State and Trends of the Carbon Market 2006

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World Bank

Based on World Bank-International Emissions Trading Association study

San Antonio

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Methodology

This study is based on the following:

- Analysis of the **World Bank's confidential project database**,
- **IETA-led Survey of key market analysts**,
- **Interviews** with market players, and,
- A **review** of published literature.

Project database includes:

- **More than 750 project-based transactions** (ERPAs signed)
- Completeness of information >90% in all fields except on exact terms and price of transaction >60%

Aggregate data on allowance markets

- From **major exchanges and OTC sources**

Global Climate Change

- Scientists believe that the earth's atmosphere is warming at a faster rate than ever before and that this is partly caused by human activities that release carbon dioxide and related warming gases into the atmosphere.
- Emissions from combustion of fossil fuels for energy, transport and industry, agriculture, land use and forestry
- Increased concentrations of GHGs and the rate of temperature change are projected to cause **impacts**:
  - Changing precipitation patterns affect water, agricultural output
  - Higher sea levels affecting coastal zone development
  - Warmer oceans impacting fisheries, coral reefs and tourism
  - More frequent occurrence of extreme weather events
  - Higher likelihood of spread of vector-borne diseases (malaria)

Response to Climate Change

- Countries, including the U.S., signed and ratified the 1992 Rio Climate Convention (UNFCCC) with objective to reduce concentrations of GhGs to a level required to prevent "dangerous" warming
- As a First step to meet the above objective, the Kyoto Protocol requires industrialized countries to reduce their overall GhG emissions by an average of 5.2% from 1990 levels in 2008-2012. No specific obligation on developing countries

Carbon Finance: Concept

- Industrialized country obligations:
  - In some countries, emissions are up by 30% since 1990.
  - How would such countries reduce emissions by more than 1/3 by 2012
    - Shut down production by 1/3?
    - Mandatory energy efficiency at any cost?
    - Off-shore industrial jobs?
    - Tax all energy consumption?
  - In a globalized world economy this becomes an issue of trade competitiveness, especially for industrial sectors
- The KP allows "Flexible Mechanisms" for Compliance
  - OECD countries and companies regulated by them can meet part of obligations by "purchasing" carbon credits from projects overseas
  - This creates an opportunity for resources to flow from OECD sources to support clean and sustainable projects in Niger and elsewhere
  - Eligible Projects receive a multi-year hard currency revenue stream --- CARBON FINANCE – for verifiably reducing emissions
- Currently carbon finance buys credits until 2012 or so. The sooner projects can be identified, the more years of revenue they can earn

Mitigation and Sequestration

- Carbon projects can EITHER:
  - "Mitigate" climate change or reduce emissions. Examples:
    - Project to generate energy **from bagasse** in the sugar industry for own needs and to displace emissions from expensive **diesel** generators. Surplus electricity to provide energy access for neighboring trading posts, clinics, schools and local communities currently using **diesel, fuelwood or kerosene**
    - Project to demonstrate improved operating performance of utility by **reducing technical losses** and improving service as a precursor to privatization, **OR,**
  - Sequester carbon (Kyoto Protocol currently provides credit only for afforestation and reforestation activities). Examples:
    - Communities **planting and protecting trees on degraded lands**, creating carbon assets in Kenya and using carbon revenues to supplement incomes
    - Replanting on slopes of watershed. Carbon revenue helps secure other co-benefits e.g. **reduced siltation and improved hydrology**

Types of Carbon Projects

- Hydroelectric power offsetting the need for coal- or gas-fired generation
- Extending grid to reach customers currently using diesel or kerosene
- Reducing Transmission and Distribution losses and creating effective capacity that offsets the need for new fossil-based generation
- Reducing CO2 by and methane (a potent greenhouse gas) by generating energy and bio-fuels from sugar industry by-products -- bagasse and molasses
- Reducing methane by bio-digesting livestock wastes
- Extracting methane from landfills
- Extracting methane from composting organic waste in urban dumpsites
- Extracting methane from disposal of sewage sludge
- Capturing methane leaks from gas pipelines, tankers, coal mines
- Capturing N20, a powerful greenhouse gas, from fertilizer production
- Sequestering CO2 by tree planting, small plantations, land restoration

