



## 2009 Carbon Trading and LT View of Carbon Credit

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January 2010

TISCO Credential

## TISCO Group Business Structure

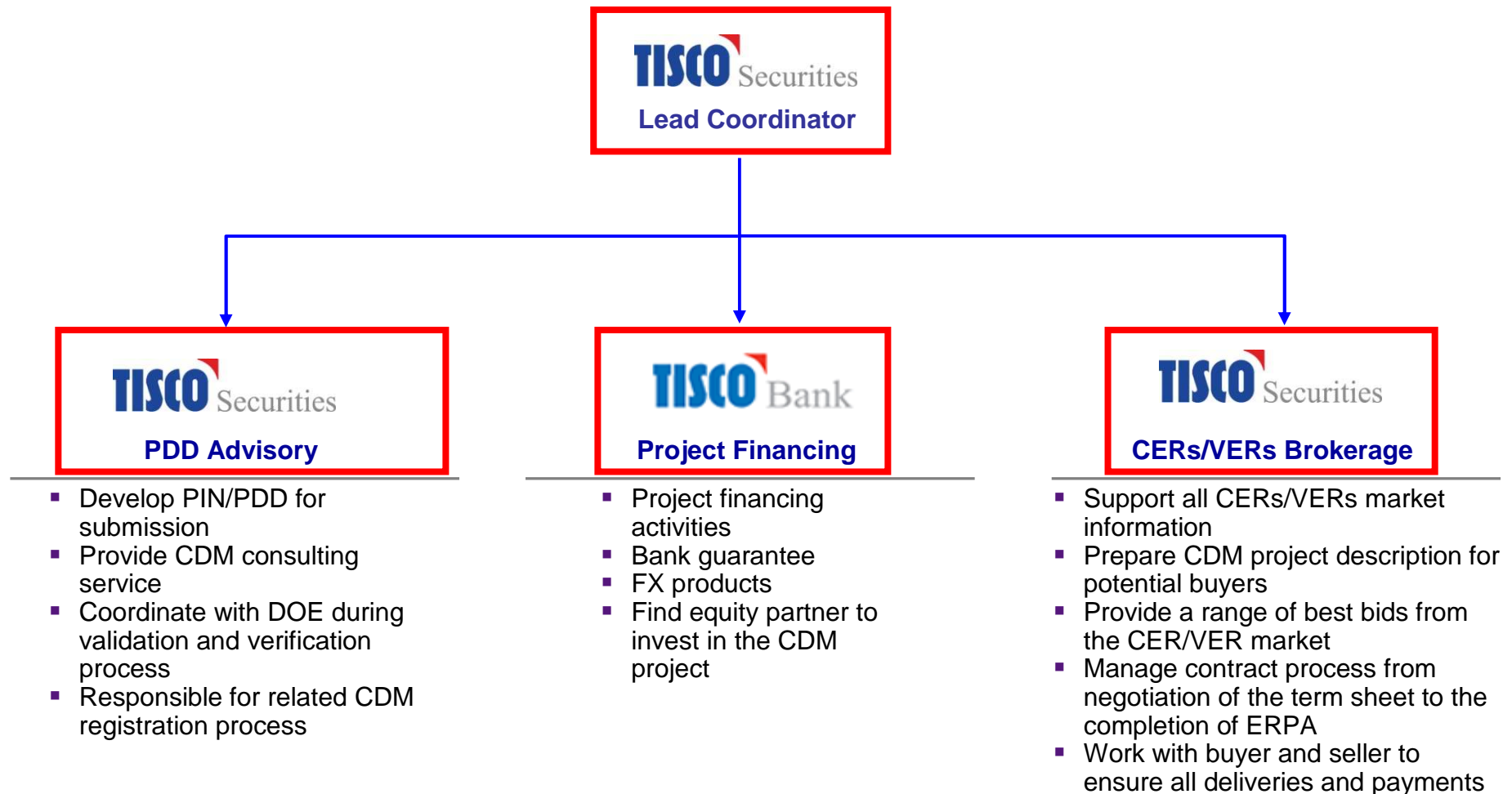
- ▼ TISCO Group has long been acknowledged as a leader in the Thai financial services industry, with history dating back 40 years. TISCO Securities Co., Ltd. has been established as a wholly-owned subsidiary of TISCO Financial Group Public Company Limited since 1 October 1998, following the separation of TISCO Group's finance and securities businesses.
- ▼ We are only a few Thai financial conglomerate with integration of bank, securities, and asset management.
- ▼ Our investment banking team has been widely accepted by investment community on their capability and commitment to deliver best services to clients.
- ▼ We have a strong claims of being the award-winning leader in Thai investment banking industry, with a long-established reputation and an enviable track record in providing full range of services, including fund raising from equity and debt capital market, privatization advisory and implementation, project financing, Merger & Acquisitions, debt restructuring, etc.



TISCO Group

## Integrated Carbon Services

*TISCO acts as Lead Coordinator within CDM Work Force*



**I. Carbon Trading Market**

**II. CDM in Thailand**

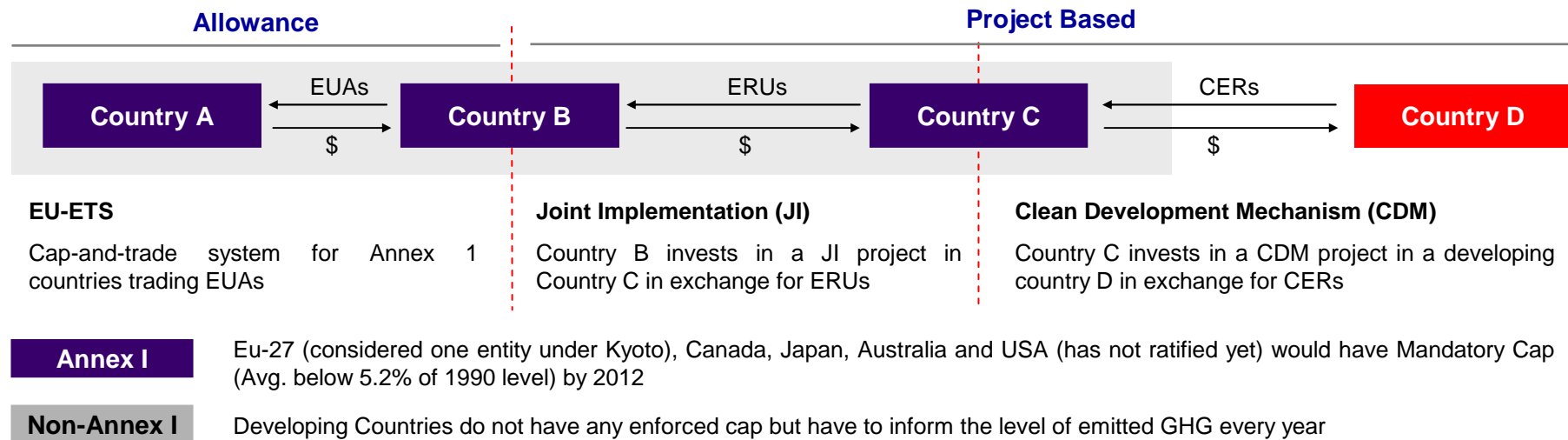
**Appendix A: Glossaries**

Carbon Trading Market

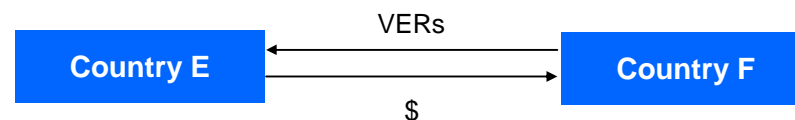
# Carbon Credit Visual

## Kyoto Protocol

- The rationale behind these three mechanisms is that greenhouse gas emissions are a global problem and that the place where reductions are achieved is of less importance
- In this way reductions can be made where costs are lowest, at least in the initial phase of combating climate change



