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Carbon Emissions

The Crying of Lot 2013: Phase-3 Auctions and the EUA Price outlook

Economics

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Despite continuing weak macro outlook, 2013 shortfall could support EUAs
We have downgraded our ETS emissions forecasts for 2009-12 to take account of an even weaker EU economy in H2 of 2009 than previously assumed. We see moderate downside risk to EUAs until mid-February, but think that thereafter utility buying could see prices revert to €15-16/t by mid-year. This is because generators will have to hedge increasing amounts of 2013 power sales this year, and with the auctioning of 2013 EUAs unlikely before Q3 2011 at the earliest, they will have to buy Phase-2 EUAs instead.

Downgrading estimates for 2009-12, but Phase-3 forecasts unchanged
We have downgraded our 2009 ETS emissions forecasts by 70Mt to 1,900Mt, and also trimmed our estimates for 2010-12 to reflect the lower base from which the recovery we are assuming in our model will now be taking place. However, we have left our estimates for 2013-20 unchanged. On our revised estimates, Phase 2 of the ETS will now be long by +260m EUAs (+115m previously) assuming that all the allowances in the new-entrants reserve (NER) come to market over this period. After taking into account the allowed maximum use of CERS/ERUs, this means that for Phases 2 and 3 combined we now derive an average residual abatement requirement over 2008-20 of -30Mt p.a. (-42Mt previously).

Moderate downside risk in the short run, but no repeat of Q1 2009 ...
We would not be surprised to see some selling of industrial companies' EUA surpluses over the next month, and some speculative selling of EUAs ahead of the allocation of the 2010 quotas in mid-February is also a possibility. Against this backdrop, we think the price risk for EUAs in the very short term remains to the downside. That said, we would not expect prices to come under anything like the same pressure as witnessed over the same period last year, when the impact of the credit crunch on industrials' working-capital positions compounded the weak economic outlook. Furthermore, the abnormally cold start to 2010 will help support short-term prices in our view.

... and incumbent generators are still very short EUAs over Phase 2 ...
Although on our revised estimates Phase 2 is +260m EUAs long if the full NER comes to market, incumbents are still short. If we take all ETS incumbents together, the average EUA deficit on our revised estimates is -10m p.a. over Phase 2 (-40m p.a. previously). However, if we consider only incumbent generators, the average EUA deficit is -148m p.a. (-167m p.a. previously). This means that the timing of the release of surplus NER allowances to the market could have a significant bearing on EUA pricing, and we would not expect the majority of surplus NER allowances to be sold into the market until late 2011 or 2012.

... and will have growing demand to hedge 2013 power sales over 2010
Power generators (and particularly German generators) will be selling increasing amounts of electricity forward into 2013 over the course of this year, and we do not think the first 2013 EUAs will be auctioned until Q3 2011 at the earliest. In our view, this means that German generators will have to hedge their 2013 carbon exposure via the purchase of Phase-2 EUAs (primarily the 2012 vintage), which in turn should support prices across the curve. As a result of this demand from German generators, we would expect the Dec-10 EUA contract to revert to the level of €15-16/t by the beginning of Q3, and to remain comfortable at this level over H2 of this year before rising further over 2011 and 2012 in line with our longer-term valuation methodology.

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All prices are those current at the end of the previous trading session unless otherwise indicated. Prices are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is sourced from Deutsche Bank and subject companies. DISCLOSURES AND ANALYST CERTIFICATIONS ARE LOCATED IN APPENDIX 1. MICA(P) 106/05/2009

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The Crying of Lot 2013

Revised estimates: Phase 2 now +260m EUAs long in total

Figure 1 shows our previous forecasts for reported ETS emissions over 2008-12 relative to the EUA cap, and Figure 2 our revised estimates for the same period.