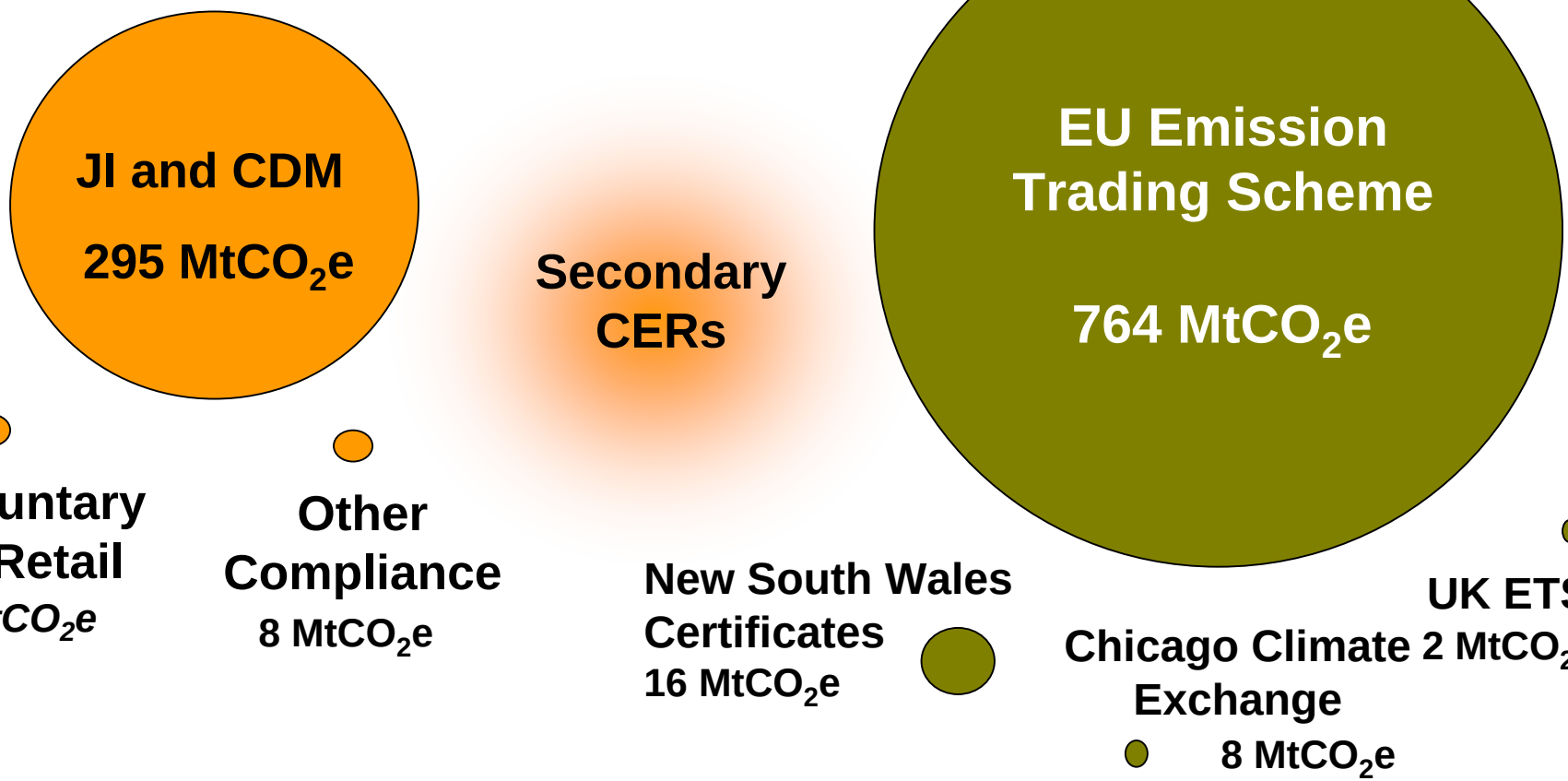
Structure of the Market 2006

Project-Based Transactions

Credible

C-asset

Allowance Markets



Carbon price signal emerges

- Constraint on carbon emissions under Kyoto and under the EU-ETS where regulated companies can no longer emit unlimited into the atmosphere
- Price signal from EU-ETS creates an incentive worldwide to innovate and compete to reduce emissions through clean development projects

Market Doubles to $22 billion

EUA transactions of US$19 billion recorded in 2006

- US$22 billion (2006 ytd) > US$11 billion (2005) mainly from EUAs
  EUAs physically exist already – minimal risk
- Trade goes well beyond physical trade of EUAs. Market value arises from trading EUAs: sale, re-sale for hedging, arbitrage + compliance
- EUA price signal (from EU compliance caps, interplay with European energy markets, regional weather) influences price of project-based
- Highly volatile market

Developing countries sell $3 billion credits in 2006

- Mainly forward transactions for credits likely be created in the future from projects that have risks
- First projects implemented and CERS are issued --- spot and secondary markets emerge
- China & India dominate; Africa share doubles
- Current and expected transactions likely to equal 2005 volumes
- Average contract prices up across all market segments
- Pricing so far linked to EUAs – how long will this last?
- When will demand from California, U.S. markets emerge?

Elements of Carbon Markets EU-ETS, RGGI *et al*

- **Highly Credible targets and comprehensive coverage**
  - **Adding sectors/gases covered can enable strong reduction targets. What level of reductions will EU ETS-II require?**
- **Longer-time horizons with shorter-term milestones**
  - **Regulatory certainty and time horizon required for making investments**
  - **California law has 2020 and 2050 targets; EU until 2012. ETS-3 for 2017?**
- **Flexibility**
  - **Encourage early reductions and allow banking within and across periods**
  - **U.S. RGGI has ability to extend compliance period for market by one year**
  - **U.S. RGGI allows 6 offset types with "prescriptive" rules, price "triggers"**
  - **Australian proposal allows offsets for avoided deforestation and CCS**
  - **EU-ETS currently limits access for afforestation and most LULUCF**
  - **Regimes allow for linkage to offsets from mandatory regimes. Will they discount them or limit the volumes allowed?**
- **Market transparency through quarterly reporting**
  - **Final Rule of U.S. RGGI requires quarterly performance reports**
- **Strong enforcement and penalties for non-compliance**
  - **EU-ETS has strong rules and Commission says it will enforce them**

