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German Power: The Role Of Nuclear & Carbon

Commodities Special

- German power prices reflect the interplay of (i) supply and demand, (ii) regulation, and (iii) fuel-input prices (coal, gas, and carbon).
- Supply-and-demand outlook: The nuclear reprieve – if confirmed by the courts – will make for comfortable capacity margins for the foreseeable future, while demand is set to recover only modestly from the 2009 low.
- Regulation: The impact of regulation on wholesale prices is a function of both EU and national policies on emissions reductions, renewable energy, and energy efficiency. In terms of the impact on wholesale prices, the most important of these elements is the EU's emissions-reduction target.
- The outlook for fuel prices: With EU demand recovering only very modestly, fuel-input prices remain depressed, with the short-term outlook for gas prices in the EU in particular still clouded by over-supply.
- Against this backdrop the near-to-medium term outlook for power prices appears unexciting, as reflected in the forward curve out to 2014.
- Nevertheless, our base-case scenario for EU carbon prices over the next six months implies an increase in German power prices of EUR3-4/MWh per year across the curve, giving upside potential of 8%.

The drivers of German power prices

Power prices in Germany are driven by supply and demand, regulation at both the national and EU levels, and the relative prices of the commodities that determine the price-setting fuel in the merit order (coal, gas, and carbon).

Figure 1: German baseload prices, 2005-10 (EUR/MWh)

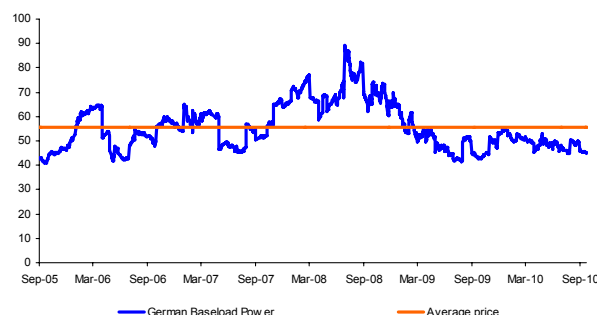


Figure 1 shows the evolution in the one-year forward German baseload-power contract over the last five years. As can be seen, German baseload prices reached an all-time high of nearly EUR100/MWh in July 2008 as oil rose to a record high of \$147/bbl and gas, coal, and carbon prices all followed in its wake, with the carbon price also reflecting the perception that the Phase-3 EU-ETS cap was going to be very tight. At this time the EU and German economies were still growing steadily, and the "Grand Coalition" government between the CDU/CSU and SPD parties was not in a position to revoke the legislation passed in 2002 decreeing that all of Germany's nuclear power plants should be phased out by 2022. As a result, there was concern over future capacity margins and hence a potential need for a significant new build programme at a time when commodity prices were at all-time highs.

In short, summer 2008 saw a vicious circle in power prices

Over the following 12 months, however, power prices more than halved, reflecting the collapse in oil and other commodity prices triggered by the onset of the global financial crisis and the ensuing global and EU recessions. German GDP and German electricity demand both fell by 5% in 2009, this being the first time that German power demand had declined since 1993 (the fall at that time being due to the collapse of large parts of eastern Germany's industrial base in the wake of reunification).

Overall, then, while German power prices have averaged EUR55/MWh over the last five years, they have also been exceptionally volatile, reflecting the dynamic interplay of their key drivers over this period.

With the one-year baseload contract today trading just below its five year average at EUR50/MWh, German power prices from here will depend on the outlook for the key variables that determine prices: (i) supply (i.e. capacity margins), (ii) demand, (iii) regulation, and (iv) fuel-input prices.

The nuclear reprieve relieves capacity concerns

In April 2002 Germany's amended Atomic Energy Act entered into force mandating the closure of all nuclear power plants by 2022. Under this legislation, Germany's entire remaining nuclear capacity was to be gradually phased out by 2022 on a schedule determined in accordance with a defined amount of allowed output per station.

In line with this law, of the total 20.5GW of nuclear capacity available in Germany today, 7.1GW was due to close over 2010-13.

However, on Sunday 5 September this year the CDU/CSU/FDP Government agreed amendments to the 2002 Act, which, if ratified by the lower house of Parliament (the *Bundestag*), will enable German nuclear plants to run for an extra 12 years on average.

