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Promoting low-carbon technologies via carbon markets: the EU-ETS and CCS

Presentation by

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The policy objecives of the EU-ETS

- **The overriding objective of EU climate policy is to limit the increase in average global temperatures to <2°C above pre-industrial levels.**
- **The ETS is there to generate a 'clear, undistorted and long-term carbon price signal' and so help achieve this policy target.**
- **To this end, there are three main dimensions to the ETS' role:**

1. To help achieve the EU's 2020 GHG-emissions-reduction target
2. To promote CCS technology in the power sector such that it becomes the new entrant of choice by 2020
3. To help foster a genuinely global carbon market

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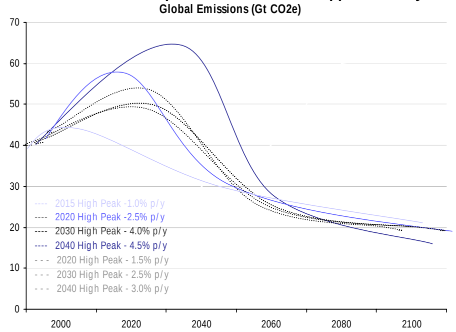
The importance of CCS

❖ **Stern and the centrality of power generation in fighting climate change**

Stabilizing GHG concentration levels at 450-550ppm CO2e, implying

- below 5Gt of CO2e/y (40Gt/y currently)
- -25% GHG emissions by 2050
  to stabilize at or below 550ppm
  -70% GHG emissions by 2050
  to stabilize at or below 450ppm
- disproportionately large share of the burden for achieving the required cuts will have to be borne by the power-generation sector

Illustrative emissions paths to stabilize at 550ppm CO2e by 2050



Source: Reproduced by the Stern Review based on Meinshausen, M. (2006): 'What does a 2°C target mean for greenhouse gas concentrations?"

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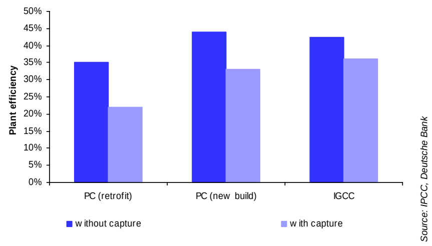
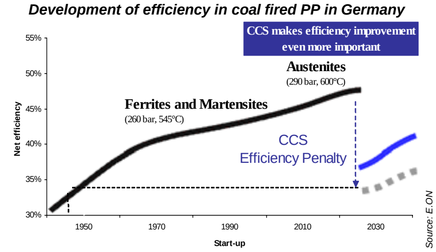
The Economics of CCS: Capture as the main cost-driver, efficiency rates crucial

Comparison of IGCC plants and PC plants in a CCS context



Development of efficiency in coal fired PP in Germany



- capture costs ~75-90% of the total incremental cost of a CCS plant relative to a conventional thermal station
- storage costs ~10-15%
- transportation costs ~ 5% over distances of <100km

Barriers to the development of CCS:

Barrier	Comment
Cost	Both capital and operating costs need to be reduced, with efficiency rates the key swing factor
Security	Is there an issue with leakage and who would bears responsibility?
Public opinion	Could take time to convince electorates of the need for CCS
Legal/regulatory issues	Maritime sea law/UNFCCC attitude need clarification

Source: Kema, 2007

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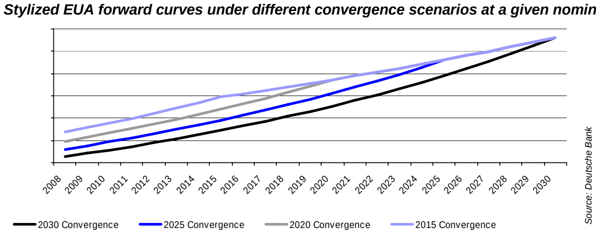
The EUA forward curve: contango is the norm

Convergence is the long-run marginal-cost curve for the ETS

→ the price implied today by the long-run abatement-supply curve represents a floor price

→ in a rational and efficient market the EUA price should never fall below this level

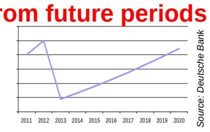
Stylized EUA forward curves under different convergence scenarios at a given nominal 2008 CCS price



The longer it takes the EUA price to reach the convergence trajectory:

- *the longer it will be before the signal is sent to incentivize investment in CCS*
- *the greater the amount of CCS capacity that will be required to meet the cap by the point of convergence*
- *the higher the cost of that capacity*

... but backwardation is possible because installations cannot borrow allowances from future periods into the current period => NOT a ceiling on today's price level



