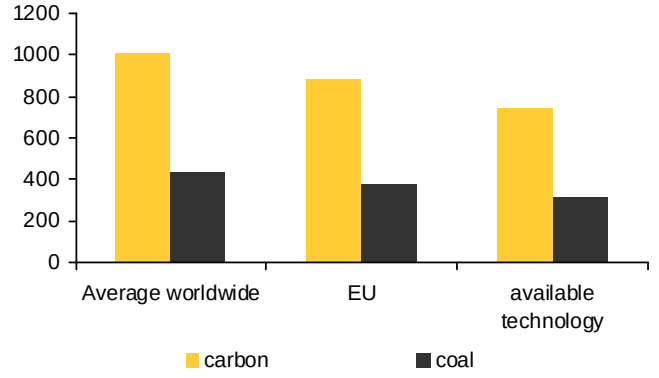
Price effect: Still structurally depressing prices, but to a slightly lesser extent

CHART 4: **Power prices easily explained (in retrospect)**
Euro per MWh, Phelix future for next calendar year



Sources: Bloomberg, ICE, Commerzbank Corporates & Markets

CHART 5: **Use of coal and carbon emission in coal-fired plants**
gram per kWh



Sources: VGB, Commerzbank Corporates & Markets

- **Lasting turnaround in emission trading**

Price rally in emission trading

Carbon prices have jumped far more rapidly than envisaged recently. In just four weeks, the price of an EU allowance to emit one ton of carbon rose by 50%, trading at more than €7 for a while, a 13-month high (chart 6). Thanks to the fast-track approvement of the so called "backloading", the EU Commission should be reducing the volume of auctions as of mid-March. So, 400m of the total 900m allowances will be probably held back this year already.

Another high market surplus in 2013

In view of the last rally, corrections are a distinct possibility: The market did after all build up a surplus of 2bn allowances in the second trading period (2008 to 2012). In 2013, too, power station emissions will at most have stagnated, as electricity generation in the EU fell by 1.8%. This will have more than compensated for the increase in emissions caused by the larger percentage of coal-fired power generation. Moreover, with the exception of the steel sector, output in the industrial sectors covered by EU Emission Trading System was down. Consequently, the supply-side surplus in ETS will have continued to rise in 2013.

Strong political interest in reviving emission trading

The decisive factor for medium-term prices, however, is whether and how much of this surplus, probably accrued largely by industry, comes onto the market. As long as the economy is getting sufficiently stronger and corporate finances will be sound, these 'hidden reserves' are unlikely to be disposed of. Furthermore, the ultimate speedy implementation of backloading emphasises the political will to strengthen emission trading. In the medium term, carbon prices can be expected to continue their advance. We increased our price forecast and expect the carbon price to climb to 9 Euro per ton until summer 2015.

Price effect: supportive in medium term

Coal to remain cheap, but price will not fall any further

No imminent rally in coal prices

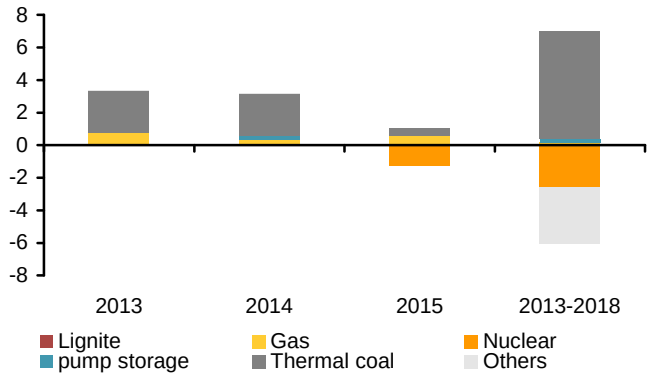
The fact that electricity prices have not risen despite higher carbon prices can be explained by the price of coal coming under renewed pressure recently. While short-term prices have meanwhile rallied on account of Colombia's export problems, 12-month prices for coal have again come under pressure. Even though coal prices are very low, we haven't seen strong supply side cuts. In fact, many producers are being forced to continue mining coal due to binding logistics contracts. The outcome is a market surplus.