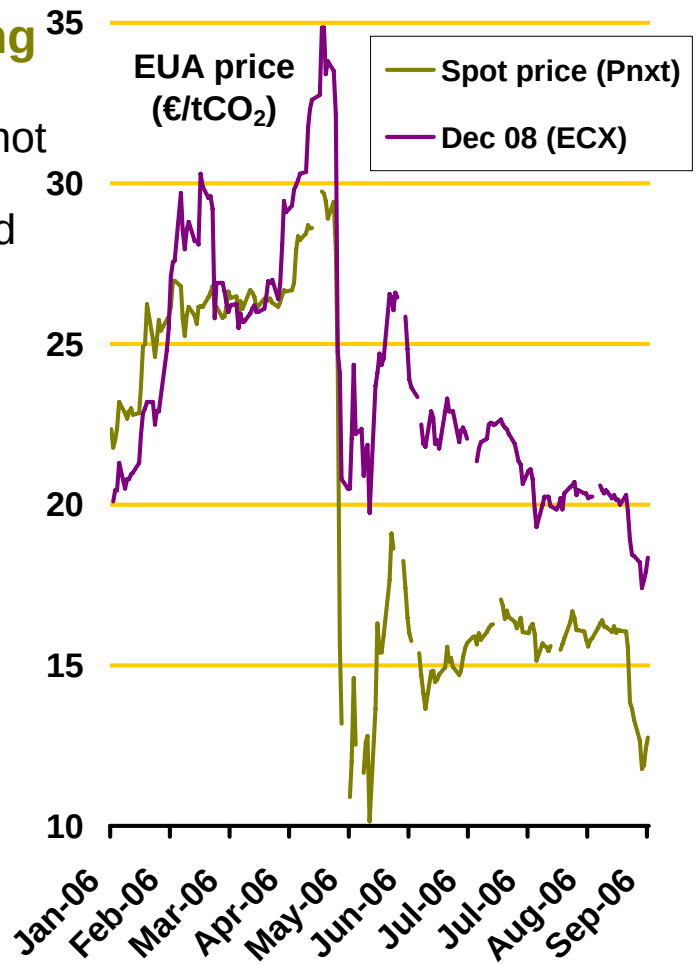
Demand Dynamics: EU-ETS

Selective IETA survey of market analysts shows a 90% probability for Ph 1 to be long and 80% probability that EUA < € 5

- Ph. I market may be long as a whole, but not all market participants are long.
- Compliance players buying Ph. I EUAs and banking CERs for Ph. II
- Traders continue to trade for risk management, hedging, arbitrage
- Fundamentals: EUA > hot, dry July; EUA spot < when gas prices < in Sept

Selective IETA survey of market analysts shows a 95% probability for Ph II to be short (avg. 700 MT) and that EUA > € 10

- Submitted NAPs2: Ph II EUAs > Ph I
- Eastern countries generally > caps
- Some countries propose to cover gases beyond CO2 or additional sectors
- Proposals to limit imports of CERs/ERUs range from 7% to 50% (supplementarity)



How will EU Commission respond?

Linkage between markets

Phase I EUA market is potentially long; faces price risk. Expectations for Phase 2 contribute to volatility as 08 vintages trade > spot

CER/ERU prices have broadly correlated with EUAs? Will this continue?

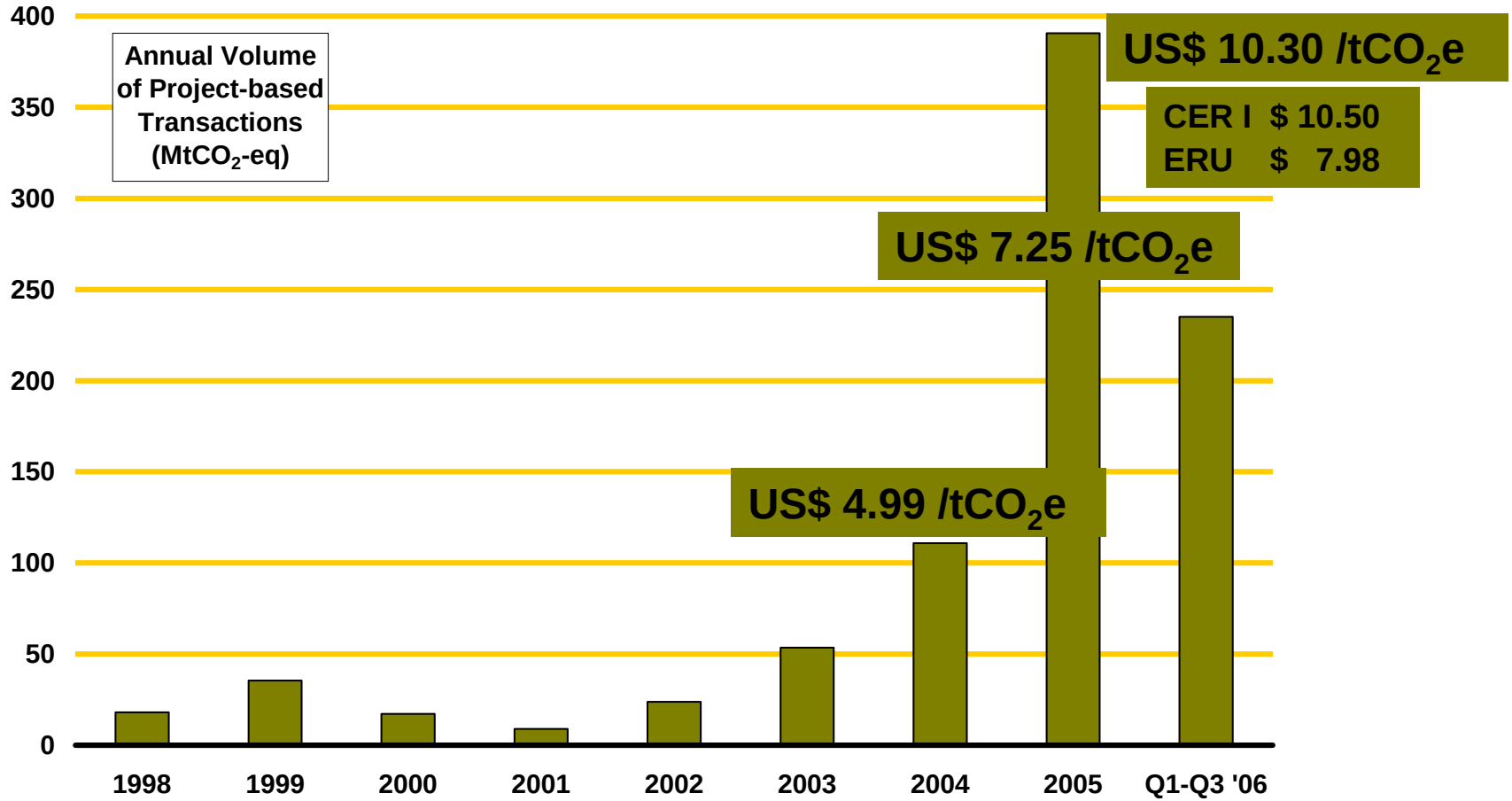
Will price for project assets withstand EUA volatility?