The Government has a majority in the *Bundestag* so securing the votes for the proposed changes should not be a problem, but it does not have a majority in the upper house (the *Bundesrat*) and has said that the *Bundesrat*'s approval is not required to make amendments. This could soon be the subject of a legal case, as opposition parties have said that they will ask the Constitutional Court to rule on this question if the Government does not submit it to the *Bundesrat* after the *Bundestag* vote.

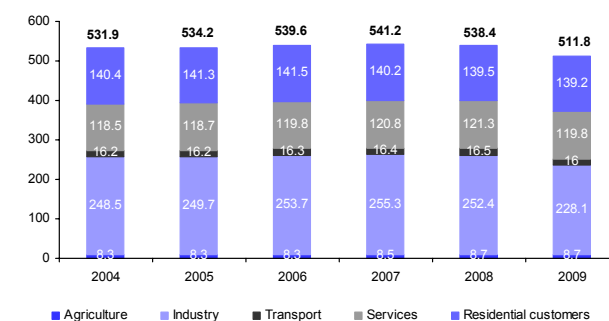
It is unclear how long it will take for the legal position to be clarified, but assuming the Government's position prevails then the extension of nuclear plants' operating lives means that the capacity margin looks comfortable over the next three years. Although we estimate that up to 10GW of old fossil-fuel plant will be retired in Germany by the end of 2013 (see 13-14 of our report *Which Way Blows the Wind? German Nuclear Policy in Focus*, 15 July 2009), this is offset by 11GW of new fossil-fuel plant under construction (again, see *Which Way Blows the Wind?*, pages 16-17).

Even allowing for recovering demand over 2010-13, this should mean that the capacity margin will remain comfortable at >15GW above peak load out to 2013-14.

And the recovery in demand will likely slow

Figure 2 shows German electricity demand over 2004-09.

Figure 2: German electricity demand, 2004-09 (TWh)



Source: RWE from BDEW

Demand peaked in 2007 at 541TWh, falling back slightly in 2008 but then declining by 5% in 2009 as the economy contracted by the same amount.

According to BDEW figures cited by Bloomberg, electricity consumption in H1 2010 was 274TWh versus 262TWh in H1 2009, an increase of 4.5%. This would imply full-year demand in the region of 535TWh, a healthy increase on 2009 but still below the 2007 number.

Indeed, the recovery in electricity demand in Germany has been helped by the strength of Germany's industrial sector, in turn a beneficiary of a weaker Euro boosting exports. The recovery in demand has not been as strong in other large EU countries, and the risk is that continuing macro uncertainty in southern EU Member States and the more recent strength in the Euro versus the US dollar will lead to a reduction in the rate of demand recovery in Germany in 2011.

Accordingly, we do not see any meaningful upward pressure on power prices from demand in the near future, although if, as we expect, demand grows modestly over 2011-13 (at a compound annual growth rate of 1.5%) this should nonetheless underpin prices.

The key regulatory driver is the EU carbon target

The role of regulation in determining wholesale power prices is a function of both EU and national policy measures. The EU has three major energy-policy targets for 2020, namely (i) to reduce greenhouse-gas (GHG) emissions by 20% versus 1990 levels, (ii) to derive 20% of all final energy consumed from renewable sources (compared with about 9% today), and (iii) to reduce total primary energy consumption by 20% by 2020 relative to business-as-usual levels.

Of these three targets it is the emissions-reduction target that has the biggest direct impact on wholesale power prices, as the main policy tool for achieving this goal is an

emissions-trading scheme (the EU-ETS) that caps the emissions of the power sector and other heavy industries. This means that the EU power sector has to reduce its emissions by becoming less carbon intensive, and over time this will dictate a move away from fossil-fuel fired generation to low-carbon technologies (renewable and nuclear). In the short run, though, the main way of reducing the carbon intensity of power generation on a large scale is by switching from coal to gas.

As a result, depending on the market's perception of the tightness of the cap over a given period (and hence of the amount of abatement required), the carbon price will be driven either by the long-run marginal cost (LRMC) of fuel switching (if new low-carbon capacity is required to meet the cap), or by the short-run marginal cost (SRMC) of fuel switching (if the cap can be met with available capacity as long as enough gas-fired generation displaces coal-fired output).