An additional negative factor is the fear of Chinese imports slowing down, as the Chinese government intends to do more to overcome the country's air pollution problem. This will put some coal-fired power plants to the test. These concerns are being reinforced by the decline in domestic prices, which makes imports less attractive. In fact, though, China's coal imports have still been rising, thanks to low international prices, the generally better quality of imported coal and the consequent lower emissions. And the fact that energy demand is still rising as the urban middle class continues to expand should ensure that Chinese coal imports do not collapse.

CHART 6: **Turnaround in emissions trading**
Euro per ton CO_2, nearby December future

Sources: ICE, Bloomberg, Commerzbank Corporates & Markets

CHART 7: **Strong growth in coal-fired power station capacity (GW)**



Sources: German Net Regulator, Commerzbank Corporates & Markets

Additionally, we are expecting coal demand to pick up somewhat in industrial countries. Low coal prices and stronger economies will boost demand, while at the same time coal mining is shrinking. In Germany, for example, 12.5% more coal was imported last year than in 2012. Moreover, from 2013 to 2018 on balance, there will be a substantial increase in coal-fired power station capacity (chart 7, p.4). All in all, coal prices should start to bottom out, but with ample supplies available, we only expect a gradual price recovery to kick in later.

Price effect: short-term neutral

- **Stronger economy supports electricity consumption**

Recovery of the German economy gives impulses to cyclical power demand

We envisage the German economy making further progress over the next two years. The sentiment indicators, the so-called soft indicators, point to a clear upturn, but the hard data likewise suggest that the worst is over. The sovereign debt crisis no longer plays hardly any role and the German economy can once again gather pace. This should lend support to power consumption, which is cyclical because almost half of Germany's net power consumption is attributable to industry.

Price effect: positive

Conclusion: no rapid transformation on the energy exchange

After trending sideways German power prices should only recover slowly

Our overall conclusion is that higher carbon prices, the rather more hesitant medium-term expansion of renewable energy sources and the reviving German economy all point to the slump in electricity prices coming to an end. However, a more vigorous recovery in coal prices would be a pre-requisite for a turnaround on the electricity market. And given the uncertainty about demand from China, this turnaround will not be happening for a while yet.

This means that for the current year we envisage a price for the baseload in 2015 of between €35 and €37 per MWh, and a slight increase only next year towards €39 per MWh.

At a glance

TABLE 1: **Our Forecasts**

		Forecasts								Yearly Average		
	28-Feb	1Q14	2Q14	3Q14	4Q14	1Q15	2Q15	3Q15	4Q15	2013	2014	2015
Brent Blend ($/bbl)	109.1	108	105	105	107	107	109	111	113	109	106	110
WTI ($/bbl)	102.6	98	99	100	102	102	106	108	108	98	100	106
Diesel ($/t)	931	940	920	910	960	970	960	970	1010	938	930	980
Gasoline (95 ARA) ($/t)	979	950	950	970	940	940	980	1020	980	986	950	980
Jet Fuel ($/t)	979	980	970	960	1000	1010	1010	1020	1050	989	980	1020
Natural Gas HH ($/mmBtu)	4.61	4.7	4.5	4.5	4.5	4.5	4.5	5.0	5.5	3.7	4.5	5.0
Coal (API #2) ($/t)	72.4	78	75	75	78	80	80	85	85	82	76	83
EUA (€ /ton)	6.5	6.0	6.5	7.0	7.5	8.0	8.0	9.0	9.0	4.5	6.5	8.5
Phelix (cal year,baseload) € /mWh	35.0	36	35	36	37	37	38	39	39	39	36	38