Will they respond to signals across markets i.e. Regional U.S. market, California?

Will CERs be priced independently of EUAs over time?

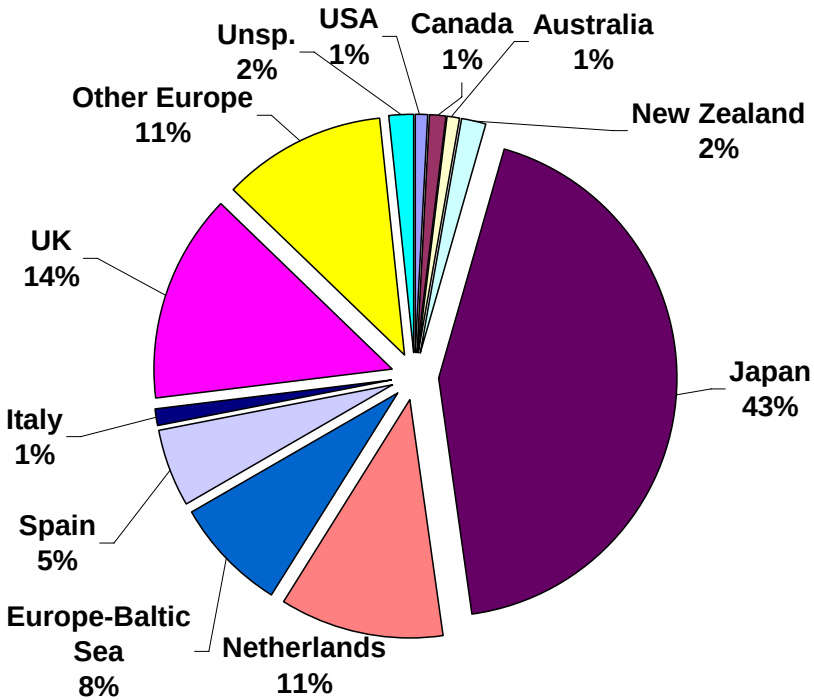
Project-based Credits:

Prices increase and volumes stabilize

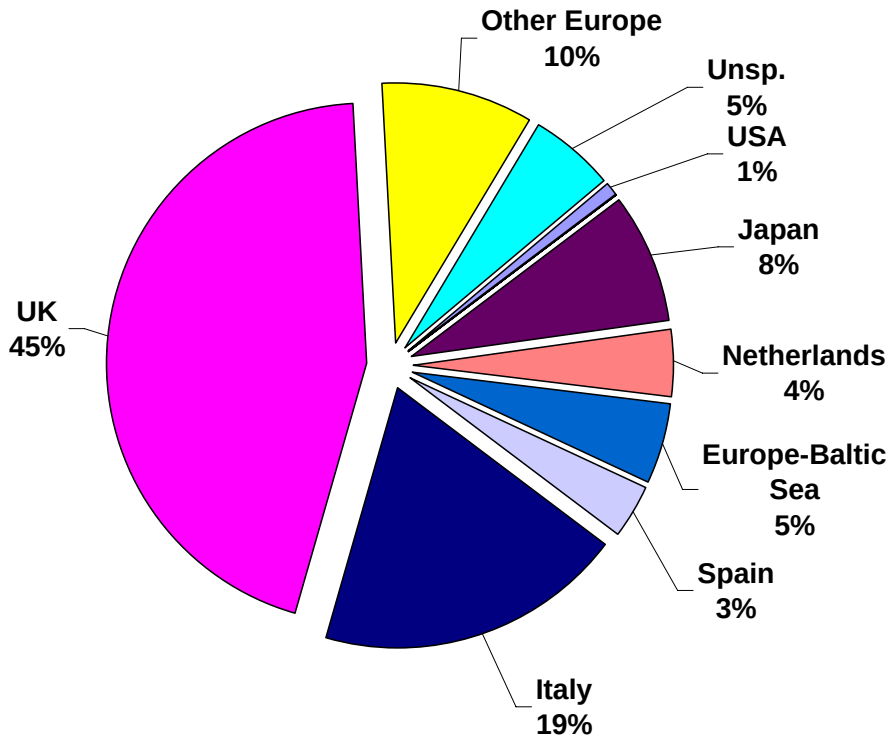


Market Share: Buyers Private firms from EU

(share in volume)