## Voluntary Basis

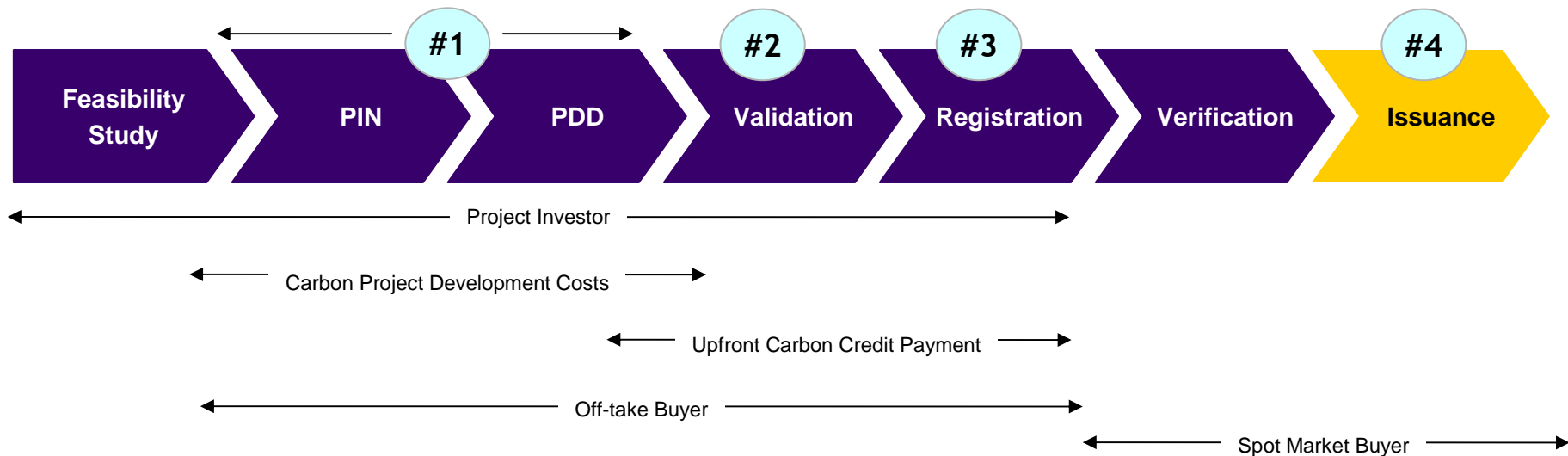


- Verified Emission Reduction (VER) is credit for emission, similar to CER, however, it is done on voluntary basis and not part of CDM mechanism under Kyoto Protocol
- VER does not need approval from host country DNA or EB of UNFCCC. However, voluntary carbon market projects are still subjected to independent 3rd party approval with strict standard for VER issuance
- VERs are not creditable to contribution in compliance of their quantified GHG reduction targets of Kyoto Protocol, nevertheless, they are bought for CSR purposes

Carbon Trading Market

# Project Timing to Market

*Depending on risk appetite and financial requirements of the Project Owner the more advanced the project, the less risk facing, thus the higher the price*



**CER Price Factors**

- Market conditions – benchmark prices for EUA
- Project size – transaction costs/CER
- Technology – reliability
- Stage along CDM project cycle – more advanced, less risk
- Project owner – operational track record to deliver CERs
- Host country – sovereign risk
- Terms & conditions – payment of CDM costs, upfront payment, price structure (fixed/floating price)

## Carbon Trading Market

## Structure of CERs Sale

## Most Carbon Credit Buyer can offer a number of different pricing structure as follows

Spot Sale	Project owner pays for all CDM expenses such as PDD advisor, DOE and related registration fees while takes on registration risk and CERs price risk in order to capture high prices in the secondary market
Forward Sale	Buyer assumes most of the CDM expenses mentioned above and take on registration risk and CERs price risk while project owner can have a predictable cash flow from CERs sale
Fixed price forward contracts	Price will depend on level of liquidated damages payable by the seller on non-delivery, from nothing to fully guaranteed CERs <ul style="list-style-type: none"> <li>• Within 2012 delivery ; € x per CERs delivered</li> <li>• Post 2012 delivery : The price paid per CER will be x% of the CERs Spot closing price on a mutually agreed liquid market exchange on the delivery date</li> </ul>
Fixed/floating forward contracts	For a seller interested in capturing some of the value of the price movements in the EU ETS market (EUAs), buyers can fix a floor price and then share a proportion of the difference between the floor and an index price referenced to the EU ETS
Firm delivery	This can be priced using fixed price or a fixed/floating price. Delivery is guaranteed by the seller, which means that liquidated damages will be payable in the event that a short fall or non-delivery occurs but a premium price will be paid by Buyers
Upfront payment	In certain circumstances depending on the projects developers credit standing, the quality of the project and the type of off take, Buyers will be prepared to prepay some of the transaction value. Normally, a bank guarantee is required by the Buyer
Note: In most cases, Buyer will become a Project Participant and the Focal Point for communication with the CDM executive board to underline the commitment to jointly developing the CDM project	

Carbon Trading Market

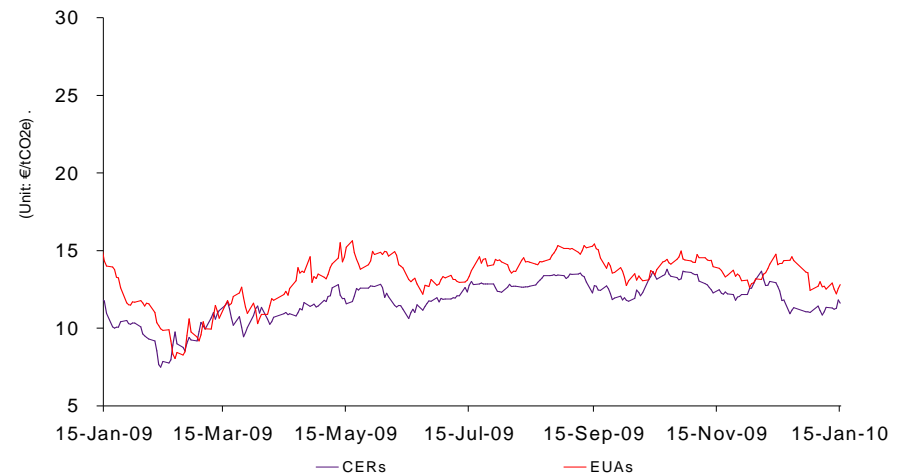
# CER Prices VS. Project Risk Profiles

## Example of CER Prices

- Estimated price indications based on market price for secondary CER
- Based on a pure off-take “Pay-on-Delivery” structure
  - (D) At issuance : Avg € 10.49
  - (C) At registration : Avg € 9.61
  - (B) Host country approval : Avg € 8.77
  - (A) PIN/PDD stage : Avg € 6.78/7.98
- CERs bid-offer price at € 11.62 (as of 15 Jan 2010)