Source: Commerzbank Corporates & Markets, Bloomberg

TABLE 2: **Inventories and imports**

		Net change			% change		Comment
		1 month	1 year	vs. 5 -year-Ø	year	vs. 5 -year-Ø	
US inventories (mm barrels)							
Crude oil	362.4	11.2	-15.1	10.2	-4.0	2.9	Extrem cold winter in the US leads to strong inventory reductions in distillates and natural gas, their inventory levels are well below the 5-year average
of which: Cushing	34.8	-6.8	-15.8	-2.6	-31.2	-6.9	
Gasoline	230.6	-4.7	2.1	2.5	0.9	1.1	
Distillates	113.1	-7.7	-11.1	-30.9	-9.0	-21.5	
Natural gas (bn cubic feet))	1348	-1075	-881	-655	-39.5	-33.9	
ARA inventories ('000 tons)							
Gas oil	1988	51	-455	-439	-18.6	-18.1	Gasoil stocks in Western Europe well below the seasonal usual level
Gasoline	888	140	-15	47	-1.7	5.6	
Imports and production (mm bpd)							
US imports	7.0	-0.5	-0.9	-1.6	-11.6	-19.0	US oil production exceeds US oil imports, Chinese imports increase to new record high
US production	8.1	0.0	1.0	2.2	13.6	37.1	
Imports China	6.6	0.3	0.7	2.2	11.9	49.1	
Refinery activity (mm bpd)							
Processing USA	15.3	0.1	0.8	1.0	5.4	7.2	US crude oil processing extraordinary high
Processing China	9.9	0.1	-0.3	1.6	-2.6	19.9	

Source: Commerzbank Corporates & Markets, Bloomberg, US Energy Information Administration

TABLE 3: **Historic prices of energy commodities**

Energy	Latest	% change				1Q12	2Q12	3Q12	4Q12	1Q13	2Q13	3Q13	4Q13
		1 Week	1 Month	ytd	year ago								
Brent Blend ($/bbl)	109.1	0.4	4.8	0.3	0.6	118	109	109	110	113	103	110	109
WTI ($/bbl)	102.6	1.3	8.0	5.8	14.9	103	93	92	88	94	94	106	97
Diesel ($/t)	931	-1.0	0.8	-2.6	-3.1	1010	943	979	984	974	889	949	942
Gasoline (95 ARA) ($/t)	979	-1.7	3.1	-0.8	-6.6	1053	1034	1061	983	1029	963	1010	944
Jet Fuel ($/t)	979	-1.3	-0.2	-4.4	-5.4	1062	995	1027	1025	1038	931	992	996
Natural Gas HH ($/mmBtu)	4.61	-13.4	-3.9	11.5	36.5	2.5	2.3	2.9	3.5	3.5	4.0	3.6	3.9
Coal (API #2) ($/t)	72.4	-2.0	-9.0	-11.0	-19.9	101	91	91	89	86	80	77	84
EUA (€/t)	6.5	-1.0	27.9	45.3	47.1	7.7	6.9	7.6	7.3	4.6	3.9	4.6	4.8

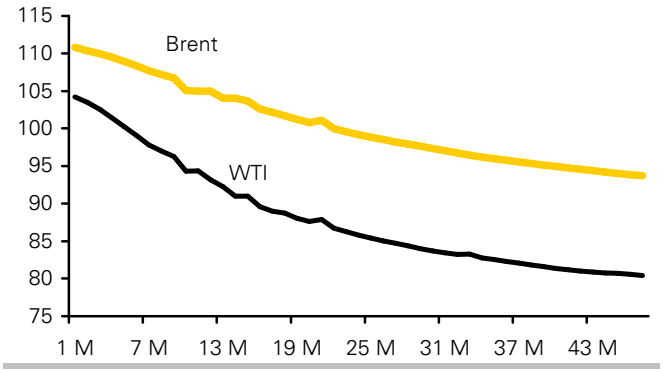
Source: Commerzbank Corporates & Markets, Bloomberg

TABLE 4: **Upcoming events**

5 / 12 / 19 March	USA	US EIA oil inventory data
6 / 13 / 20 March	USA	US EIA gas inventory data
11 March / 8 April	INT	EIA Short term energy outlook
12 March / 10 April	USA	OPEC oil market report
14 March / 11 April	INT	IEA oil market report
11 June	INT	OPEC meeting in Vienna, Austria