Figure 1: Previous DB estimate of residual abatement required over Phase 2, EU-27 plus Norway & Liechtenstein (Mt)

	2008E	2009E	2010E	2011E	2012E
Total Average EUA CAP over Phase 2	2,086	2,086	2,086	2,086	2,086
ETS Reported Emissions	2,120	1,970	2,036	2,076	2,115
Gap to cap	-34	+116	+50	+10	-29
Average gap to cap			+23		

Source: European Commission, Deutsche Bank

Figure 2: Revised DB estimate of residual abatement required over Phase 2, EU-27 plus Norway & Liechtenstein (Mt)

	2008	2009E	2010E	2011E	2012E
Total Average EUA CAP over Phase 2	2,086	2,086	2,086	2,086	2,086
ETS Reported Emissions	2,120	1,900	2,006	2,046	2,095
Change versus previous estimates	0	-70	-30	-30	-20
Gap to cap	-34	+186	+80	+40	-9
Average gap to cap			+52		

Source: European Commission, Deutsche Bank

The main reason for the downgrades to our estimates is that Q3 and Q4 of 2009 look to have been even more difficult than we were previously forecasting in certain key industrial sectors (steel and cement in particular) in the EU, and this, in turn, will have fed through into even weaker industrial demand for electricity over H2 last than we were previously assuming.

Figure 3 shows the breakdown of 2008 verified ETS emissions by sector, together with our revised assumptions for 2009 ETS emissions. Overall, we now expect 2009 emissions to be 10% lower than the 2008 number (compared with 7% lower previously), with the biggest reductions occurring in the steel and cement sectors (-33% and -21% respectively).

Figure 3: DB revised estimated sectoral breakdown of emissions for 2009 compared with 2008 (Mt)

	2008	2009E	% change
Electricity	1,510	1,400	-7.30
Iron & Steel	135	90	-33.3
Cement	190	150	-21.0
Refineries	155	150	3.3
Other*	130	110	-15.4
TOTAL	2,120	1,900	-10.4

Source: CITL, Deutsche Bank; *the other sectors covered by the ETS are Coke, Metallic Ore, Glass, Ceramics, and Pulp & Paper.

The EU steel sector has suffered very badly in the global economic contraction that has occurred in the wake of the financial crisis of late 2008, and according to the latest production figures available from the World Steel Association, total EU output was down by 33% year on year as at 30 November 2008 (at 126.3Mt compared with 189Mt – for more details see <http://www.worldsteel.org/pictures/newsfiles/1109%20Production%20figures.pdf>).

The reduction in steel output has been fairly uniform across the whole of the EU, although at the extremes Belgian production was down 50% in the first eleven months of 2008 while Slovakian output fell by “only” 19%.

Given the scale of the full-year output reductions that we are now expecting in the steel and cement industries in particular, we are also now assuming a lower level of emissions from the European power sector in 2009. On our revised estimates, ETS emissions from the power sector in 2009 are over 7% lower than in 2008, at 1,400Mt compared with 1,510Mt in 2008.

As one of the worst affected countries by the global economic crisis, Spain's power emissions fell particularly sharply in 2009, and we expect the full-year decline in emissions from Spanish generators to be in the order of 18Mt based on the breakdown of the electricity-production data by fuel source to year-end 2009 shown by the Spanish grid operator (available at http://www.ree.es/operacion/comprobar_ines.asp?Fichero=07012010).

Similarly, we expect emissions from UK generators to be down by over 20Mt for the full year 2009 given that on our calculations the data for the first nine months already implies a reduction in UK generators' emissions of 18Mt by 30 September 2009 compared with the same period in 2008 (see the breakdown of UK power production by fuel source at (<http://www.decc.gov.uk/en/content/cms/statistics/source/electricity/electricity.aspx>)).

With the sharper reduction in emissions that we are now modelling for 2009, we have also reduced our estimates for 2010-12 (albeit by a smaller amount). This is to take account of the fact that the recovery we assume will begin in 2010 will be starting from a lower base. So, we have lowered our emissions forecasts for both 2010 and 2011 by 30Mt, and for 2012 by 20Mt.

This means that after a 10% reduction in 2009, we are now expecting a year-on-year increase in ETS reported emissions in 2010 of 5.5%, and then 2% per year in 2011 and 2012.

However, given the dramatic contraction in 2009 emissions, it is sobering to realize that even allowing for the recovery in economic growth over 2010-12 that our revised forecasts assume, our new full-year emissions estimate for 2012 of 2,095Mt is 25Mt lower than the 2008 number of 2,120Mt, and 152mt lower than the equivalent 2007 number of 2,247Mt.

Overall, our revised estimates project that total emissions over the 2008-12 trading period will be 150Mt lower than we were previously assuming, at 10,167Mt versus 10,318Mt before. As a result, we are now expecting the total EUA surplus over 2008-12 to be +260Mt (+115Mt previously), or +52Mt per year on average (+23Mt previously).