Source: Reutersinteractive and IDEACarbon

## EUA / CER Historical Price



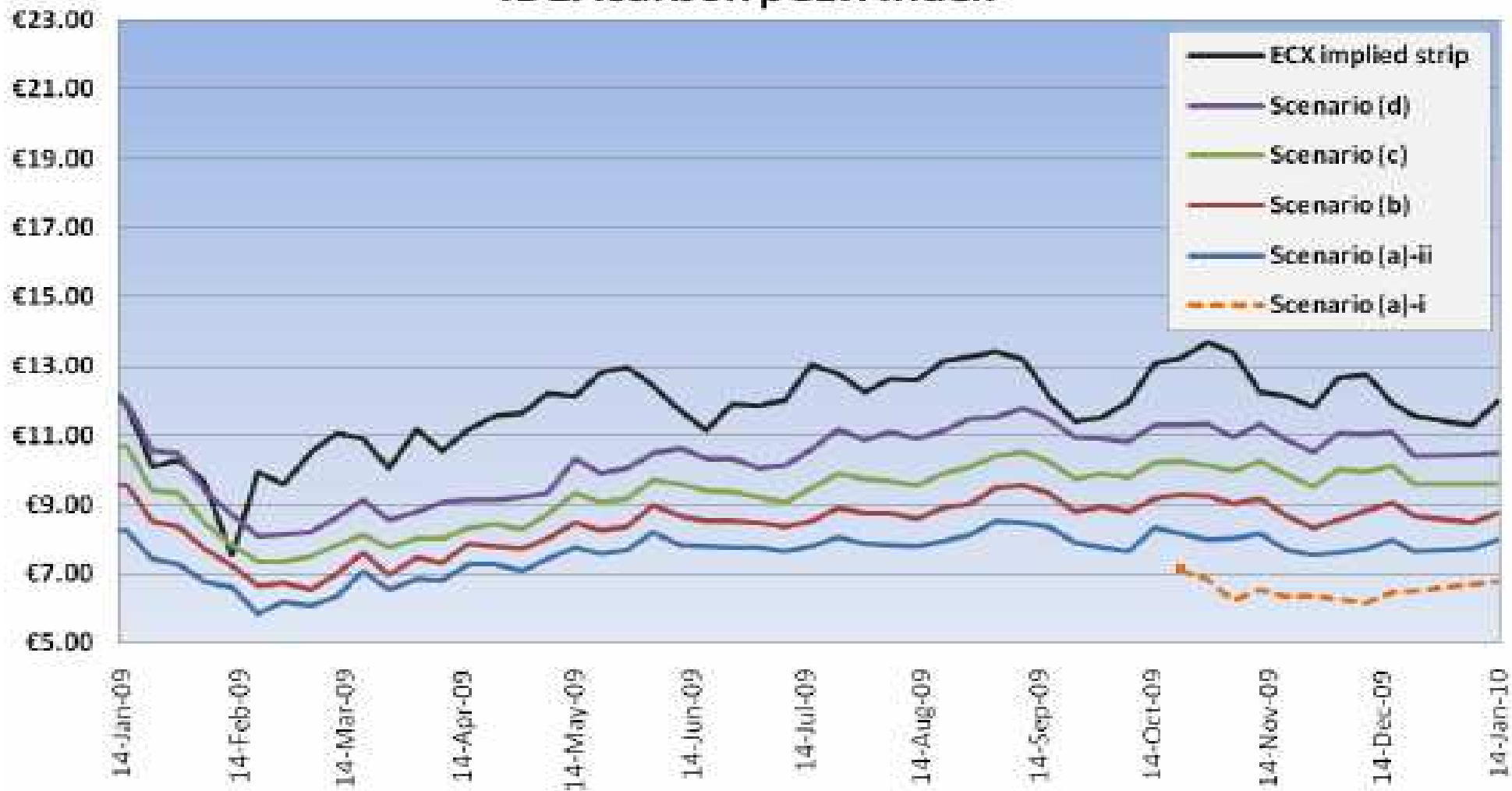
## Project risk profile and its impact on CER price



Carbon Trading Market

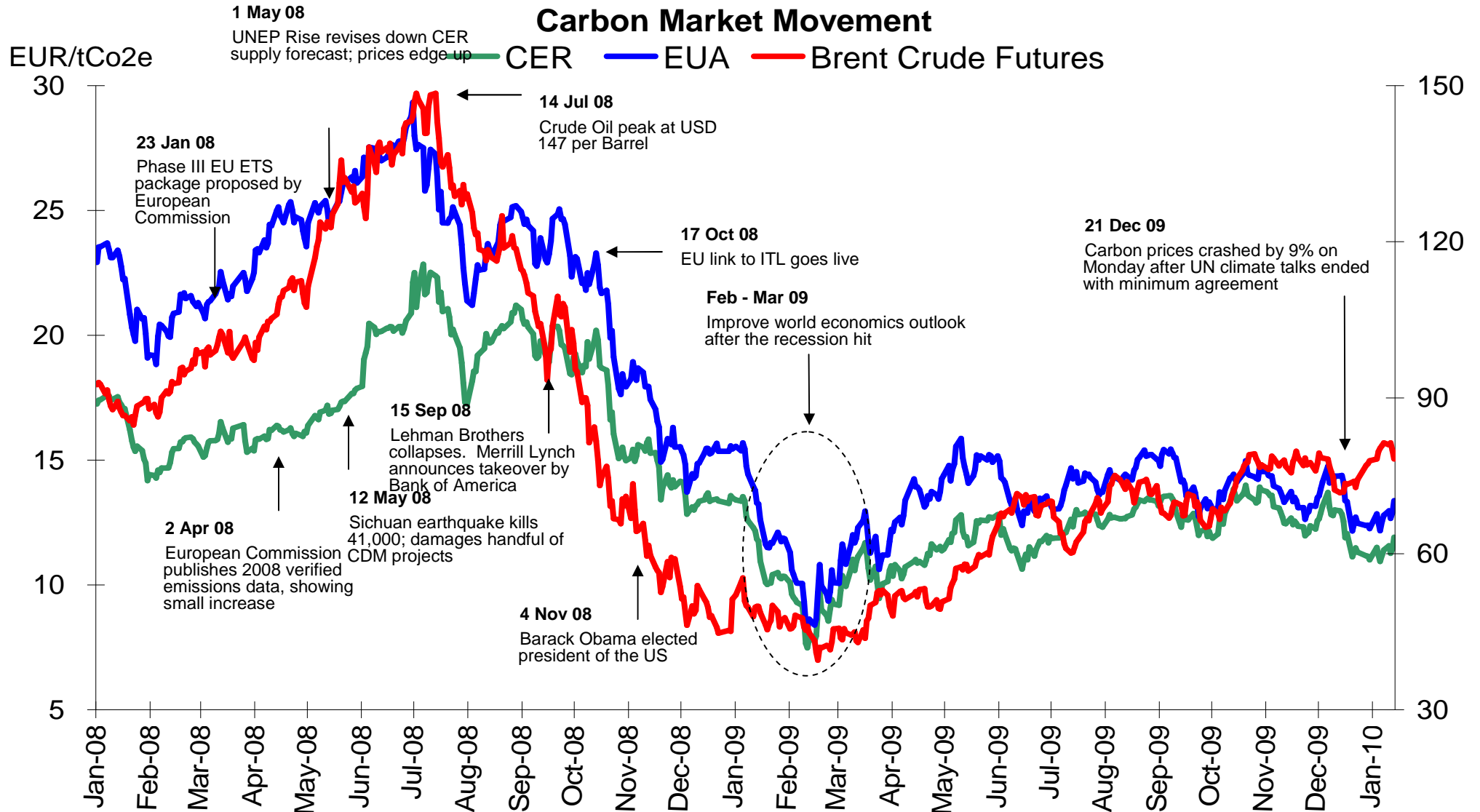
Historical Primary CERs at Various Phases

IDEAcarbon pCER Index™



Carbon Trading Market

Historical Price Movement



## Carbon Trading Market

## Traded Volumes and Values in 2009

	2008 figures		Point Carbon's 2009 forecast		2009 figures		Change 2008-09		Average prices
	[Mt]	[€ mil.]	[Mt]	[€ mil.]	[Mt]	[€ mil.]	[Mt]	[€ mil.]	[€ t]
<b>EU ETS</b>	3,091	66,993	3,823	45,170	5,646	72,787	83%	9%	12.89
<b>CDM</b>	1,609	24,172	1,510	14,704	1,590	17,520	-1%	-28%	11.02
<b>JI</b>	72	720	40	450	44	399	-38%	-45%	9.00
<b>AAU</b>	43	330	95	942	138	1,379	221%	318%	9.99
<b>RGGI</b>	71	178	339	933	765	1,773	979%	897%	2.32
<b>Other</b>	34	119	59	380	75	284	118%	139%	3.80
<b>Total</b>	<b>4,920</b>	<b>92,511</b>	<b>5,866</b>	<b>62,580</b>	<b>8,258</b>	<b>94,143</b>	<b>68%</b>	<b>2%</b>	<b>11.40</b>