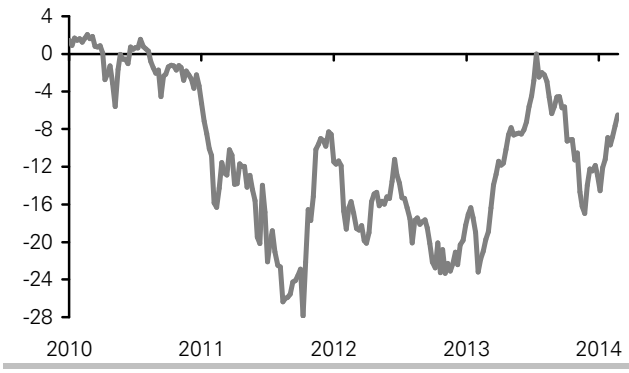
Source: EIA, IEA, OPEC, Bloomberg, Commerzbank Corporates & Markets, Bloomberg

CHART 8: **Crude Oil - Forward Curves in US$ per barrel**



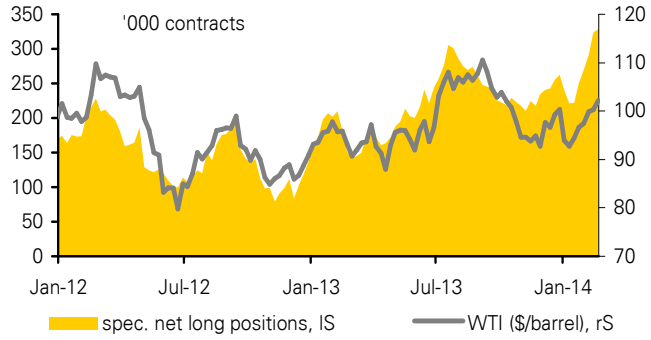
Source: Bloomberg, Commerzbank Corporates & Markets

CHART 9: **Price spread WTI and Brent Blend in US$/bbl**



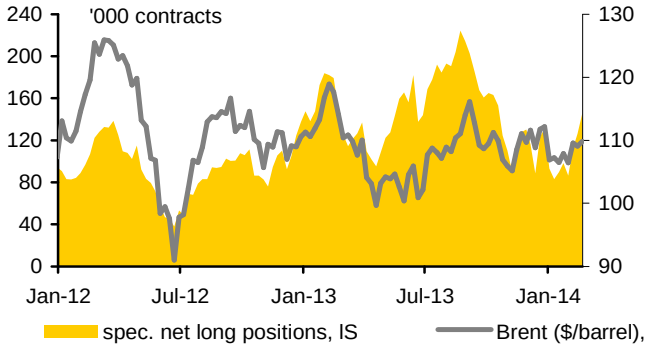
Source: Commerzbank Corporates & Markets

CHART 10: **WTI: managed money net-long positions**



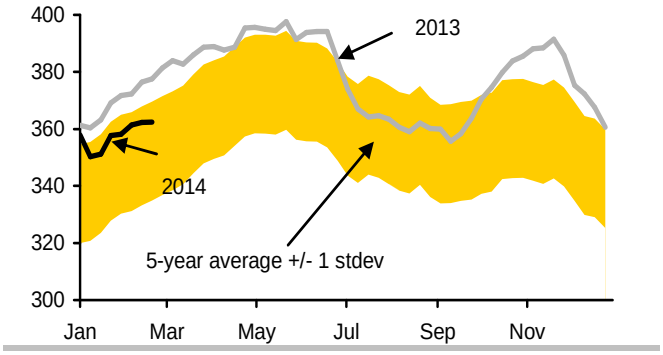
Source: CFTC, Bloomberg, Commerzbank Corporates & Markets

CHART 11: **Brent: managed money net-long positions**



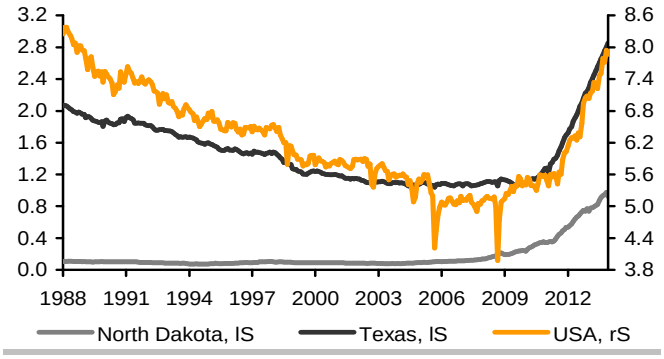
Source: ICE, Bloomberg, Commerzbank Corporates & Markets