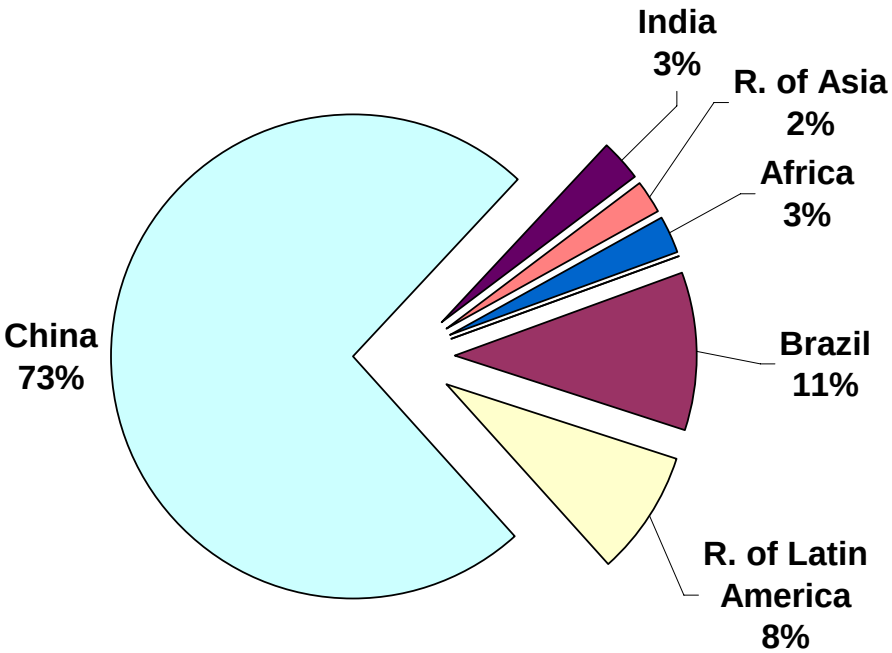
Jan. 2005 to Dec. 2005

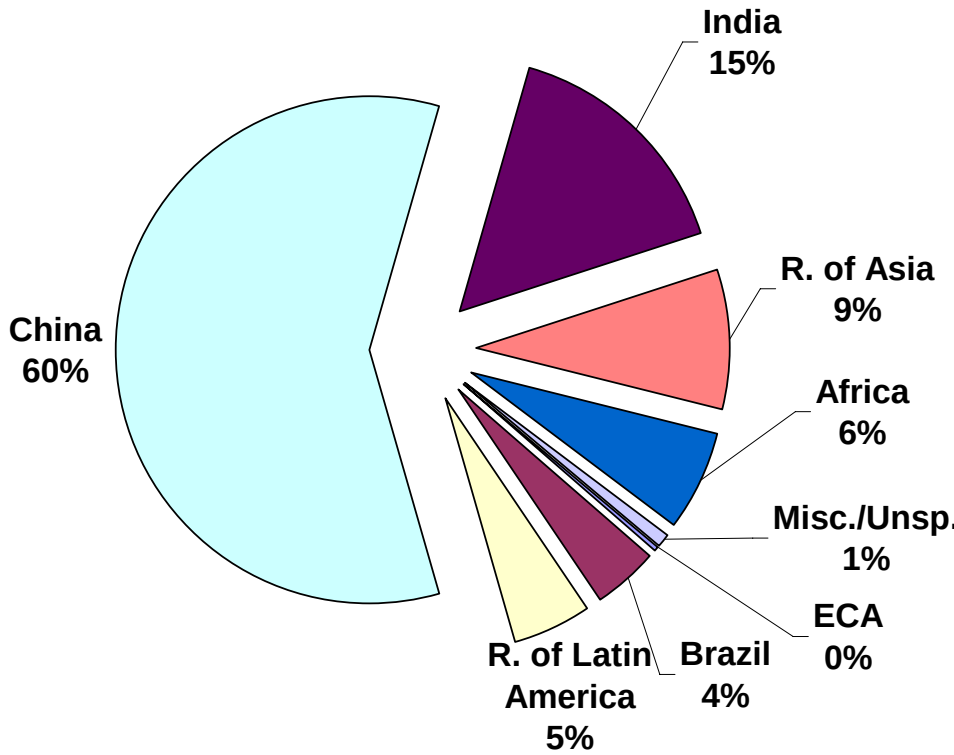


Jan. 2006 to Sep. 2006

Market Share: Sellers China & India

(share in volume)





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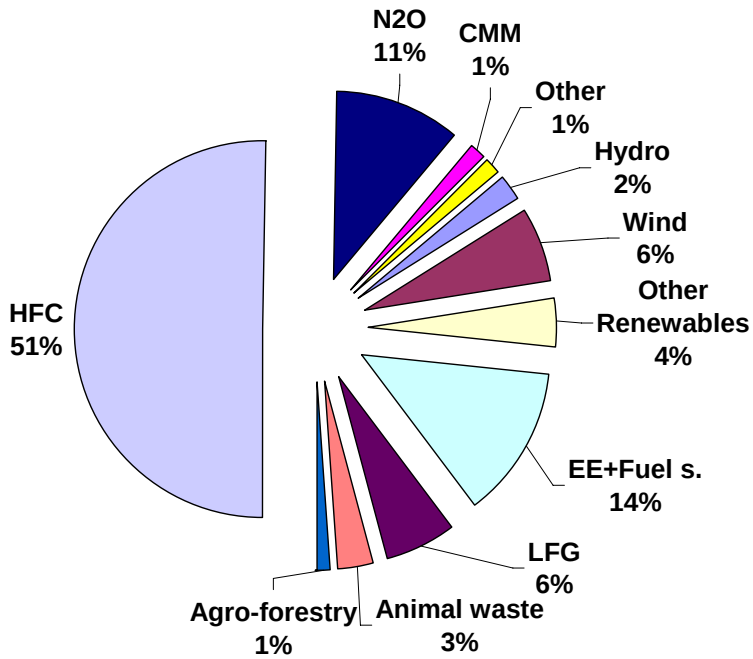
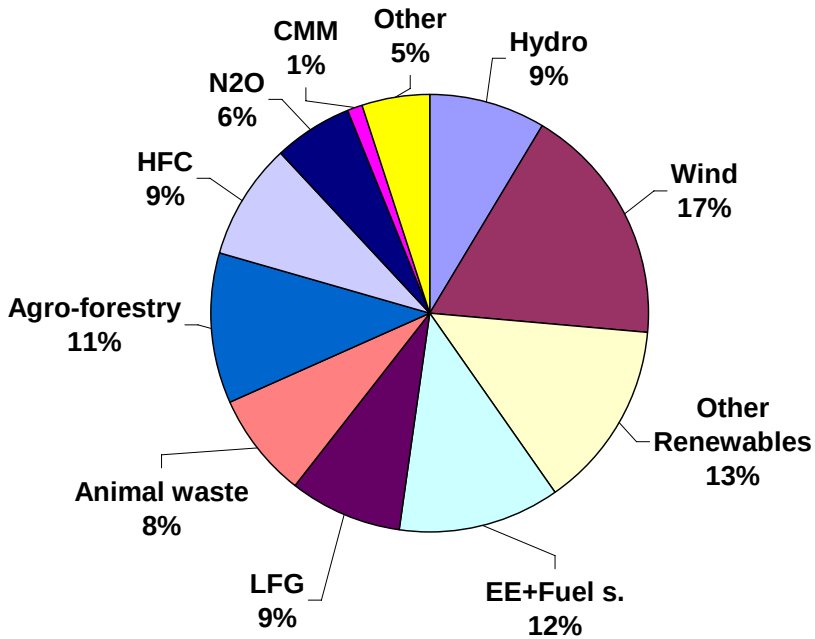
Market Share across CDM Asset Classes