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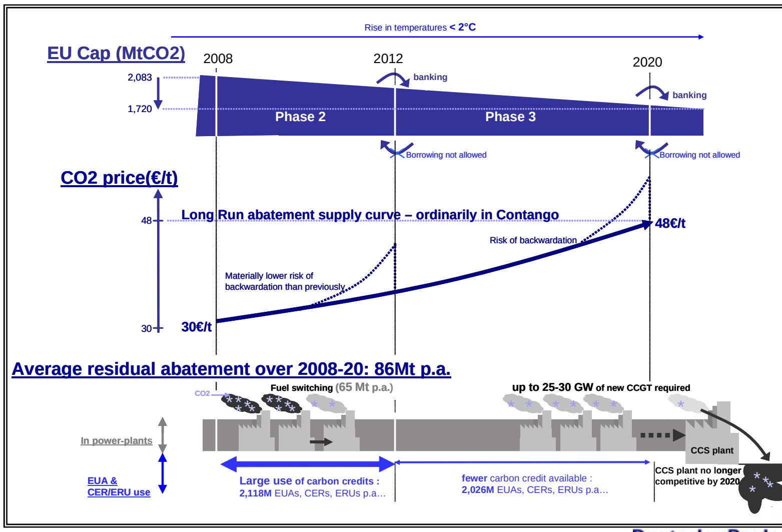
How the EUA forward curve would look if backwardation occurred at the end of Phase 2

We previously saw EUA fair value at €30/t on a LRMC basis



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But the recession has had a severe impact

Since December we have been factoring in a deeper EU recession over the next 12-18 months (impacting BAU and new renewable projects)

Revised DB estimates for Adjusted Emissions over Phase 2 (Mt)

	2008E	2009E	2010E	2011E	2012E
BAU emissions	2,165	2,054	2,074	2,116	2,158
Incremental CO2 savings from Energy-efficiency	*1*	*2*	*3*	*5*	*8*
Incremental CO2 savings from renewable energy	*16*	*31*	*40*	*40*	*40*
ETS Reported Emissions	**2,148**	**2,020**	**2,031**	**2,071**	**2,110**

Source: European Commission, Deutsche Bank

Revised DB estimates for Adjusted Emissions over Phase 3 (Mt)

	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
BAU emissions	2,191	2,213	2,224	2,235	2,246	2,257	2,268	2,280
Incremental CO2 savings from Energy-efficiency	*16*	*28*	*45*	*60*	*90*	*100*	*110*	*117*
Incremental CO2 savings from renewable energy	*45*	*55*	*65*	*75*	*85*	*95*	*110*	*140*
ETS Reported Emissions	**2,130**	**2,130**	**2,114**	**2,100**	**2,071**	**2,062**	**2,048**	**2,023**

Source: European Commission, Deutsche Bank

Revised DB estimates for adjusted emissions over Phase 2 versus pro-forma actual 2007 emissions (Mt)

	Pro-forma 2007E	2008E	2009E	2010E	2011E	2012E
ETS Reported Emissions	2,247	2,148	2,020	2,031	2,071	2,110
Change versus 2007 (Mt)	*n/a*	*-99*	*-227*	*-216*	*-176*	*-137*
Change versus 2007 (%)	*n/a*	*-4.4*	*-10.1*	*-9.6*	*-7.8*	*-6.1*

Source: European Commission, Deutsche Bank

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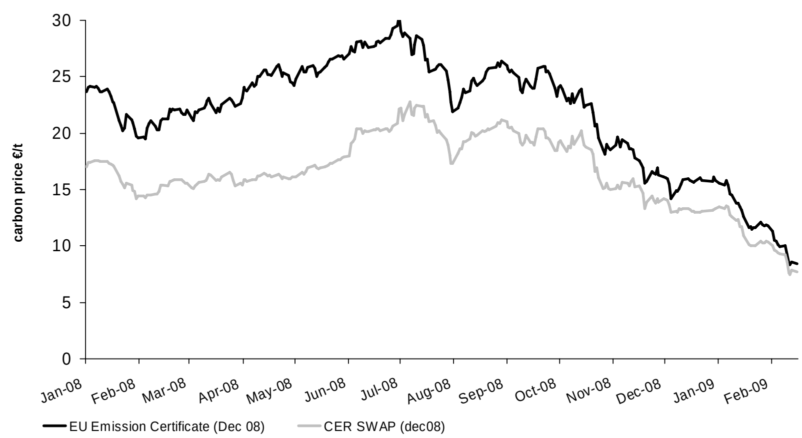
Price action in the ETS over 2005-07

Source: Datastream

Price action in Phase-2 EUAs and CERs since Jan 2008



Source: Datastream

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Why have EUA prices collapsed so much recently?

There are three main reasons why EUA prices have collapsed:

- **As a natural response to a fall in underlying ETS emissions**

  Given the sharp deterioration in the macro-economic environment, it is perfectly normal for the price to adapt to lower demand – this shows the flexibility of a market mechanism relative to a tax.