Source: Point Carbon

Carbon Trading Market

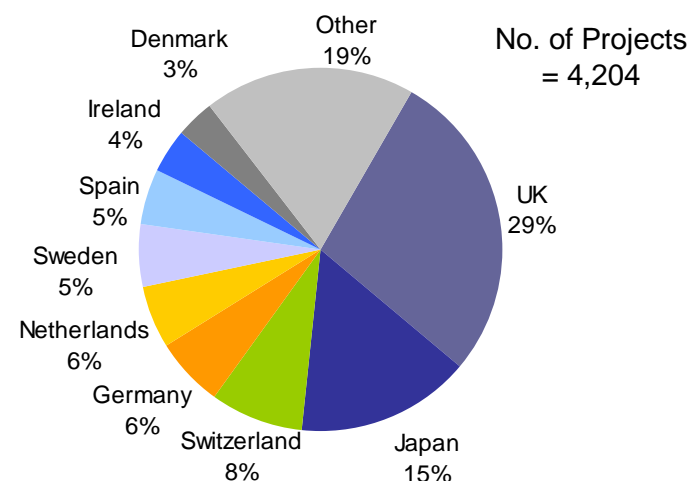
# CDM Buyers

## Top 20 CDM Buyers

Buyer	No. of Projects
EcoSecurities	286
Carbon Asset Management Sweden	161
EDF Trading	100
Mitsubishi	100
AgCert	96
Vitol	94
RWE	93
Carbon Resource Management	73
CAMCO	72
Trading Emissions	66
Cargill International	63
ENEL	62
MGM Carbon Portfolio	61
Kommunalkredit	58
Marubeni	58
Danish Ministry of Climate & Energy	51
Agrienergy	50
Climate Change Capital	50
Energy Systems International	43
IBRD	43

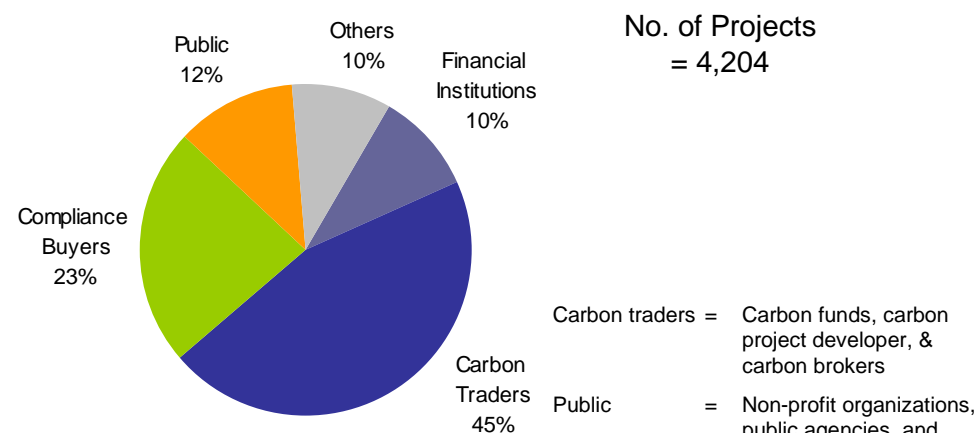
Source: CDM Pipeline, Unep Risoe as of 1 Sep 2009

## CDM Buyers by Nationality



Source: CDM Pipeline, Unep Risoe as of 1 Jan 2010

## CDM Buyers by Type of Organizations



Source: CDM Pipeline, Unep Risoe as of 1 Jan 2010

## Carbon Trading Market

## Key factors influencing the demand-supply balance in 2009

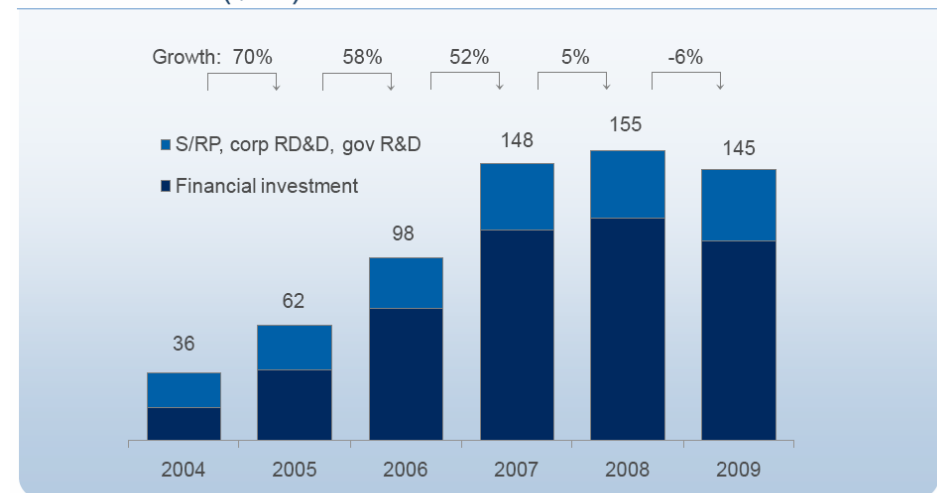
**UN issued 123.4 million CERs in 2009, 11 percent less than the 137.9 million distributed in 2008, and has now issued a total 366.2 million CERs to date.**

- A fall in clean energy investment
- A frozen credit market in the shadow of the global economic slowdown have weighed on supply
- Bureaucratic bottlenecks at the UN
- Emissions auditor (DOE) suspensions will further dent CER flow.

Certain is...

- The Kyoto Protocol will not expire in 2012
- The CDM remains and registered projects continue to generate CERs

Annual Clean Energy Investment Growth  
2004 – 2009 (\$bn)



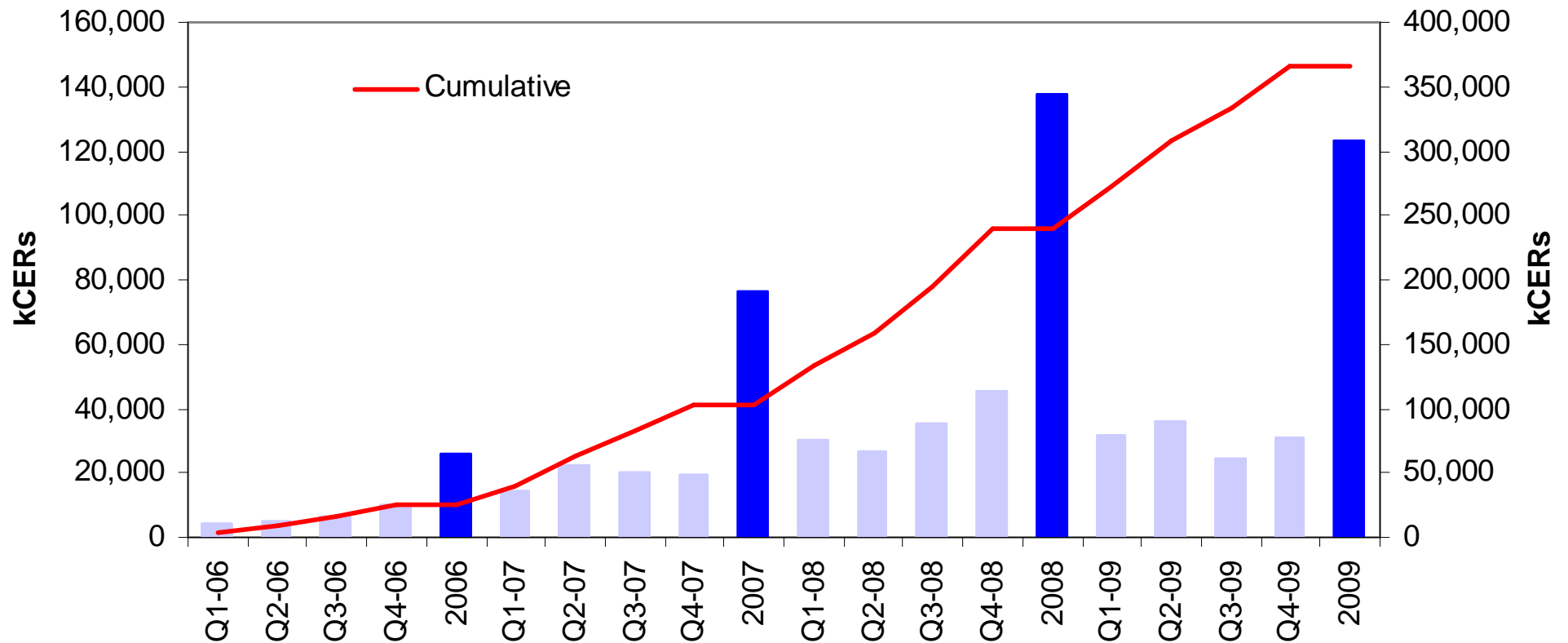
Note: S/RP = small/residential projects. New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