Share in volume (2006, year-to-date)



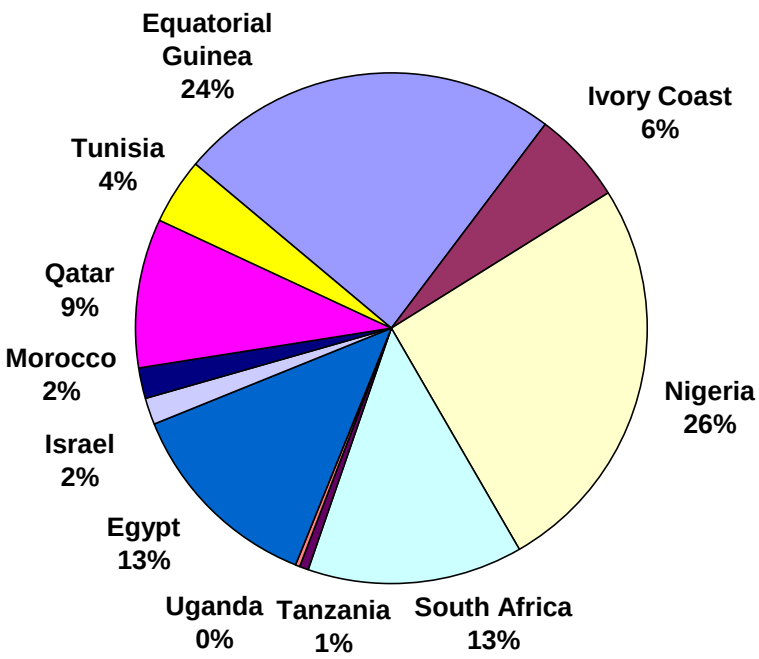
Share in number of projects (2006, year-to-date)



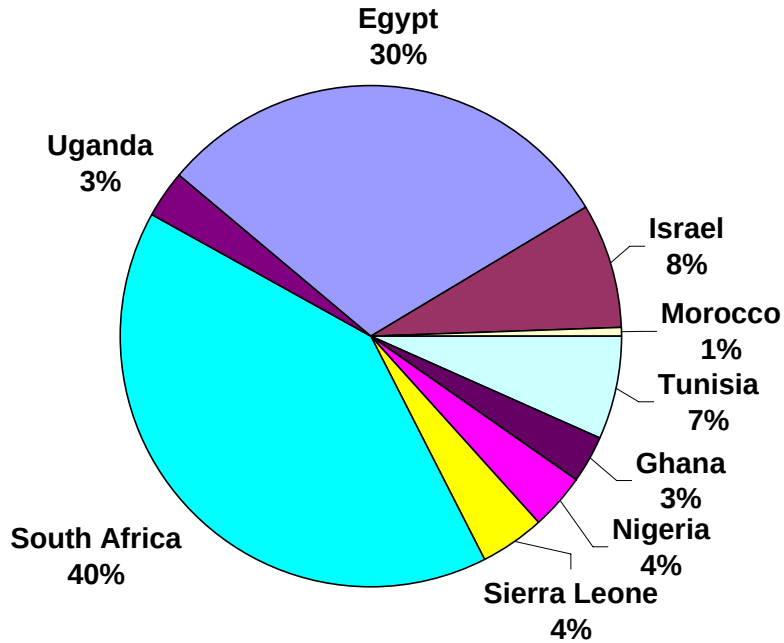
What's next? CC&S, Avoided deforestation?

Africa Market Share

Share in volume - project pipeline (2006, year-to-date)



Share in volume - transactions (2006, year-to-date)