CHART 12: **Crude oil: US inventories in mm barrel**



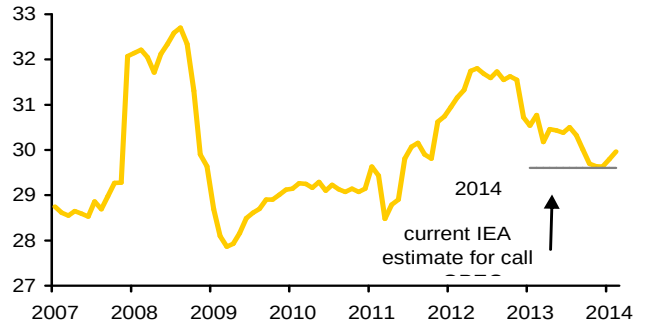
Source: EIA, Bloomberg, Commerzbank Corporates & Markets

CHART 13: **US oil production in mm bpd**



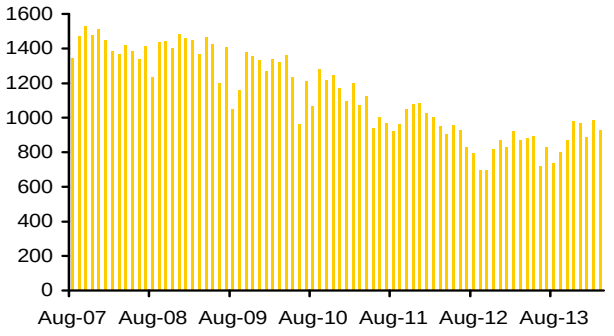
Source: EIA, Bloomberg , Commerzbank Corporates & Markets

CHART 14: **OPEC oil production in mm bpd**



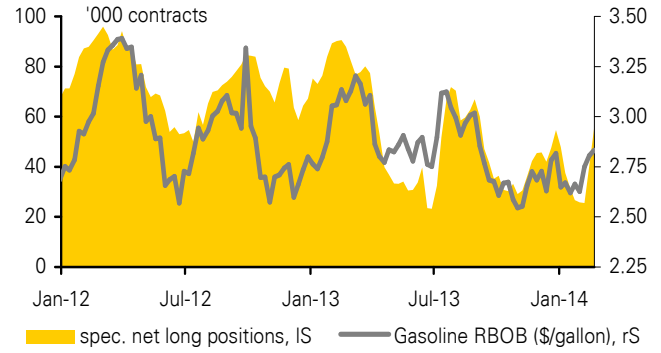
Source: Reuters, Bloomberg, IEA, Commerzbank Corporates & Markets

CHART 15: **Monthly loadings of North Sea crude oil (Brent, Forties, Oseberg and Ekofisk) in '000 bpd**



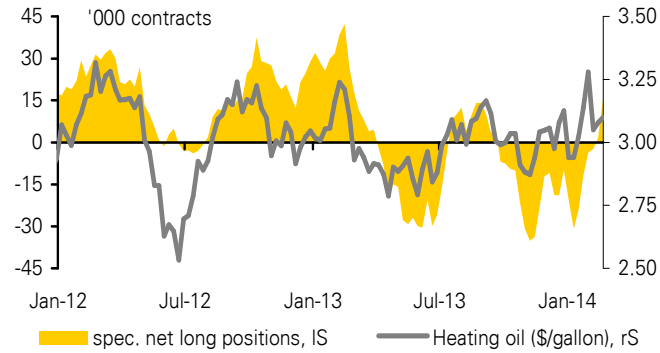
Source: Bloomberg, Commerzbank Corporates & Markets

CHART 16: **Gasoline: managed money net-long positions**



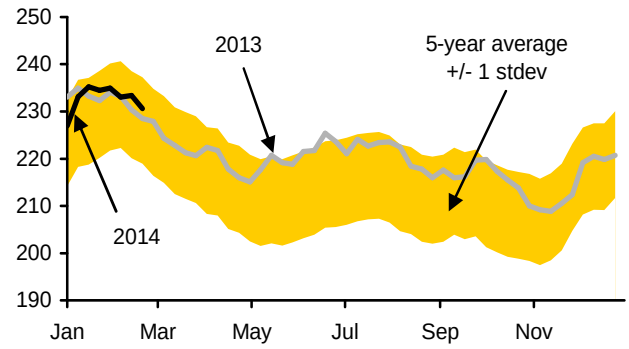
Source: CFTC, Bloomberg, Commerzbank Corporates & Markets

