

Carbon Markets and the Role of Forestry

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About TerraCarbon

- TerraCarbon LLC formed in 2006, with locations in the U.S. and Austria.
- Provides consulting and advisory services to buyers and developers of land use and forestry projects.
- Active in both international and domestic carbon markets.



Climate Change and Market Solutions

- Market based solutions are preferred over traditional, command and control regulation.
 - Allow for least-cost solutions, and
 - Provide flexibility in terms of when and how reductions are made
- Market mechanisms play an integral role in:
 - International programs, such as the Kyoto Protocol
 - National programs in Europe,
 - Proposed regional (and federal) compliance programs in the U.S.

Market Mechanisms

- Cap and trade system
 - A maximum level of emissions is set (the “cap”) and an equivalent amount of allowances are issued or auctioned off to participants.
 - Allowances can be traded.
 - At the end of each compliance period, emitting participants retire allowances equal to their actual measured emissions.
 - Excess allowances can be sold or used for future compliance

Market Mechanisms

- Offset-credit program
 - Credits are issued to project owners who undertake voluntary project based activities to reduce GHG emissions relative to a standard (project baseline).
 - Cap-and-trade systems generally allow for the import of credits from project-based transactions.
 - Examples include:
 - Clean energy (hydro, wind, biomass)
 - Industrial gas destruction
 - Landfill and agricultural methane
 - Afforestation

Overview of Carbon Markets

Type of Market	Cap and Trade Program	Crediting Program	Buyers
International (Kyoto Protocol)	International Emissions Trading	Clean Development Mechanism (CDM), Joint Implementation (JI)	Governments
National	European Union Emission Trading Scheme (EU ETS)	CDM and JI	European corporates
Subnational	Regional Greenhouse Gas Initiative (RGGI)	RGGI	Utilities in the Northeast U.S.
Voluntary – Compliance	Chicago Climate Exchange (CCX)	CCX	U.S. corporates, pre-compliance buyers in US
Voluntary – Non-compliance	N/A	Voluntary Standards (VCS)	Social/environmentally responsible corporates, pre-compliance buyers in US

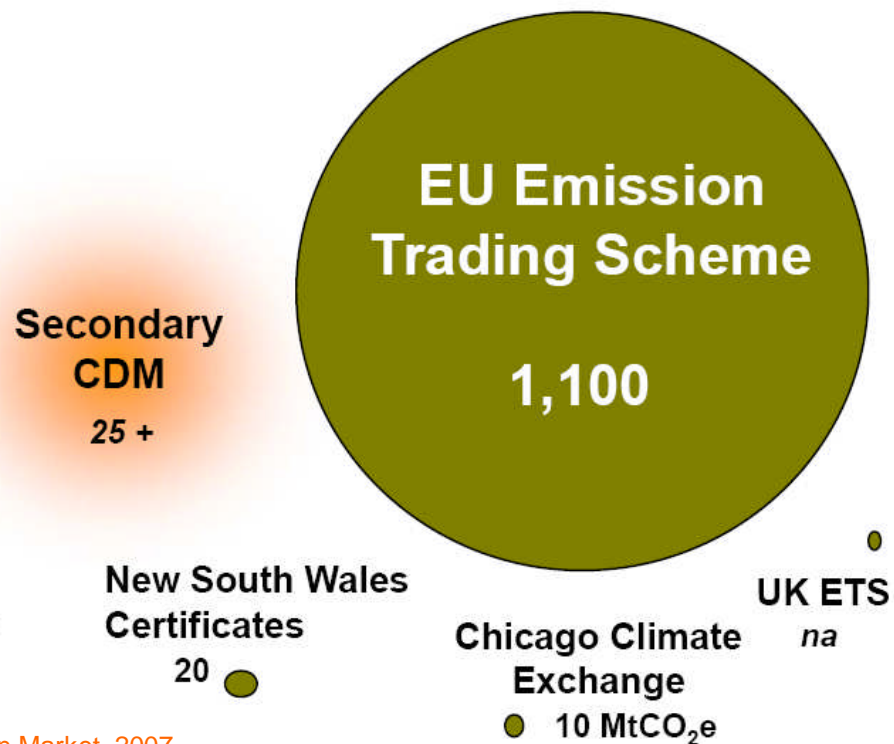
Carbon Markets

Volumes transacted in 2006 (in MtCO₂e)