Source: New Energy Finance

Carbon Trading Market

# CER Issuance

***A fall in clean energy investment and a frozen credit market in the shadow of the global economic slowdown have weighed on supply of Carbon Credit, while bureaucratic bottlenecks at the UN and emissions auditor suspensions will further dent CER flow..***



Sources: UNFCCC, UNEP Risoe Centre

## Carbon Trading Market

## Top Analysts' View After Copenhagen Summit

## WHAT DOES THIS MEAN FOR CARBON PRICES?



- "There is now no near-term prospect of the EU raising its 2020 target. As a result, sentiment will be negatively affected and we expect EUA prices to decline over the next few sessions."
- "With the selling of surplus EUAs by industrials in early 2010 already a real possibility before the outcome of Copenhagen was known, we would not now be surprised to see sustained EUA price weakness through to the middle or end of Feb. 2010."



- "The unsatisfactory outcome of the negotiations now makes it unlikely that the EU's 20 percent target will be changed, in our view, with the most likely reconsideration of the target not until 2015 -- in line with the new accord's timeline."
- "This is be negative for EUA prices in the short term, through 2010 and potentially through to 2020. We assume an average Phase 2 (2008-12) EUA price of 20 euros per tonne, rising to 25 euros in 2013 and 30 euros in 2020, based on an expectation of some tightening of the scheme from 2013. Our floor price for periods of low permit demand is 10 euros."



- "The impact is likely to be transitory. After this morning's strongly bearish opening, the market is more likely to return to reasonably normal trading patterns. The Copenhagen failure did little to alter the expected supply-demand balance under the EU ETS and it is not likely to have changed the underlying hedging pattern of power sector participants. The impact on the industrial sales is harder to call, as it does mean that some of the potential upside for EU carbon prices has been eroded."
- "Q1 is still likely to see a low for carbon prices as, if anything, there is slightly more incentive for industrial length to hit the market. We expect prices are likely to average 11.50 euros in Q1 before strengthening over the remainder of 2010."

## Carbon Trading Market

## Top Analysts' View After Copenhagen Summit

## WHAT DOES THIS MEAN FOR CARBON MARKETS IN GENERAL?



- ""It heightens uncertainty over the continuation of the CDM and JI mechanisms beyond 2012, at least in their current forms ... The development of new CDM projects is likely to slow over the course of next year, and perhaps significantly so."
- "This opens up the possibility of ... bilateral deals between the EU and third countries under which emissions reduction projects could be established in to generate credits for use in the EU ETS over 2013-20 (note: any such credits would complement, not replace, Kyoto offsets.)"



- "International offset markets were hoping for detail on how CDM would be expanded, perhaps including sector-specific benchmarks and an expansion of the market's size. Heavy industry must wait longer for clarification of emission liabilities and international abatement mechanisms ... This will likely perpetuate carbon market uncertainty post 2012."



- "This is a very disappointing outcome that is even below our modest expectations. The news is bearish ... I see nothing here that should drive investment in the carbon commodity and low carbon technology."

## Carbon Trading Market

## CER Supply, Price Forecasts to 2012

**Point Carbon is the latest analyst to cut their supply forecasts for U.N.-approved CER through 2012, due to uncertainty over the market's future mechanism, Australia's rejection of federal carbon trading and a U.N. panel's rejection of Chinese wind projects.**

	SUPPLY TO 2012 (in bln tonnes)	PRICE (in euros)			
		2009	2010	2011	2012
Barclays Capital <BARC.L>	1.309 (ISS)	11.0	13.0	15.0	19.0
	1.435 (RDD)				
COER2	1.350 (ISS)	11.0	16.0	22.0	16.0
Deutsche Bank <DBKG.n>	1.350 (ISS)	"slightly less than EUAs"			
New Energy Finance	1.381 (ISS)	11.0	8.0	7.0	9.0
Point Carbon	1.194 (ISS)	12.0	13.0	14.0	14.0
	1.454 (RDD)				
Sagacarbon	1.345 (ISS)	13.0	14.3	16.5	19.5
Societe Generale <SOGN.PA>	1.500 (ISS)	11.8	14.0	17.0	19.0
UBS <UBSN.VX>	1.600 (ISS)	EUA price minus 2.0			
UNEP Risoe (cdmpipeline.org)	1.149 (ISS)	N/A			

NOTE: ISS = Total CERs issued by 2012

RDD = Amount of total CO2 reductions from CDM projects by 2012

N/A = Not applicable

Source: Reuters as of 11 December 2009

## Carbon Trading Market

## Selected “Quotes” from Copenhagen Climate Summit

**U.S. PRESIDENT BARACK OBAMA :**

"I'm confident that America will fulfil the commitments that we have made: cutting our emissions in the range of 17 percent by 2020, and by more than 80 percent by 2050 in line with final legislation. "

**CHINESE PREMIER WEN JIABAO :**

"We will honour our word with real action. Whatever outcome this conference may produce, we will be fully committed to achieving and even exceeding the target."

**JAPANESE PM HATOYAMA :**

"If we cannot manage (to achieve a deal) we will not have fulfilled our responsibilities as world leaders, which is a disgrace to the world." "The issue now is a seemingly unbridgeable gap between China on one hand and the European Union, the United States and Japan on the other."

**INDIA PRIME MINISTER MANMOHAN SINGH :**

"Each one of us acknowledges that those worst affected by climate change are the least responsible for it. Whatever emerges from our negotiations must address this glaring injustice; injustice to the countries of Africa, injustice to the least developed countries and injustice to the small island states whose very survival as viable nations is in jeopardy."

**ENVIRONMENT MINISTER OF MALDIVES MOHAMED ASLAM :**

"In Copenhagen the best we can expect is a political declaration. We're very disappointed." "We didn't come here all this way to not agree anything."