CHART 17: **Heating oil: non-commercials' net-long positions**



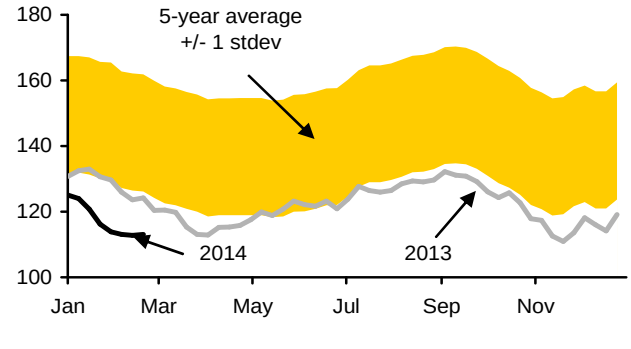
Source: CFTC, Bloomberg, Commerzbank Corporates & Markets

CHART 18: **Gasoline: US inventories in mm barrel**



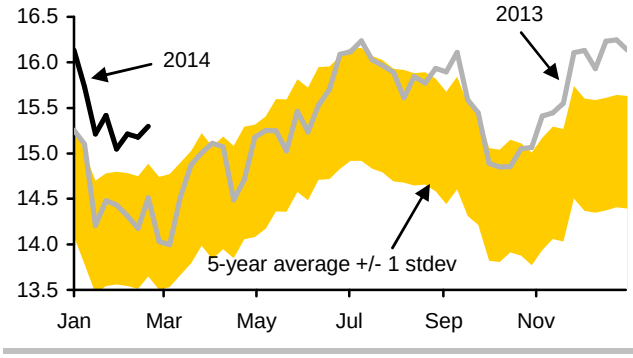
Source: EIA, Bloomberg, Commerzbank Corporates & Markets

CHART 19: **Distillates: US inventories in mm barrel**



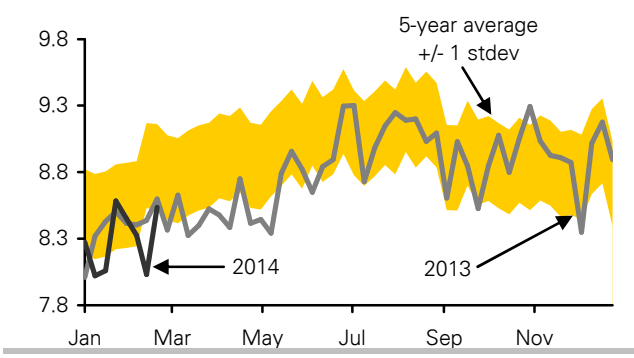
Source: EIA, Bloomberg , Commerzbank Corporates & Markets

CHART 20: **US crude oil processing in mm bpd**



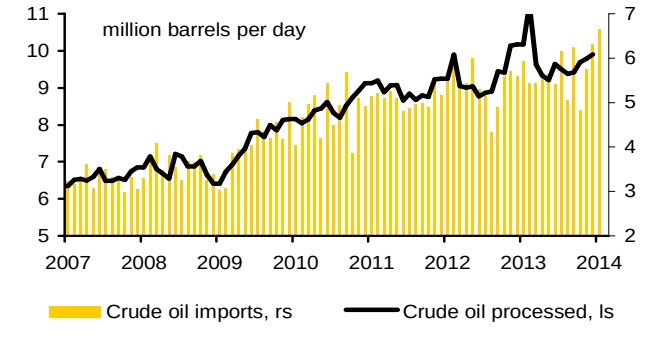
Source: EIA, Bloomberg, Commerzbank Corporates & Markets