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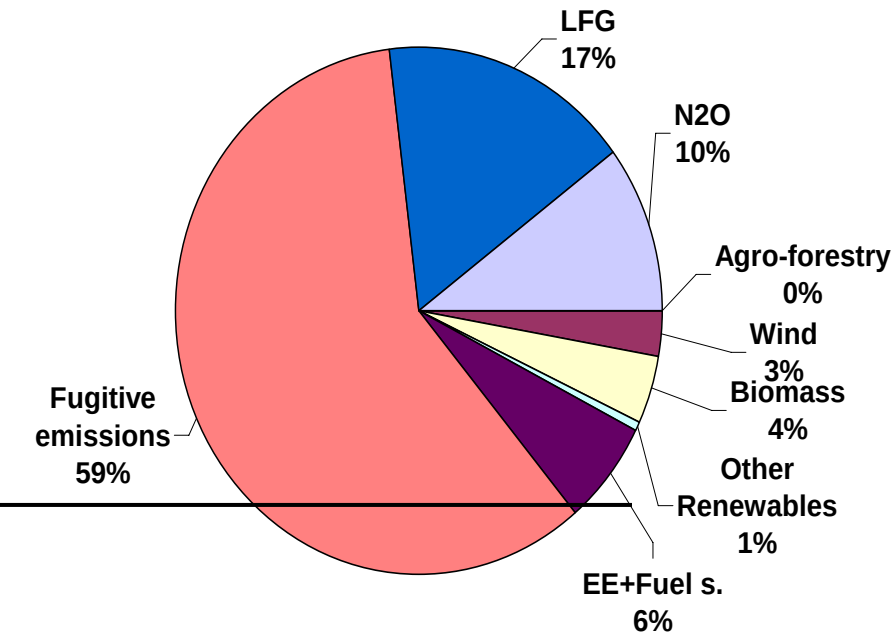
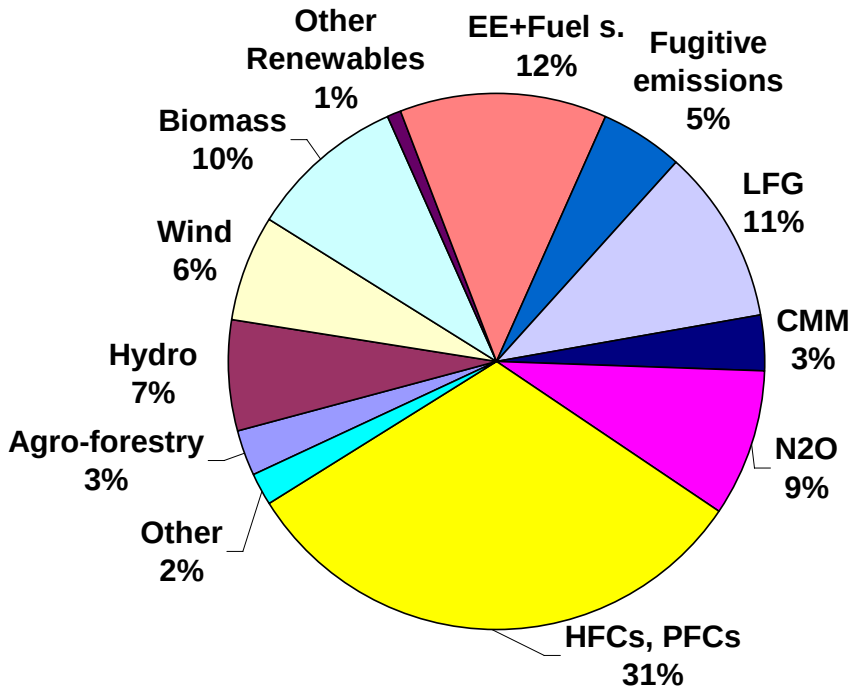
Africa CDM Pipeline: Asset Classes

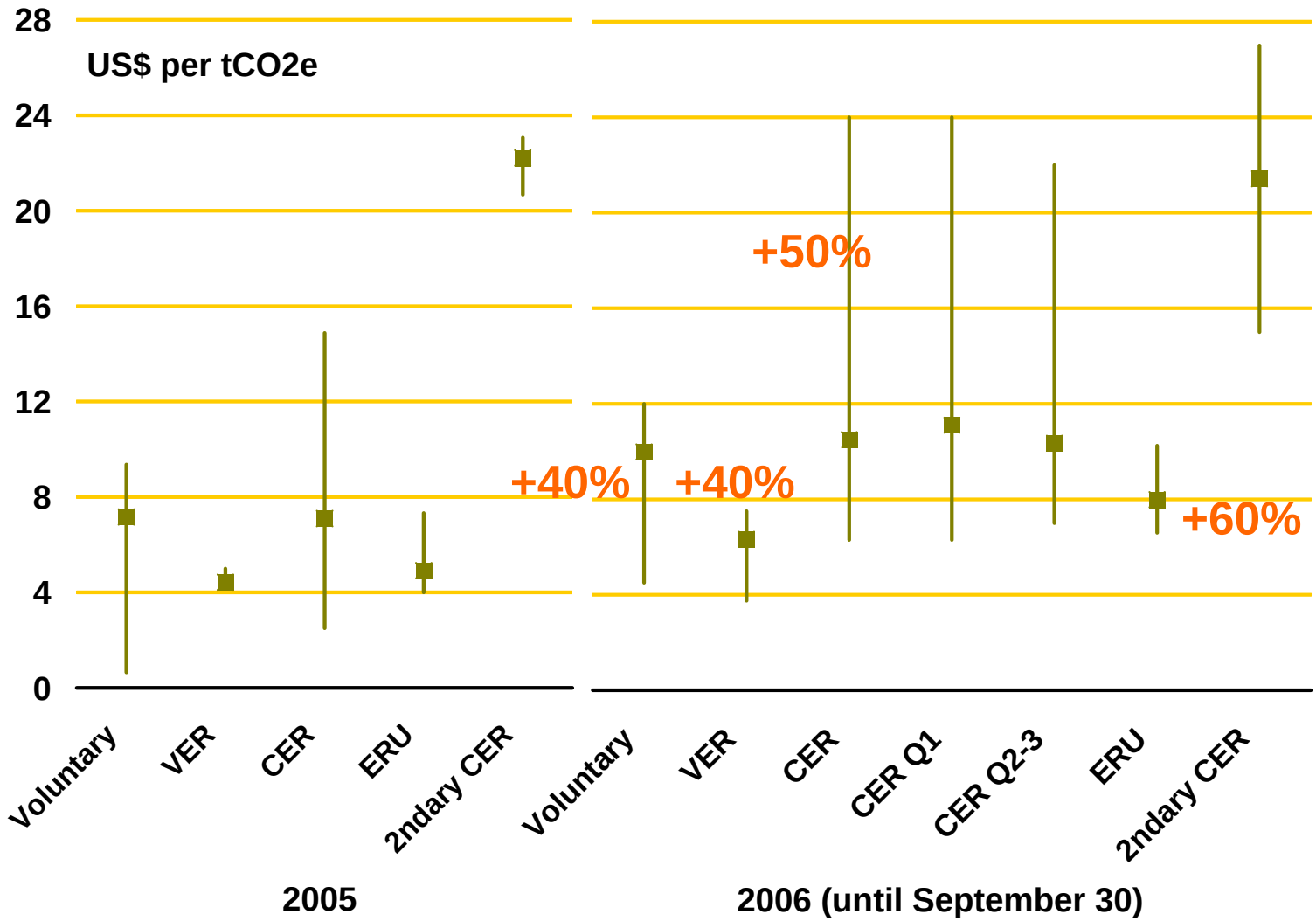
Africa Share in volume (2006, year-to-date)