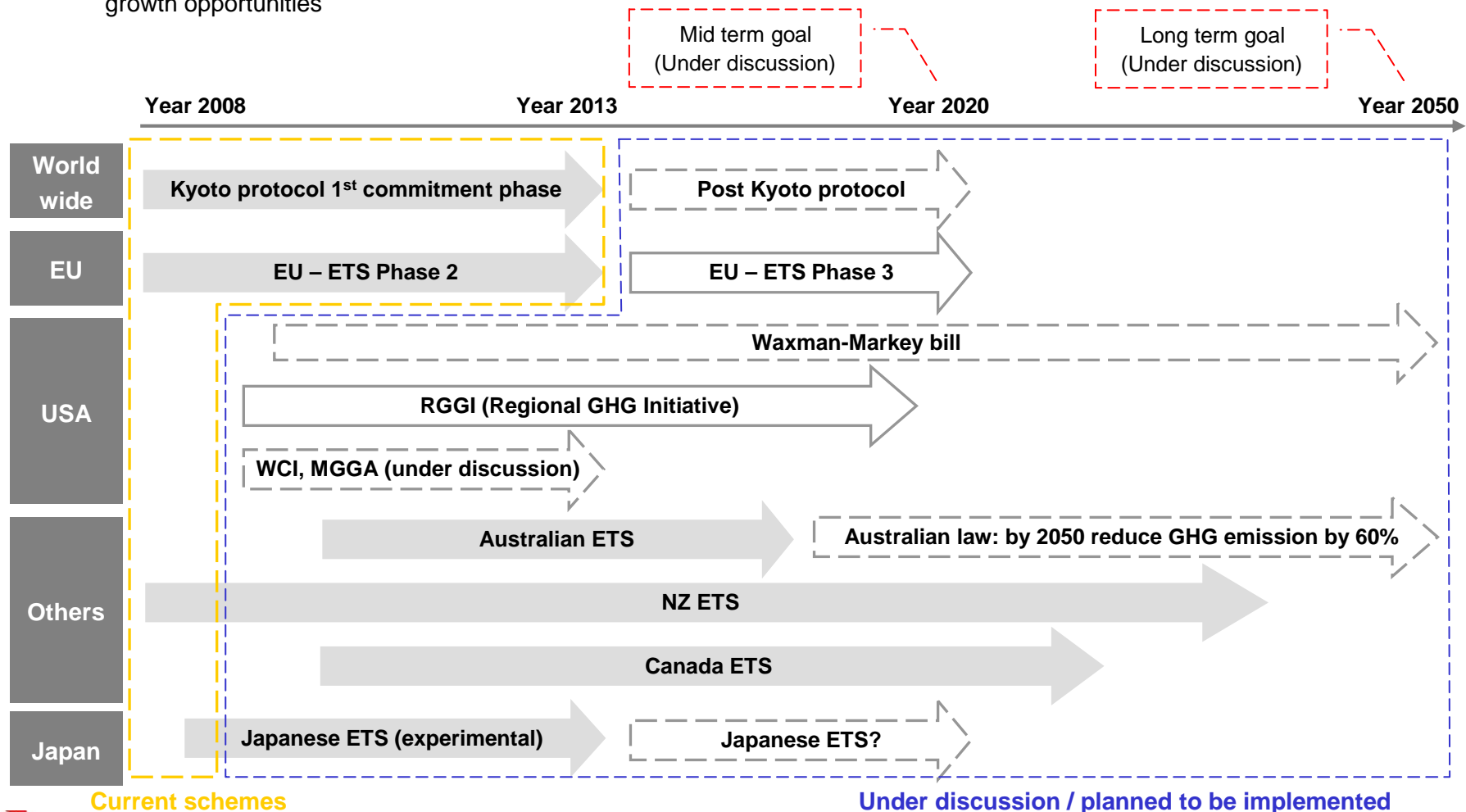
**THAILAND PRIME MINISTER ABHISIT :**

"A wide gap exists on the issue between developed and developing countries. Abhisit said he had reaffirmed at the conference Thailand's readiness to take part in the efforts to reduce global warming. He said the country would move ahead with its own plan to tackle climate change despite the Copenhagen summit's failure."

Carbon Trading Market

# Global Carbon Market: Increasing Opportunities

- Commercial carbon markets are looking to expand over the long term as the next phase of EU-ETS and the post Kyoto protocol extend the trading of carbon credits through the medium term
- Additional countries are implementing or are considering to implement GHG reduction laws and ETS, providing additional growth opportunities



Carbon Trading Market

## Development on Post Kyoto Protocol Carbon Credit Fund

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ADB

### Future Carbon Fund:

- Begins operations on January 2009
- Is a public-private partnership between ADB, governments, and companies
- Has received financing commitments of over USD 100 mm and aim to provide up to USD 200 mm to help finance renewable energy
- Will make finance available upfront to project developers instead of the standard “payment on delivery” method
- Expects the first project financing could come as early as the second half of 2009



The World Bank  
Carbon Finance Unit  
[www.carbonfinance.org](http://www.carbonfinance.org)

### Carbon Partnership Facility:

- Would be supported by a carbon asset development fund to be established by the World Bank
- Would be a partnership between governments as well as public and private sector entities from developed, developing countries and countries with economies in transition
- Aims to promote long-term investments in low-carbon growth by purchasing emission reductions
- Would target a development of large scale emission reduction opportunities
- Expects the target size for the fund over the first five years of operation to be in the billion dollar range

## Carbon Trading Market

## Development on Post Kyoto Protocol Carbon Credit Fund

**NEFCO Carbon Fund:**

- Was launched in Spring 2008
- Is a partnership of public and private sector
- Has capitalization of EUR 77 mm
- Has committed a portion of its fund capital for purchasing carbon credits that are generated after 2012
- Has recently received EUR 3 mm investments from Finland's Environment and Foreign Ministries to acquire carbon credits generated after the post-Kyoto protocol period

**Post 2012 Carbon Credit Fund:**

- Was established in March 2008
- Has EUR 125 mm available to invest in carbon credits for its portfolio
- Is a partnership of 5 leading European public financing institutions: Caisse des Depots, European Investment Bank, Instituto de Credito Oficial, KfW Bankengruppe, and Nordic Investment Bank
- Focuses on purchasing Kyoto- compliant carbon credits generated after 2012, potentially up to 2020

Carbon Trading Market

## Renewable Energy Loan – Sample Terms

**Generally most of local commercial banks are keen to provide financing for renewable projects which could be under their normal loan program as well as special energy efficiency loan program of DEDE subject to certain conditions**

Loan Size	Estimated loan portion of 66% of total project investment (Debt : Equity) = approx 2:1 or less, depending on project type and risks
Interest Rate	<ul style="list-style-type: none"> <li>■ Commercial Bank Loan = MLR +/- spread depending on factors such as collateral, credit risk and project cash flow and major shareholders</li> <li>■ DEDE loan program = 4% p.a.</li> </ul>
Maturity	Flexible depending on project life and cash flow project
Collateral Requirement	Normally Banks would consider loan for either <ul style="list-style-type: none"> <li>■ Corporate Finance</li> <li>■ Project Finance</li> </ul>
Note: current MLR (large bank) = 5.85%, MLR (medium size bank) = 6.25%	

## Carbon Trading Market

## ERPA Loan – Sample Terms

***Certain development bank is considering to provide ERPA financing to facilitate project owner for CDM project completion. However, ERPA is rather common in other non-annex 1 countries such as India***

Loan Size	Depending on several factors such as <ul style="list-style-type: none"> <li>■ CER price</li> <li>■ The number of CERs per year</li> <li>■ ERPA period not more than 2020</li> </ul>
Interest Rate	■ Commercial Bank Loan = MLR +/- spread depending on factors such as buyer credit rating, possibility of CDM registration and ERPA contract period
Principle Repayment	Deduction from cash flow from CER delivery
Collateral Requirement	Transfer of rights of payment received from CER sale and delivered
Note: current MLR (large bank) = 5.85%, MLR (medium size bank) = 6.25%	

Carbon Trading Market

## Strategic Equity Investment – Sample Terms

**Several financial institutions and Renewable Energy Fund are keen to make investment in the renewable energy projects (i.e. ethanol, biomass, biogas, waste management and solar)**

Investment Size	25% - 30% of equity interest of the project company with investment amount not exceeding 300 – 400 million
Expected IRR	Depending on type of project and risk profile (approximately > 15%)
Special Condition	Key project sponsor shall have strong experience with respect to the renewable project, management capability and fully committed to the success of the project
Investment Period	5 years from the first investment
Exit Strategy	<ul style="list-style-type: none"> <li>▪ Sell back to other shareholders</li> <li>▪ Sell out to new strategic investors</li> <li>▪ IPO in SET / MAI</li> </ul>