We now see an average residual abatement requirement of 30Mt p.a. over 2008-20

Given the bankability of Phase-2 EUAs into Phase 3, we have consistently argued that market participants should not look at Phase 2 in isolation but rather at the overall supply-and-demand situation for Phases 2 and 3 combined (see in particular our in-depth research reports *Banking on Higher Prices* from 23 July 2007, and *It Takes CO2 to Contango* from 30 May 2008).

In this respect, the impact of the downgrade to our emissions forecasts over 2009-12 is less dramatic when viewed over the entire 2008-20 period.

Accordingly, Figures 4 and 5 show the net EUA position of all ETS participants over Phase 2 and Phase 3 respectively, with the final line in each of these tables showing the average net annual EUA deficit for the ETS as a whole over the two phases combined.

Figure 4: Revised DB estimate of residual abatement required over Phase 2, EU plus Norway & Liechtenstein (Mt)

	2008	2009E	2010E	2011E	2012E
Total Average EUA CAP over Phase 2	2,086	2,086	2,086	2,086	2,086
ETS Reported Emissions	2,120	1,900	2,006	2,046	2,095
<i>Change versus previous estimates</i>	0	-70	-30	-30	-20
Gap to cap	-34	+186	+80	+40	-9
Average gap to cap over Phase 2 alone			+52		
Average gap to cap over 2008-20			-125		

Source: European Commission, Deutsche Bank

Figure 5: Unchanged DB estimate of residual abatement required over Phase 3, EU plus Norway & Liechtenstein (Mt)

	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Total Average EUA CAP over Phase 3	1,854	1,854	1,854	1,854	1,854	1,854	1,854	1,854
ETS Reported Emissions	2,135	2,137	2,121	2,106	2,076	2,062	2,048	2,023
Gap to cap	-281	-283	-267	-252	-222	-209	-195	-169
Average gap to cap over Phase 3 alone				-235				
Average gap to cap over 2008-20				-125				

Source: European Commission, Deutsche Bank

So, while our revised estimates for 2008-12 in Figure 4 show that Phase 2 in isolation is long by an average of +52m EUAs per year, after taking into account our unchanged emissions forecasts for 2013-20 shown in Figure 5 (which result in a net average deficit of EUAs for the ETS over Phase 3 of -235m per year), we derive an average net EUA deficit over the entire 2008-20 period of -125m EUAs per year.

However, the true impact of the downgrade to our emissions forecasts over 2009-12 can only be gauged by looking at the effect it has on our average annual residual abatement requirement over 2008-20. This is the number we derive after considering not only the net EUA position of ETS participants over 2008-12, but also the impact of higher levels of renewable-energy production and energy-efficiency over time, and the allowed use of CERs/ERUs in the ETS. We also need to take into account the impact of the aviation sector on the demand for EUAs.

Figure 6 summarizes all these factors to derive our new average residual abatement requirement over 2008-20. Given that the only variable we have changed in our model is the level of emissions over 2009-12, we now project an average residual-abatement requirement in the ETS over Phases 2 and 3 combined of -30Mt per year, compared with -42Mt per year previously.

Figure 6: Previous & revised DB ETS residual abatement requirement, 2008-20 (Mt)

	Previous estimate	Revised estimate	Comment
Total EUA cap over 2008-20	25,263	25,263	Unchanged
Total EUA deficit over 2008-20	-1,765	-1,615	Impact of downgrades to our 2009-12 estimates
Aviation net EUA demand	-390	-390	Unchanged
ETS use of CERs/ERUs	+1,610	+1,610	Unchanged
Residual abatement requirement	-545	-395	Assumes full NER come to market
Implied annual residual abatement requirement	-42	-30	Assumes full NER come to market

Source: Deutsche Bank

Although this is a meaningful reduction, we still expect the ETS to be short over the entire 2008-20 period by an average of -30Mt pr year, and this shortfall will have to be made up via fuel switching in the power-generation sector, such that the price of EUAs today should in theory – i.e. in a rational and efficient market – reflect either the long-run or the short-run

marginal cost of displacing coal with gas (see our Carbon Valuation section on Page 11 below for more details on this point).