Accordingly, the wholesale power price across the EU includes the cost of carbon, with its impact on the wholesale price in each country a function of the marginal price-setting fuel. In Germany this is generally hard coal, so the carbon price is reflected in the German wholesale price as the cost of carbon to coal-fired generators.

At the moment, EUAs are trading at EUR15/tonne, and assuming a carbon intensity of 0.9/tonne per MWh generated this means that the cost of carbon to German coal-fired generators is about EUR13/MWh. In other words, given a German wholesale price at the moment of EUR50/MWh, then if the market is perfectly efficient EUR13/MWh of this – or 25% – is accounted for by the cost of carbon.

By contrast, the EU target for renewable energy does not have such a direct impact on the wholesale power price in Germany, while the energy-efficiency target does not have such a quantifiable effect.

As far as the renewables target is concerned, Germany has been the leader in Europe in developing wind-fired power generation, but its approach has been based on feed-in tariffs that are fixed over a specified period and are therefore paid for by end consumers as a supplement to, but not a component of, the wholesale price.

As far as the energy-efficiency target is concerned, to the extent that any efficiency improvements lead to lower demand for electricity, then other things being equal this will, of course, reduce the power price. However, in the short run it is difficult to quantify any such impact directly as reductions in demand can occur for all kinds of other reasons as well (e.g. economic and weather conditions). That said, over the longer term the move towards stricter

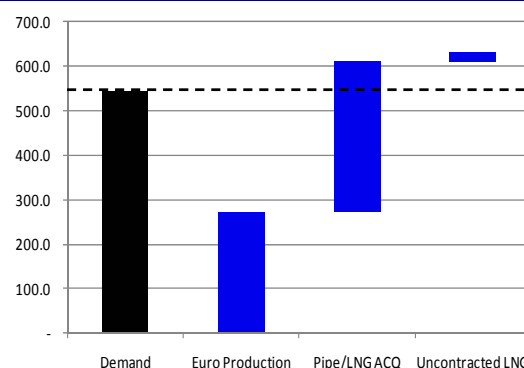
efficiency standards on appliances will undoubtedly have a structural impact on demand (and hence on prices), but retaining efficiency improvements is harder than achieving them in the first place, as there is a tendency for consumers to re-invest savings in more consumption.

In short, in terms of the regulatory framework and its impact on German wholesale power prices, we see the EU's emissions-reduction target as the most important factor. As explained in the EU Carbon Markets section of this report, we see upside risk to EUA prices over the next 6-12 months, and therefore upside risk to German power prices as well (see below).

Gas prices likely subdued until 2013

Despite the relatively strong oil price that has prevailed throughout 2010, gas prices in the EU remain depressed given the over-supplied market that exists at the moment (Figure 3).

Figure 3: European Gas Supply & Demand 2010 (bcm)



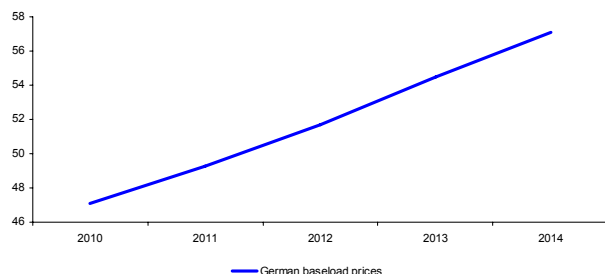
Source: WoodMackenzie, Deutsche Bank

DB's oil-and-gas equity research team recently published an in-depth report looking at the outlook for global gas markets over the next decade (*Global Natural Gas: Battlefield Analysis*, 13 September 2010), and concluded that EU spot prices would remain below oil-indexed contract prices until the recovery of demand and awareness of the need for incremental EU supply from the latter part of the decade lead to a re-balancing of the market by 2013-14.

Although coal is generally the price-setting fuel in the German power market gas is nonetheless at times the marginal plant, and this is likely to be more often the case in future as older lignite and coal plants are retired and new CCGT plants come more aggressively into the merit order. However, with a subdued outlook for EU gas prices out to 2013-14 we expect the relative price differential to coal to remain fairly stable, and hence do not see upward pressure on power prices from fuel-input prices in the foreseeable future.