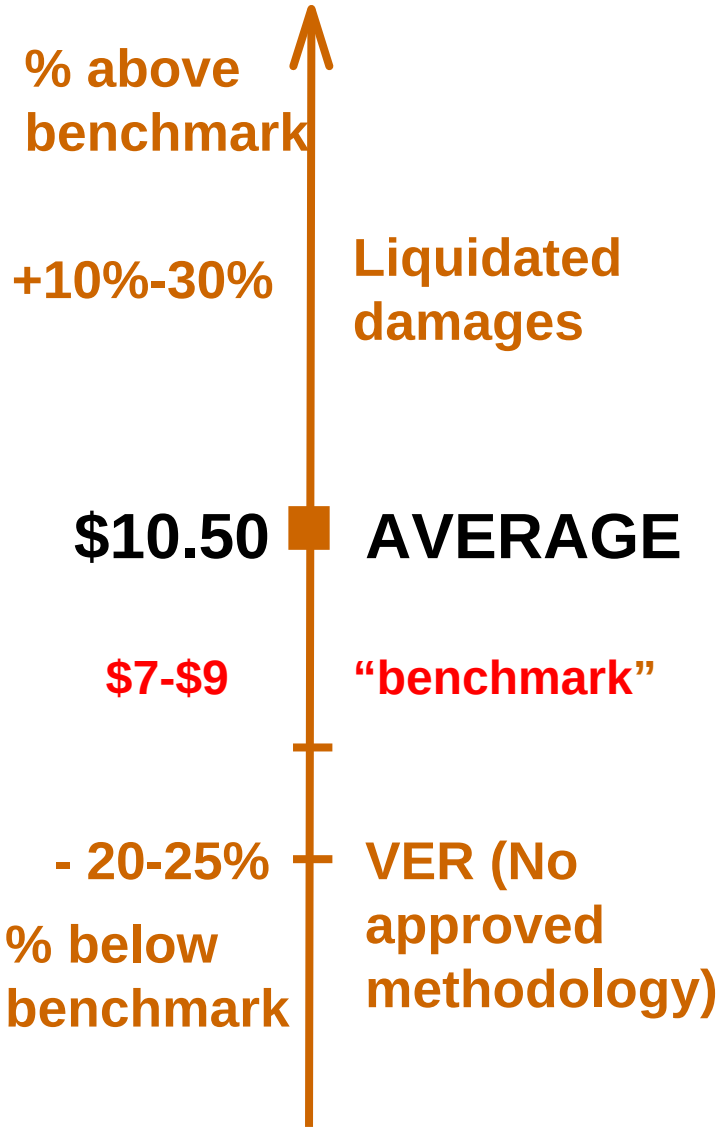
All CDM Share in volume (2006, year-to-date)



Prices: Up across the Board



Prices and CER contracts terms



Fixed forward primary CER transactions dominate

Buyers rely on due diligence more than sellers' guarantees for delivery

Upfront payments are rare and buyers rely on due diligence more than bank guarantees. Payments made on agreed milestones

Secondary markets emerge as more CERs are issue and as financial institutions reduce credit risk to offer "compliance" across projects

Managing risk through

- contracts for delivery of all generated, firm delivery, call options, prices discounted for under-delivery, requirement for replacement CERs
- portfolio management, cross-commodity trades
- emergence of insurance products

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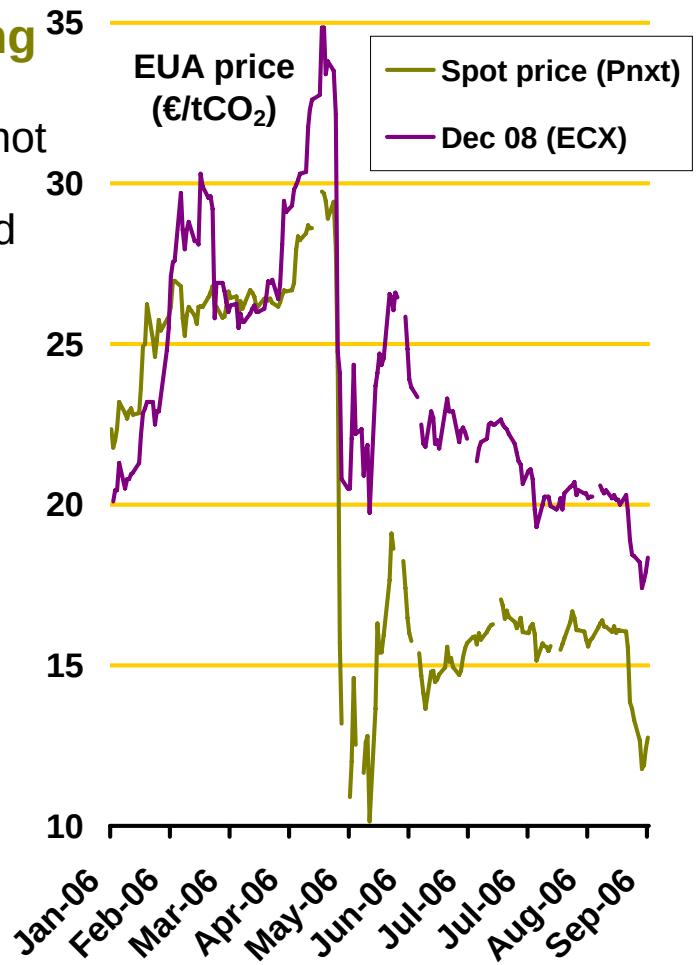

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Thank you

Full report available at

www.carbonfinance.org