CHART 21: **US gasoline demand in mm bpd**



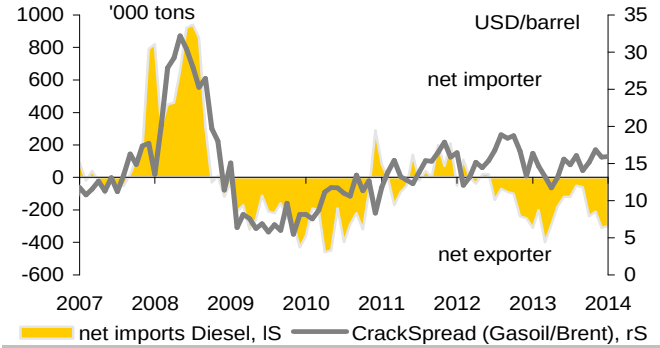
Source: EIA, Bloomberg, Commerzbank Corporates & Markets

CHART 22: **China: crude oil processed and imports**



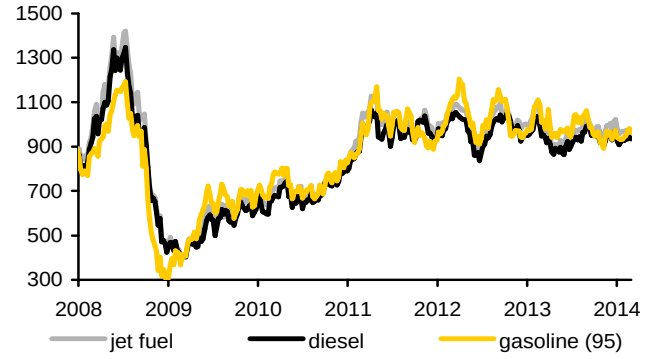
Source: China NBS, Chinese Customs, Commerzbank Corporates & Markets

CHART 23: **China: Diesel imports and gasoil crackspread**



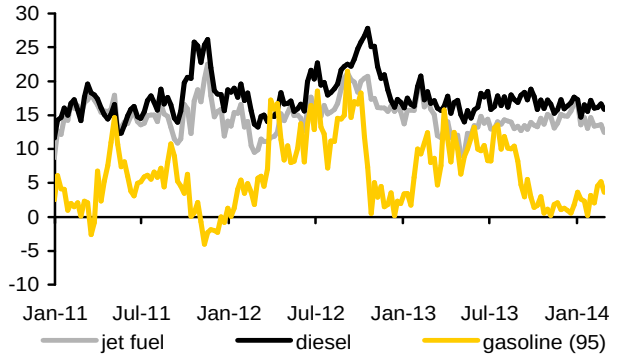
Source: Chinese Customs, Commerzbank Corporates & Markets

CHART 24: **Prices of oil products in US$ per ton**



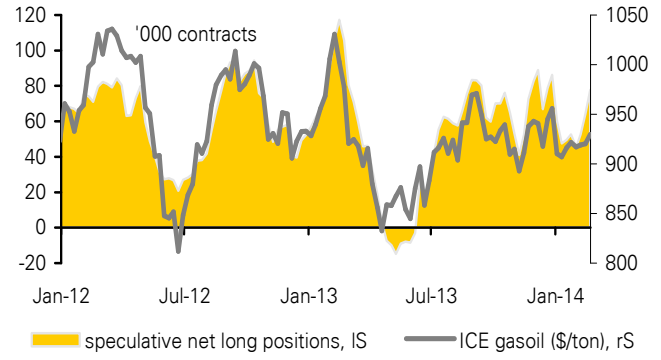
Source: Commerzbank Corporates & Markets

CHART 25: **Price spread products to Brent in $ per barrel**



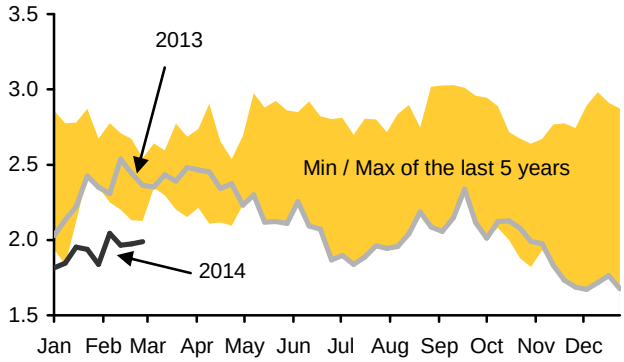
Source: Bloomberg, Commerzbank Corporates & Markets