However, and as we have explained in previous research reports (see in particular our in-depth study of 23 February 2009, *The ETS Review: Unfinished Business*), the EU-ETS is not yet in our view a rational and efficient market.

As a result, we think the larger surplus of EUAs that we are now projecting over Phase 2 could weigh on prices in the short run as industrials look to monetize some of their surplus allowances from 2009 now that the year is over and as speculative players position themselves for the allocation of 2010 quotas in mid-February.

That said, there are two reasons why we think EUA prices should recover from the beginning of Q2 this year and remain well supported over the second half of the year:

- (i) Although on our revised estimates Phase 2 is +260m EUAs long if all allowances in the NER ultimately come to market, incumbents are actually still short over Phase 2.
- (ii) Power generators (and particularly German generators) will be selling material amounts of electricity forward into 2013 over the course of this year, and will have to hedge their 2013 carbon exposure in 2013 via the purchase of Phase-2 allowances (primarily the 2012 vintage). This should support prices across the curve.

Below we consider each of these points in turn.

But incumbents are still short EUAs over Phase 2

We estimate that the NER in the ETS over Phase 2 averages 82Mt per year, and that in 2008 only about one quarter of this amount was allocated, with the rest held back in the NER either for distribution to new entrants in later years or for selling back to incumbents at the end of Phase 2. So, while the total cap over 2008-12 averages 2,086Mt per year the amount actually allocated in 2008 was only 2,024Mt, with the difference held back in the NER.

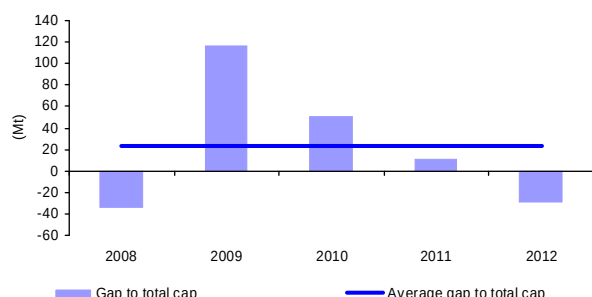
Figure 7 shows our previous estimate of the net EUA position of ETS incumbents over 2008-12 as set out in our report *How Long Is a Piece of String?* of 26 May 2009 (incumbents here being defined as the installations already up and running as of 1 January 2008 plus those installations that received allowances from the NER in the course of 2008). As can be seen, on our previous estimates, we were forecasting that incumbents would have an average net EUA deficit of -40Mt per year over 2008-12.

Figure 7: Previous DB estimate of ETS incumbents' net EUA position over 2008-12 over Phase 2 (Mt)

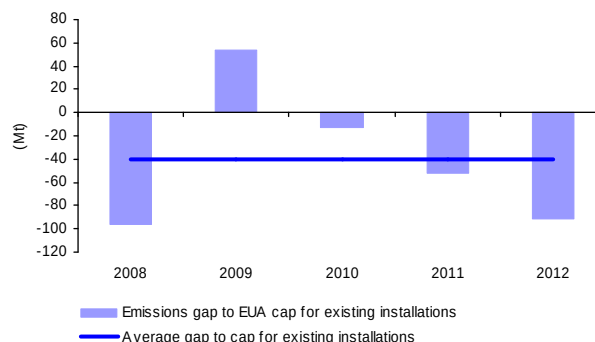
	2008E	2009E	2010E	2011E	2012E
ETS Reported Emissions	2,120	1,970	2,036	2,076	2,115
Average EUAs actually allocated to installations	2,024	2,024	2,024	2,024	2,024
Emissions gap to EUA cap for existing installations	-96	54	-12	-52	-91
Average gap to cap for existing installations			-40		
Unused EUAs in NER	+60	+60	+60	+60	+60

Source: European Commission, Deutsche Bank

Figures 8 and 9 then show diagrammatically the contrast between the position of the ETS on our previous estimates assuming all EUAs in the NER were ultimately to come to market over 2008-12 (Figure 8), and the position of incumbent installations only (Figure 9).

Figure 8: Previous DB estimate of annual average EUA surplus over Phase 2 if full NER used (Mt)

Source: Deutsche Bank

Figure 9: Previous DB estimate of annual average EUA deficit of incumbents over Phase 2 (Mt)

Source: Deutsche Bank

On our previous estimates, then, we were projecting that while the ETS in Phase 2 would be long by an average of +23Mt per year if all the allowances in the NER were to come to market, incumbents would be short by an average of -40Mt per year unless and until these spare allowances in the NER were sold back to incumbents.