Project-Based Transactions



Allowance Markets



EU ETS

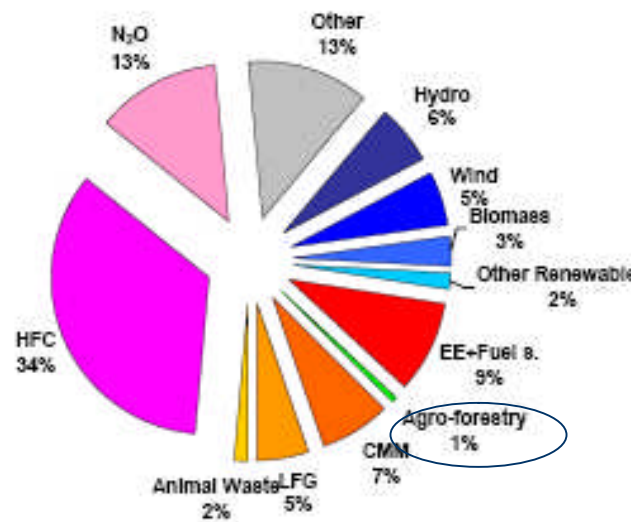
- EU's Domestic Cap and Trade System
 - Phase I: 2005-2007 (Pre-compliance period)
 - Phase II: 2008-2012 (Kyoto period)
 - Phase III: 2012-2020 (post-Kyoto period)
- EUAs allocated via National Allocation Plans prepared by MS and approved by EC.
- Five sectors, accounting for 40% of emission covered.
- Includes roughly 12,000 installations
- CDM and JI credits allowed up to a limit

CDM

- Occur in (non Annex I) developing countries
- Projects must be approved by the CDM Executive Board
- Buyers include EU Corporates, Japanese corporates, Annex I governments

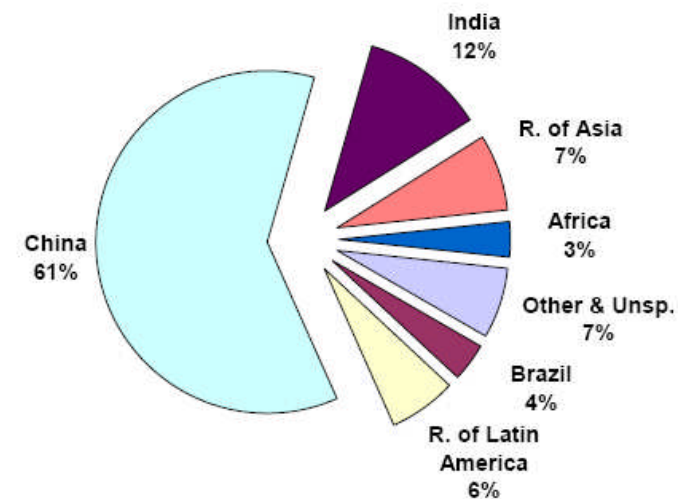
CDM Project Experience

By Project Type



As a share of volumes contracted in 2006

By Location



Source: World Bank, 2007

Carbon Prices

<u>Market</u>	<u>Price(€)</u>	<u>Price(\$)</u>
EU ETS	€25	\$40
CDM - primary	€8-13	\$12-20
CDM - secondary	€16	\$25
CCX		\$6
VCS		\$5-7

Note: Prices are in metric tons of CO2 equivalent (carbon credits for non-CO2 greenhouse gases converted to CO2 using Global Warming Potential factors) and reflect approx. prices as of 4/25/08.