I. Carbon Trading Market

II. CDM in Thailand

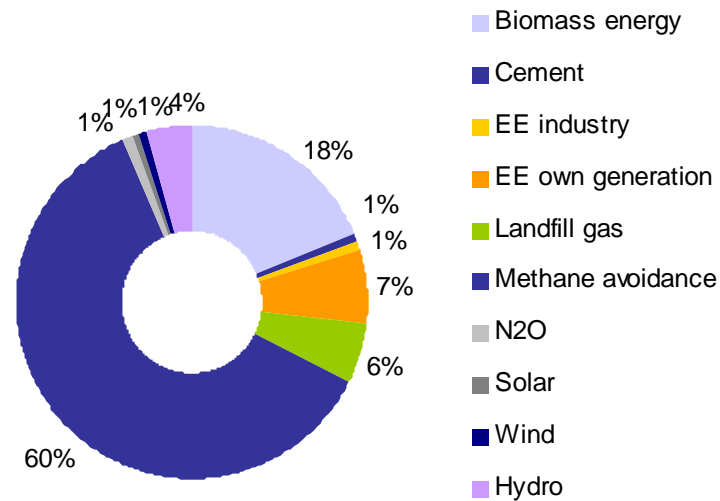
Appendix A: Glossaries

CDM in Thailand

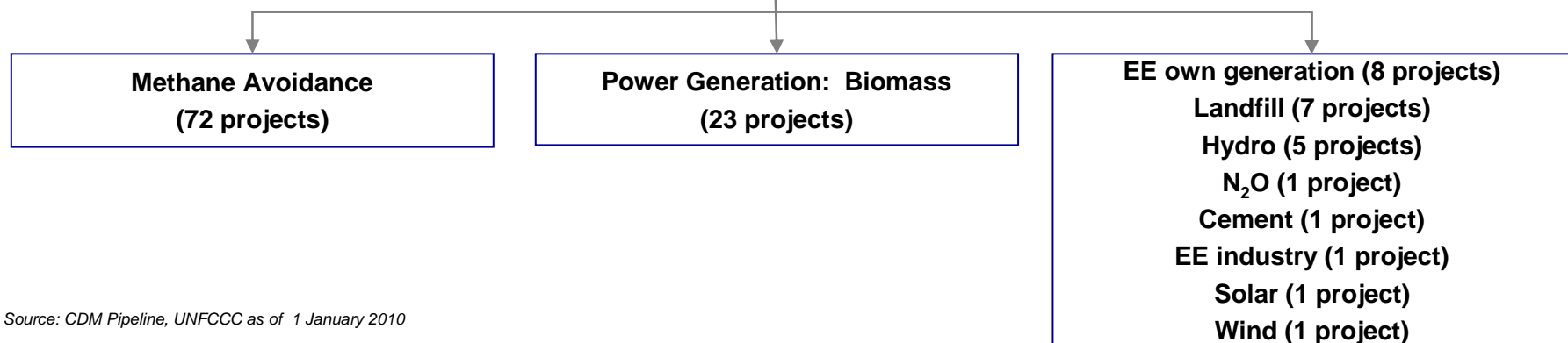
# Thai CDM Projects

## Types of CDM Projects

At present, 123 projects altogether



Currently, 76 projects at validation process; 2 projects request for registration; 4 projects at correction request; 2 projects request review; 1 project under review; 1 project rejected; 9 projects validation terminated; 28 projects registered  
 Total CERs : 6,922 ktCO<sub>2</sub> / year

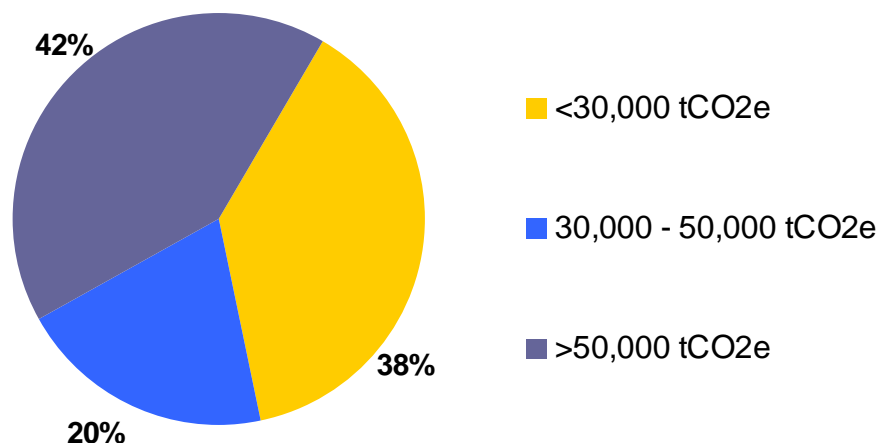


Source: CDM Pipeline, UNFCCC as of 1 January 2010

CDM in Thailand

## Thai CDM Projects Approved by TGO

### Thai CDM Projects Categorized by Size



- As of 8 January 10, there are 94 CDM projects approved by TGO
  - 36 CDM projects (38%) has GHG reduction of less than 30,000 tCO<sub>2</sub>e per year
  - 19 CDM projects (20%) has GHG reduction of between than 30,000 – 50,000 tCO<sub>2</sub>e per year
  - 39 CDM projects (42%) has GHG reduction of more than 50,000 tCO<sub>2</sub>e per year
- The average GHG reduction of the 94 CDM projects is approximately 65,866 tCO<sub>2</sub>e per year while the median is only 41,438 tCO<sub>2</sub>e per year
  - This represents that the Thai CDM projects are dominated by large-size projects (GHG reduction more than 50,000 tCO<sub>2</sub>e per year)

Source: Thailand Greenhouse Gas Management Organization (TGO) as of 8 January 2010