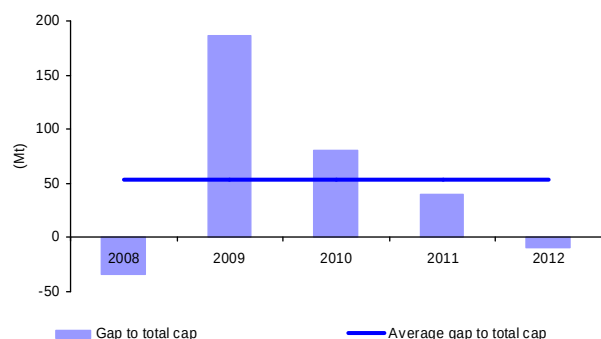
On our revised estimates, we project that ETS incumbents will still be short over Phase 2, but by a smaller amount of only -10Mt per year (Figure 10).

Figure 10: Revised DB estimate of incumbents' net EUA position over 2008-12 over Phase 2 (Mt)

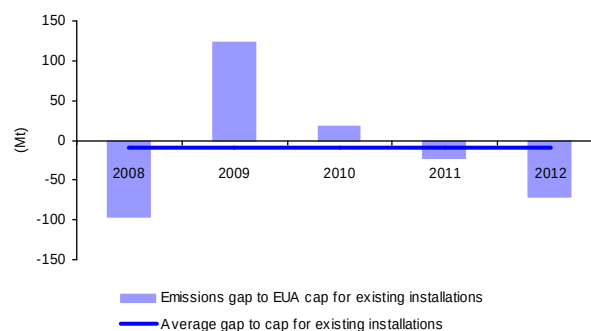
	2008E	2009E	2010E	2011E	2012E
ETS Reported Emissions	2,120	1,900	2,006	2,046	2,095
Average EUAs actually allocated to installations	2,024	2,024	2,024	2,024	2,024
Emissions gap to EUA cap for existing installations	-96	124	18	-22	-71
Average gap to cap for existing installations	-10				
Unused EUAs in NER	+62	+62	+62	+62	+62

Source: European Commission, Deutsche Bank

Figures 11 and 12 then show diagrammatically the contrast between the position of the ETS on our revised estimates assuming all EUAs in the NER were ultimately to come to market over 2008-12 (Figure 11), and the position of incumbent installations only (Figure 12).

Figure 11: EUA surplus over Phase 2 if full NER used

Source: Deutsche Bank

Figure 12: EUA deficit of incumbents over Phase 2

Source: Deutsche Bank

On our revised estimates, then, we are projecting that while the ETS in Phase 2 will be long by an average of +52Mt per year if all the allowances in the NER come to market, incumbents will still be short by an average of -10Mt per year unless and until these spare allowances in the NER are sold back to incumbents.

So, despite the downgrades we have made to our estimates over 2009-12, if we measure ETS emissions against the EUA allocations to the installations actually emitting (rather than against the total EUA cap including the full NER), the market is still short EUAs.

And incumbent generators will have a much bigger average deficit of -148Mt p.a.

Figure 13 shows our revised estimate of how we would expect the decline in emissions over 2009-12 relative to 2008 to break down between the different sectors.

Figure 13: Revised DB estimate of change in ETS emissions over 2009-12 relative to 2008 (Mt)

	Decline in ETS Emissions versus 2008	o/w assumed change in generators' emissions versus 2008	o/w assumed change in other sectors' emissions versus 2008
2009	-220	-110	-110
2010	-114	-50	-64
2011	-74	-20	-54
2012	-25	-10	-15

Source: Deutsche Bank,

Figure 14 then shows what this means for our estimate of the aggregate net deficits for the power sector on the one hand, and all the other sectors combined on the other after taking into account the changes in their emissions relative to 2008 shown in Figure 13 above.