- **As a result of the fact that supply has been fixed long in advance**

  The ETS cap has been fixed until 2020, so suppply cannot react directly to the change in demand as it would in any other commodity market

- **As a result of the free allocation of EUAs over Phase 2**

  With lower demand for allowances, companies can sell the EUAs that they have been given free of charge and thereby raise cash (this is an issue for some companies because of the credit crunch)

Three ways auctioning might improve market efficiency

There are three dimensions to market efficiency, and auctioning might improve the current situation across all three dimensions:

- **STATIC EFFICIENCY**

  This is all about ensuring a the optimal short-term clearing price in the market

- **DYNAMIC EFFICIENCY**

  This is all about ensuring a long-term price signal is sent for the correct investment decisions to be made

- **ALLOCATIVE EFFICIENCY**

  This is all about ensuring the carbon price is fully reflected in end-user prices to ensure that consumers are faced with behavioural decisions

Static efficiency: clearing the market in the short run

- The free allocation of allowances to ETS operators means they effectively start off with a long position.
- This means that until their hedging systems tell them they need to buy for compliance purposes, they might not enter the market in size to buy the EUAs they need.
- As a result, there is a risk that the market will clear at a higher price than it would do if all operators had to buy 100% of their allowances from day one, because abatement opportrunities might be missed early on in the trading period which would then have to be made up susbsequently at higher cost.
- There is also the risk that many buyers come to the market at the same time to buy the marginal allowances they need, thereby creating a technical bull squeeze and increasing market volatility.
- In short, the free allocation of allowances distorts the short-run clearing price and thereby makes the market less efficient.
- AUCTONING WOULD IMPROVE STATIC EFFICIENCY

Dynamic efficiency: sending a long-run price signal

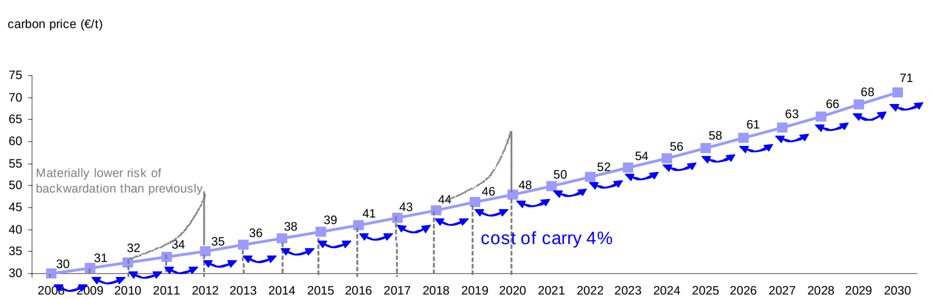
- Large industrial infrastructure typically has a very long capital-investment cycle, as such assets (e.g. power stations) last 30-40 years.
- This means that in order to make the right investment choices for the low-carbon economy of the future, the price signal today needs to be sufficiently robust that companies are dissuaded from investing in CO2-intensive infrastructure in favour of less CO2-intensive alternatives. In other words, the cost of carbon needs to be fully reflected in the new-entrant price – i.e. the long-run marginal cost – for the industries covered by the cap.
- However, if allowances are allocated free of charge, the full cost of carbon may not be reflected in today`s price, and the more CO2-intensive infrastructure might get built as a consequence. This would be bad not only from a carbon perspective, but also from an economic perspective, as the less CO2-intensive assets would ultimately still have to be built in order to meet the future cap.
- In short, the free allocation of allowances distorts the long-run price signal sent and thereby make the market less efficient.
- AUCTONING WOULD IMPROVE DYNAMIC EFFICIENCY

Allocative efficiency: changing consumer behaviour

- The free allocation of allowances to ETS operators means that the cost of carbon may not be reflected in the price of the industrial products of the companies subject to the cap.
- This means that consumers may not see any change in the cost of CO2-intensive products relative to less CO2-intensive alternatives, and hence that they will not have an incentive to change their consumption patterns.
- By contrast, if allowances were fully auctioned and the cost of carbon thereby passed on fully to consumers, the price of CO2-intensive products would increase relative to less CO2-intensive products, theeby providing an incentive for consumers to change their consumption patterns and reduce their carbon footprint.
- In short, the free allocation of allowances distorts consumer behaviour and thereby make the market less efficient.
- AUCTONING WOULD IMPROVE ALLOCATIVE EFFICIENCY

Over the longer term, it still takes CO2 to contango

… and ultimately, new power-generation capacity will probably still be needed, which implies a carbon price of €30/t already today based on a long-term oil price forecast of $85/bbl, and a long-term coal-price forecast of $125/t



Source: Deutsche Bank

Appendix 1

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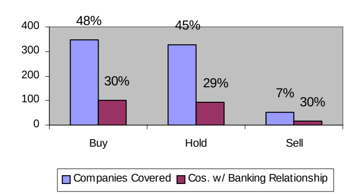

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