CHART 26: **Gasoil: managed money net-long positions**



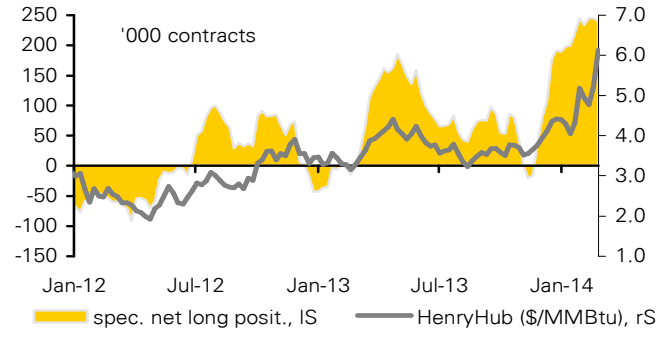
Source: ICE, Bloomberg, Commerzbank Corporates & Markets

CHART 27: **ARA Gasoil inventories in million tons**



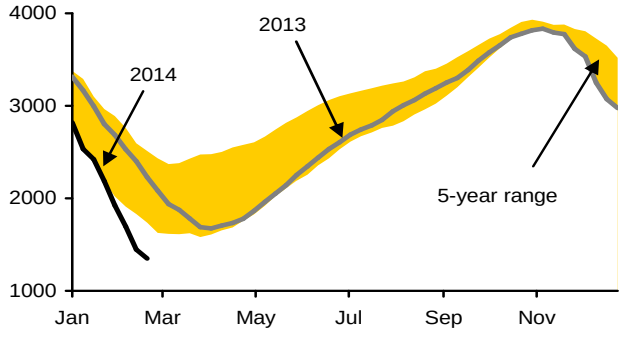
Source: PJK International, Bloomberg, Commerzbank Corporates & Markets

CHART 28: **Nat. gas: non-commercials net-long positions (Futures and swaps)**



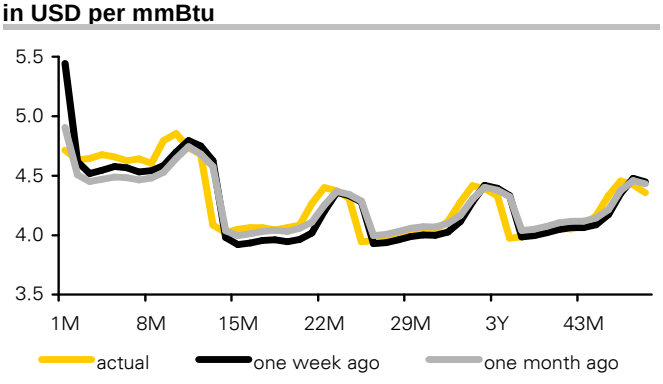
Source: CFTC, Bloomberg, Commerzbank Corporates & Markets

CHART 29: **Natural gas: US storage in bn cubic feet**



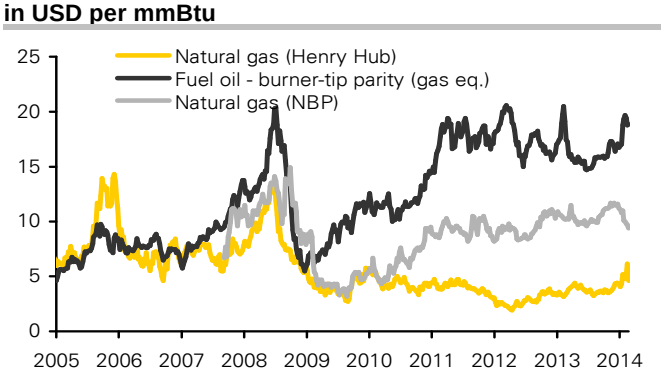
Source: EIA, Bloomberg, Commerzbank Corporates & Markets

CHART 30: **Natural gas – forward curve (Henry Hub) in USD per mmBtu**



Source: Bloomberg, Commerzbank Corporates & Markets

CHART 31: **Burner-tip parity (natgas vs. fuel oil no.6) in USD per mmBtu**



Source: Bloomberg, Commerzbank Corporates & Markets

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