Figure 14: Revised DB projected aggregate net position of different ETS sectors over 2008-12 (Mt)

	Power sector	All other sectors combined	NET ETS position before unused NER allowances	Unused NER allowances
Assumed net position in 2008	-186	+90	-96	+62
Implied net position in 2009	-76	+200	+124	+62
Implied net position in 2010	-136	+154	+18	+62
Implied net position in 2011	-166	+144	-22	+62
Implied net position in 2012	-176	+105	-71	+62
TOTAL OVER 2008-12	-740	+693	-47	+310

Source: Deutsche Bank

In this way, before taking into account any unused EUAs from the NER, we derive a total net deficit for ETS incumbents over 2008-12 of -47Mt, or -10Mt per year.

For incumbents in the power sector, however, the deficit is much greater than this. As can be seen, for incumbent generators, we derive a total net EUA deficit over 2008-12 of -740Mt, or -148Mt per year.

Of course, after taking into account the surplus of all the other sectors combined and the unused allowances in the NER there are more than enough EUAs to cover the deficit of incumbent generators, but this analysis demonstrates the importance for EUA prices of both (i) the extent to which incumbent industrials monetize their surplus Phase-2 allowances, and (ii) the timing of the sale into the market of the spare allowances in the NER.

Moreover, there is another element to consider that in our view will start to exercise an increasing influence on EUA prices over the course of 2010, particularly in H2. This is the fact that EU generators, and particularly German generators, will have to start hedging increasing amounts of 2013 power sales this year, but the first auctioning of 2013 allowances will likely not take place until Q3 2011 at the earliest.

The crying of lot 2013: German generators still key to prices

Figure 15 shows our unchanged estimate of the cumulative need on the part of German generators for Phase-3 EUAs by the end of 2012 to hedge forward power sales over the period 2013-16, as first set out in our report *The Long and the Short of It* of 5 May 2009.

Figure 15: Potential German power-sector demand for Phase-3 EUAs over 2010-12 (Mt)

	Amount of 2013 EUAs potentially required by year- end	Amount of 2014 EUAs potentially required by year- end	Amount of 2015 EUAs potentially required by year- end	Amount of 2016 EUAs potentially required by year- end	CUMULATIVE TOTAL
2010	107	32	0	0	139
2011	202	107	32	0	341
2012	288	202	107	32	629

Source: RWE, DB estimates

As can be seen, we estimate that German generators will need 139m Phase-3 EUAs by year-end 2010, 341m by year-end 2011, and 629m by year-end 2012.

Even allowing for the fact that generators in the UK, Italy, Spain and other western European countries sell a smaller proportion of their future output as far forward as the German generators, we think our reasoning would imply cumulative EU demand for Phase-3 allowances (including that of Germany) of at least 2x the German level: 278m by year-end 2010, 682m by year-end 2011, and 1,258m by year-end 2012.

Figure 16 shows our unchanged estimate of the potential cumulative EU demand for Phase-3 EUAs over 2010-12 based on this reasoning.

Figure 16: Potential cumulative EU-15 demand for EUAs over 2010-12 to hedge 2013-16 power sales (Mt)

	Cumulative amount of EUAs potentially required in Germany	Cumulative amount of EUAs potentially required in EU-15 as a whole (including Germany)
By year-end 2010	139	278
By year-end 2011	341	682
By year-end 2012	629	1,258

Source: RWE, DB estimates

This is clearly a very significant amount of allowances, and the 682m required by year-end 2011 would be more than twice the amount of unused EUAs left over in the NER by the end of Phase 2 (310m as per Figure 14 above).

Moreover, and again as explained in *The Long and the Short of It*, we think that the ETS installations with a net surplus of EUAs over Phase 2 may well require higher EUA prices to be incentivized to sell their surplus EUAs and then to swap out their CER/ERU quotas.

As a result, the supply of EUAs available to power companies to hedge their Phase-3 exposure over 2010-12 will depend (i) on the timing of the first auctions of Phase-3 allowances, and/or (ii) the price of Phase-2 EUAs (the higher the Phase-2 price, the greater the willingness of ETS installations with a surplus to make their excess allowances available to the market).

We do not expect 2013 EUAs to be auctioned before Q3 2011 at the earliest. As far as the timing of Phase-3 auctions is concerned, this will be subject to the outcome of the Comitology process. This began in 2009 and should be voted on in June 2010.

In addition to the legislative process, there is also the practical question of how the different national auctioning systems will interact with one another (the auctions will probably not be centralized at the EU level but will rather likely be the responsibility of individual or groups of Member States in the relevant jurisdictions).