Potential Forestry C Mkt Activities

- Afforestation/Reforestation (AR)
 - Storing C by planting new forests
- Reduced Emission from Deforestation (RED)
 - Preserving C stocks in existing forests under threat of deforestation
- Improved Forest Management (IFM)
 - Increasing C stocks in existing forests
 - E.g., Reduced impact logging, extending rotations

Forestry in the Intl C Market

- Kyoto Protocol
 - CDM → Only AR activities allowed; but only 1 registered project (more in pipeline)
 - JI → all forestry activities are possible; but none registered
- EU ETS
 - Allows CDM and JI credits
 - But....not forestry credits

Forestry in the Domestic C Market

- CCX
 - Allows AR, IFM, and RED in conjunction w/AR
- RGGI
 - Allows AR (more difficult in non-RGGI states)
- Federal bills - Lieberman-Warner
 - Would allow AR, RED, and IFM
 - Would permit both U.S. and International projects

Forestry in the Voluntary C Market

- Over the counter market
 - Forestry is largest segment
 - High environmental and sustainability co-benefits
- Voluntary Carbon Standard (VCS)
 - Covers AR, IFM, RED
 - Published at end of 2007 (no projects yet registered)

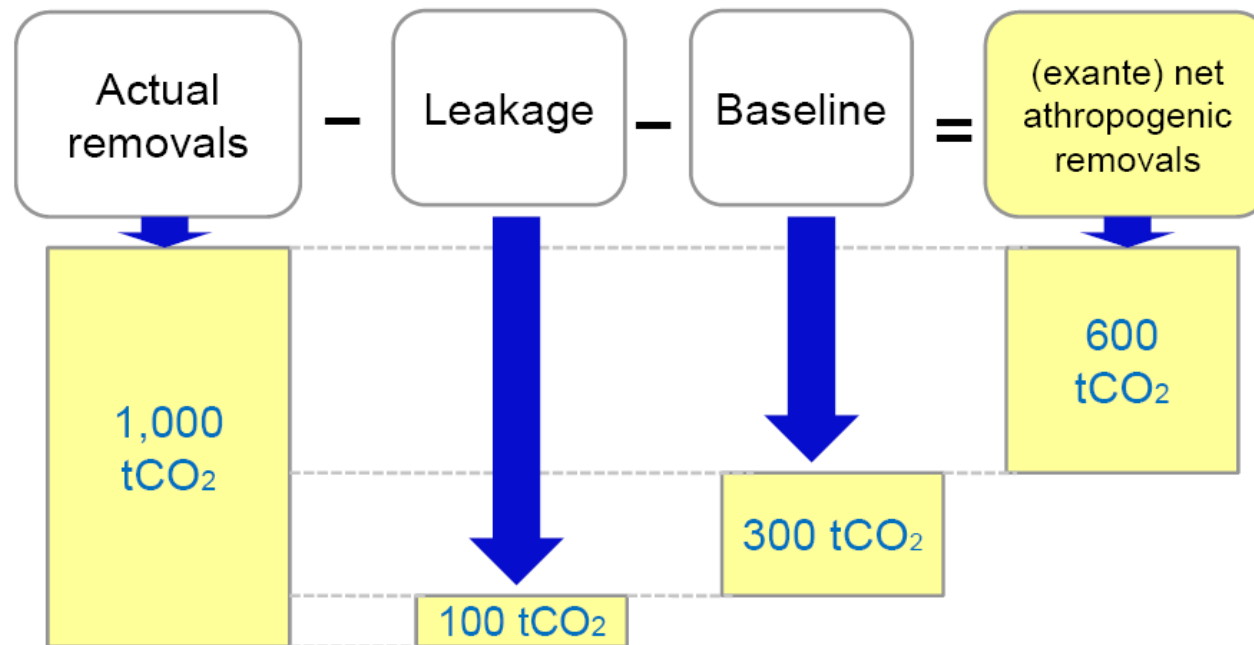
Considerations for C Projects

- **Additionality**
 - CCX – start date
 - CDM, VCS – start date + demonstrate that project would not have occurred without C mkt
 - Financial additionality test (IRRs before and after C revenues)
 - Common practice (barriers) test