Forward curve in contango with a 5% cost of carry

Figure 4 shows the forward curve for German baseload prices over 2010-14. The curve is almost perfectly linear, with prices rising to EUR57/MWh for 2014 delivery from EUR47/MWh for 2010, giving a cost of carry of 5%

Figure 4: German baseload forward curve (EUR/MWh)

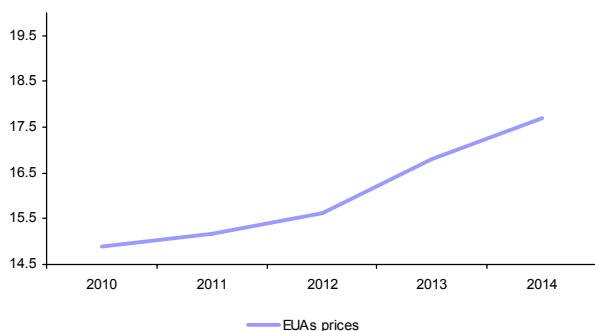
Source: Bloomberg Finance LP

As such, the forward curve for German power appears consistent with the outlook for the key drivers that we have set out above, namely comfortable capacity margins over 2010-14, the modest recovery in demand that we expect, and the subdued outlook for fuel prices generally and EU gas prices in particular.

That said, we think that there is upside risk to EU carbon prices over the next 6-12 months.

EUA prices as currently reflected in power prices

Figure 5 shows the EUA forward curve over 2010-14. Like the forward curve for German power it is in a contango pattern, but the shape of the curve is much less even.

Figure 5: EUA forward curve (EUR/tonne)

Source: Deutsche Bank

Over 2010-12 the curve shows a cost of carry of 2.4%, but then between 2012 and 2013 the price rises by over 7%, to EUR16.8/tonne from EUR15.6/tonne, while from 2013 to 2014 the increase is over 5%

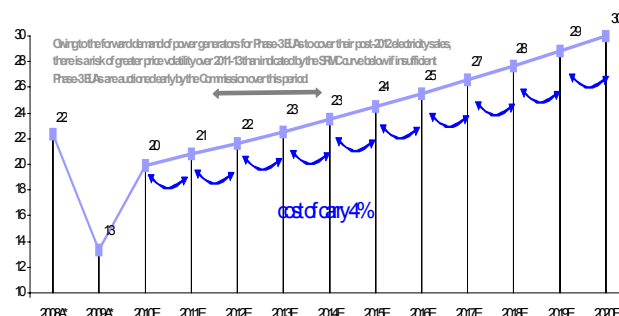
There are two reasons why the EUA forward curve is more uneven than the forward power curve: (i) after 2012 the market is pricing in a jump in prices associated with the decline in the cap will occur from 2013, and (ii) the forward curve in EUAs beyond 2012 is still very illiquid.

As explained above, if the market is perfectly efficient then these are the carbon prices currently being priced into the forward power curve, although the different inclines of the two curves would suggest that we are not dealing with perfectly efficient markets here.

Whether forward carbon prices are being perfectly priced into forward power prices or not, and changes to EUA prices will nonetheless be reflected in the power price, and the point here is that we expect EUA prices to rise by the end of the year.

2010 EUAs should trade at EUR20/tonne by year end

As explained in our recent research report "May You Live in Interesting Times" (31 August 2010) and EU Carbon Markets section of this report, we expect EUAs to reach EUR20/tonne by year-end 2010, rising to EUR30/tonne by 2020 assuming a 4% cost of carry (Figure 6).

Figure 6: DB base-case EUA forward curve (EUR/tonne)

Source: Deutsche Bank; *For 2008 and 2009 the average realized price in each year is shown

With prompt EUA prices currently trading at EUR15.3/tonne this would imply an increase of EUR5/tonne by year end. In turn, if this were then fully reflected in the power price, this would imply an increase in power prices of EUR3-4/MWh, depending on whether the price setting fuel were coal or gas.

In short, most of the key drivers of German power prices point to stable prices over the next 12 months, but our view on the outlook for EUAs leads us to conclude that the German baseload contract could rise by EUR3-4/MWh over the next three to six months, implying upside of up to 8%.

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Appendix 1

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