As a result, Member States must agree how closely they want to co-operate in terms of auction design, allowed participants, timing and frequency, and so on. Depending on the level of co-operation ultimately achieved, it is conceivable that some Member States might begin their auctions before others.

Nonetheless, given the legislative and logistical issues to be debated over the next 12-18 months, we think it is unlikely that the first auction will happen before the end of 2011.

However if the auctioning of Phase-3 EUAs does not start until year-end 2011 then even if Member States are already auctioning back to incumbents unused EUAs from the Phase-2 NER by this stage (and in our view this is a big "if"), there will be a significant need for power generators – especially German power generators – to buy Phase-2 EUAs in the market in order to start covering their Phase-3 exposure.

Under this scenario, the EUA price would have to rise in order to attract ETS installations with surplus EUAs into (i) selling their excess Phase-2 allowances, and (ii) into swapping out more of their CER/ERU quotas in order to take advantage of the arbitrage opportunity offered by the spread against EUAs.

As a result, we would expect to see German generators looking to buy Phase-2 EUAs to cover their 2013 demand over the course of this year, especially from Q2 onwards. Accordingly, whilst we would not be surprised to see some price weakness in EUA prices until mid-February (when the 2010 allocations take place), we would then expect to see prices recover from Q2 2010 onwards.

Indeed, we would expect the Dec-10 EUA contract to revert to the level of €15-16/t by the beginning of Q3, and to remain comfortable at this level over the second half of the year before rising further over 2011 and 2012 in line with our longer-term valuation methodology.

Conclusion

We would not be surprised to see some selling of industrial companies' EUA surpluses over the next month, and some speculative selling of EUAs ahead of the allocation of the 2010 quotas in mid-February is also a possibility. That said, we would not expect prices to come under anything like the same pressure as witnessed over the same period last year, when the impact of the credit crunch on industrials' working-capital positions compounded the weak economic outlook. Furthermore, the abnormally cold start to 2010 will help support short-term prices in our view.

From Q2 onwards, power generators (and particularly German generators) will be selling an increasing amount of electricity forward into 2013, and 2013 EUAs will not be available for purchase on the market until Q3 2011 at the earliest.

In our view, this means that German generators will have to hedge their carbon exposure in 2013 via the purchase of Phase-2 allowances (primarily the 2012 vintage), which in turn should support prices across the curve.

As a result of this demand from German generators, we would expect the Dec-10 EUA contract to revert to the level of €15-16/t by the beginning of Q3, and to remain well supported at this level over H2 before rising further over 2011 and 2012 in line with our longer-term valuation methodology.

Carbon valuation

The theory behind our valuation

In theory, we think that the Phase-3 ETS cap agreed at the EU Heads of Government Summit last December is tight enough to imply an EUA price of €25-€30/t already in 2009. This is because expectations about a much tighter cap in Phase 3 will make Phase-2 allowances more valuable given that they can be carried over into Phase 3. In effect, the bankability of Phase-2 EUAs means that the shortage of EUAs foreseen by the market in Phase 3 should already be anticipated in Phase 2 (assuming the market is efficient).

In other words, bankability means that we have to consider the expected residual abatement requirement in Phases 2 and 3 together rather than separately. On our revised assumptions, the proposed Phase-3 cap results in an average residual abatement requirement within the ETS of 30Mt per year over the entire 2008-20.

If there is insufficient fuel-switching capacity in the EU to meet the required level of abatement in the ETS then today's EUA price should reflect the long-run marginal cost (LRMC) of carbon, this being the carbon price required to ensure that CCGT gas-fired plant gets built ahead of coal-fired plant. On our estimates, however, the full ETS shortfall of 30Mt per year could in theory be met via existing plant across the EU, and if this were to happen the price of EUAs would be set by the short-run marginal cost (SRMC) of fuel switching rather than the LRMC, unless the SRMC of abating 30Mt per year were greater than the LRMC of building new capacity.

Given the volatility of commodity prices over the last 18 months, estimating both the LRMC and the SRMC of fuel switching is very difficult at the moment. At this time, however, we see no reason to change our long-run commodity-price forecasts as set out in our report of 15 October 2008, *Emissions in Remission*. Our LRMC analysis would therefore still indicate a fundamental value for EUAs of €30/t already in 2010, rising thereafter at the cost of carry (we use 4% to derive a 2020 EUA fair value of €48/t), should the building of new capacity be necessary to meet the cap.