Crediting for C Projects

- Actual C removals
 - From the project activity
- Baseline
 - C removals in absence of the project
- Leakage
 - Emissions resulting outside of project area (as a result of the project)

Crediting for C Projects



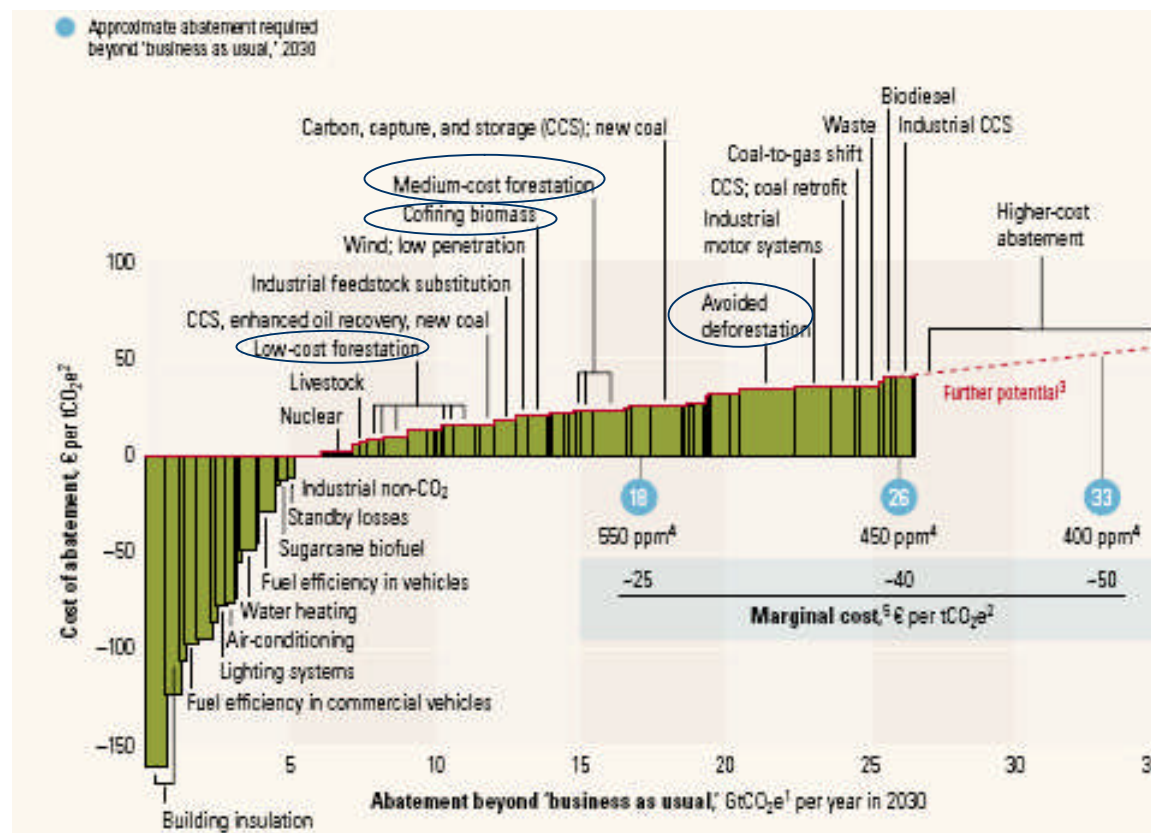
Considerations for Forestry C Projects

- Permanence
 - Risk that there is a reversal and subsequent emissions
 - Under CCX, RGGI, and VCS, a reserve (buffer) approach is used
 - Under CDM, temporary credits have been developed

Reasons for Optimism

- Emerging understanding that forests are critical
- Improving international policy
- Emerging US state and federal programs
- Growing voluntary market (supported by new standards)

Why Forestry is Critical



Up to 6 billion tons of annual mitigation or 25% of supply under \$60/ton

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