The SRMC changes constantly in response to the prompt prices of oil, gas, and coal, but we estimate that to abate 30Mt of CO₂ fuel switching would be required in both Spain and the UK. Given that the UK's CCGT fleet is on average older and less efficient than Spain's, then even with oil and gas prices having fallen so dramatically in recent months we calculate that a price in the range of €25/t-€30/t would be necessary to achieve this in the short run (assuming coal prices of \$80/t-\$90/t, and an oil price of \$50/bbl or higher).

Risks to our valuation

In practice, we think that market inefficiencies could keep EUA prices significantly below our theoretical fair-value estimate throughout 2010 and the first half of 2011. In particular, with our forecasts showing Phase 2 viewed in isolation to be long of EUAs by an average of 52Mt per year, we think the EUA price will remain volatile and potentially vulnerable to any further deterioration in the EU economy beyond that already indicated in our forecasts.

Moreover, the outcome of the COP-15 conference in Copenhagen in December 2009 has in our view heightened the uncertainty over the continuation of the CDM and JI mechanisms beyond 2012, at least in their current forms. This could lead to increased volatility in CER/ERU pricing over 2010, and, indirectly, to greater volatility in EUA pricing as well.

Appendix A

Figure 17: Glossary of terms

Bankability/banking/bank	In the EU ETS context, the carrying over of carbon credits from one phase to the next (or sometimes used for the intra-phase year-to year transfer).
BBC	British Broadcasting Corporation
bbl	barrel
bn	Billion
°C	Degrees Celsius
CCGT	Combined-cycle gas turbine, a kind of gas-fired power-generating technology.
CDM	Clean Development Mechanism. Defined in article 12 of the Kyoto Protocol, CDM projects are undertaken in developing countries and are intended to meet two objectives: (i) to address the sustainable development needs of the host country, and (ii) to reduce/limit GHG emissions to generate emission credits that can be used to satisfy commitments of Annex-I Parties and thus increase their compliance options. Projects that limit or reduce GHG emissions generate CERs if approved by the CDM EB.
CER	Certified Emissions Reduction, a carbon credit generated by CDM projects.
CO ₂	Carbon-dioxide.
Comitology	The Commission has the task of implementing legislation on an EU-wide basis. In this context, the Treaty provides for the Commission to be assisted by a committee, in line with the procedure known as "comitology". The committees are forums for discussion, consisting of representatives from Member States and are chaired by the Commission. They enable the Commission to establish dialogue with national administrations before adopting implementation measures. The Commission ensures that measures reflect as far as possible the situation in each of the countries concerned. Relations between the Commission and the committees are based on models set out in a Council Decision, which gives Parliament the right to monitor the implementation of legislative instruments adopted under the co-decision procedure. Parliament can object to measures proposed by the Commission or, as the case may be, the Council if it considers them to be <i>ultra vires</i> .
Directive 2009/29/EC, or Revised ETS Directive	In the EU, the Directive amending Directive 2003/84/EC setting an Emissions Trading Scheme, the EU-ETS. Throughout this report we refer to this as "the revised ETS Directive".
EU	European Union.
EUA	European Union Allowance, being a type of carbon credit exclusively for use within the EU ETS.
ERU	Emissions Reduction Unit, a carbon credit generated by JI projects.
EU-ETS	European Union Emissions Trading Scheme, also referred to simply as "the ETS" in this report.
JI	Joint Implementation, a flexible mechanism defined in Article 6 of the Kyoto Protocol. It allows developed countries, or companies from those countries, to co-operate on projects to reduce GHG emissions and share the Emissions Reduction Units (ERUs). As JI projects occur in Annex-B countries, no new emissions units are generated.
LRMC	Long-run marginal cost.
M	Million
Mt	Million tonnes or Mega-tonnes.
p.a.	Per annum
Phase 1, Phase 2, Phase 3	Trading periods of the EU-ETS running from 2005 to 2007, 2008 to 2012, and 2013 to 2020 respectively.
SRMC	Short-run marginal cost.
t	Tonne.
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change.

Source: Deutsche Bank, UNFCCC

Appendix 1

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