## CDM Market

## Number of Projects and Amount of CERs (by Country)

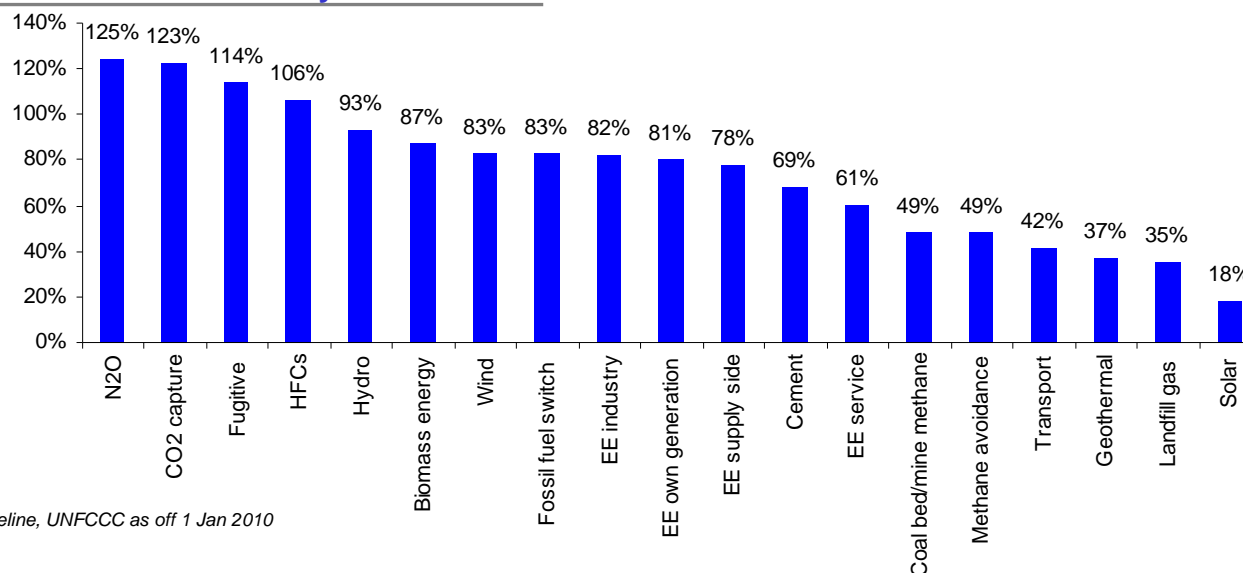
	Issued		Registered		Request registration		At validation		Rejected	
	Number	ktCO2e/yr	Number	ktCO2e/yr	Number	ktCO2e/yr	Number	ktCO2e/yr		
China	180	173,927	711	199,693	152	22,927	1,053	150,759	40	
India	212	72,883	475	38,733	36	5,025	709	68,495	41	
Brazil	93	37,349	166	20,217	8	252	175	9,768	21	
South Korea	9	47,664	35	14,867	1	26	36	3,863	2	
Mexico	24	6,085	120	9,387	0	0	44	5,202	4	
Malaysia	5	674	78	5,000	3	231	47	2,911	4	
Chile	16	4,039	36	4,696	0	0	33	2,191	1	
Argentina	8	2,548	16	4,156	0	0	13	1,102	1	
Nigeria	0	0	3	4,155	0	0	4	3,015	0	
Indonesia	6	326	42	4,048	4	162	51	7,173	1	
Colombia	6	592	20	3,096	1	7	27	1,468	0	
South Africa	6	1,138	17	2,960	0	0	13	1,251	0	
Qatar	0	0	1	2,500	0	0	0	0	0	
Peru	5	186	21	2,466	0	0	13	3,032	1	
Thailand	2	815	28	1,865	9	329	76	4,277	1	
Israel	6	273	16	1,849	0	0	12	810	4	
Egypt	1	4,301	4	1,795	2	627	7	1,235	0	
Philippines	2	95	40	1,435	1	39	32	1,647	2	
Pakistan	1	1,724	4	1,368	2	228	14	2,045	0	
Vietnam	2	4,488	15	1,238	5	210	66	4,662	1	
Uzbekistan	0	0	7	1,105	0	0	4	1,457	0	
Guatemala	5	852	11	863	0	0	5	398	2	
Tunisia	0	0	2	688	0	0	1	2	0	
Other 53 Countries	34	3,823	117	7,776	12	1,821	167	22,049	11	
<b>Total (76 countries)</b>	<b>623</b>	<b>363,782</b>	<b>1,985</b>	<b>335,954</b>	<b>236</b>	<b>31,883</b>	<b>2,602</b>	<b>298,814</b>	<b>138</b>	
<b>Total Number of Projects in Pipeline</b>					<b>4,823</b>					

Source: Unep Risoe as of 1 Jan 2010

## CDM Market

## Success of CDM Projects

## Issuance success measured by CERs issued



Source: CDM Pipeline, UNFCCC as of 1 Jan 2010

RANK	U.N. REF #	PROJECT OWNER	HOST COUNTRY	PROJECT TYPE	TOTAL CERs RECEIVED
1	0099	Rhodia <RHA.PA>	S.Korea	N2O	25,647,813
2	0306	Shanghai 3F <600636.SS>	China	HFC	20,135,976
3	0001	Gujarat Fluorochemicals <GFLR.BO>	India	HFC	18,293,679
4	0232	Dongyue Group <0189.HK>	China	HFC	16,059,798
5	0011	Jiangsu Meilan Chemical Co.	China	HFC	15,952,466
6	0116	Rhodia <RHA.PA>	Brazil	N2O	14,044,796
7	0193	Juhua Group Corp. <600160.SS>	China	HFC	13,173,993
8	0115	SRF Ltd. <SRFL.BO>	India	HFC	12,557,782
9	0003	Foosung Group <093370.KS>	S.Korea	HFC	7,735,164
10	1238	PetroChina <0857.HK>	China	N2O	7,102,124
<b>TOTAL</b>					<b>150,703,591</b>

Source: Reuters News on 29 January 2009

- I. Carbon Trading Market
- II. CDM in Thailand

**Appendix A: Glossaries**

## Appendix C

## Glossaries

AAU	Assigned Amount Units are tradable emissions units equalling 1 tonne CO <sub>2</sub> e. AAUs are allocated under the Kyoto Protocol each commitment period. Each country is permitted to emit GHG5 equivalent to their assigned amount.
Additionality	The extent to which an emissions reduction project is actually reducing emissions compared with the baseline, business-as-usual scenario. Different facets of a project can be assessed, including its financial, technological and environmental additionality.
Annex B Countries	The 39 countries specified in Annex B to the Kyoto Protocol, which include the European Union, OECD and Economies in Transition (EIT) countries, that agreed to binding commitments on their GHG emissions of variable magnitude from 1990 to 2008-12.
Annex I Countries	Countries that, as Parties specified in Annex I to the UN Framework Convention on Climate Change, are committed to adopting national policies and taking measures to mitigate climate change. All Annex I countries, with the exception of Belarus and Turkey, subsequently became Annex B countries under Kyoto Protocol.
Annex II Countries	Countries that, as Parties specified in Annex II to the UN Framework Convention on Climate Change, have an obligation to help developing countries to meet the financial and technological challenges of climate change in addition to their own efforts to mitigate climate change.
Carbon Dioxide (CO <sub>2</sub> )	A chemical formed by one carbon and two oxygen atoms. It is the most common GHG, a normal constituent of the global atmosphere and critical for biological life on Earth. Its increasing concentrations within the atmosphere have given rise to concerns about the long-term sustainability of human-induced carbon dioxide emitting activities, such as combustions of fossil fuels.
Carbon Dioxide Equivalent (CO <sub>2</sub> e)	A measure for comparing the radiative effect of different GHGs, in terms of the corresponding impact of emitting carbon dioxide. Carbon dioxide equivalents are calculated by multiplying the Global Warming Potential (GWP) of a gas by its emitted weight.
Carbon Intensity	A measure of the amount of carbon, or more usually carbon dioxide equivalent, emitted in the production and transmission of energy per unit of energy consumed.
Carbon Sequestration/ Carbon capture and Storage	The capture and storage of carbon dioxide within a carbon sink. Typically used to describe the absorption of atmospheric carbon dioxide by biomass, but can include the geological capture and storage of carbon dioxide, for example in oil/gas wells.
Carbon Sink	A geochemical or biological reservoir that acts to sequester carbon from another source within the global environment.
CDM	Clean Development Mechanism. The project-based mechanism articulated in Article 12 of the Kyoto Protocol that allows Annex B parties, ie, developed countries with quantitative emission limits, to invest in carbon projects in non-Annex I countries, to assist their sustainable development. The investor receives tradable carbon credits ("Certified Emission Reductions") in return.

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CER	A Certified Emission Reduction is a tradable credit generated by projects accredited by the Clean Development Mechanism (CDM) of the Kyoto Protocol. These are aimed at the developing world to encourage carbon abatement and generate revenue. The compliance period is seven (with two renewals) or 10 years and the reduction target is averaged over the whole period. One CER equals one tonne of CO <sub>2</sub> e.
Community Independent Transaction Log (CITL)	The transaction log established under the EU Emissions Trading Scheme, through which all Transactions are communicated, recorded, checked and completed or rejected as appropriate.
COP	Conference of the Parties. The organising and decision making body of the United Nations Framework Convention on Climate Change (“UNFCCC”), representing more than 170 nations that have ratified the Convention.
Designated Operational Entity (‘DOE’)	Accredited, independent bodies that validate emission reduction projects submitted to the CDM Executive Board, and verify the carbon credits that should be issued to the project.
ERU	Emission Reduction Units are credits allocated to projects under the Joint Implementation provisions of the Kyoto Protocol and are each worth one tonne CO <sub>2</sub> e. Joint implementation projects take place within Kyoto capped (Annex B) countries only. When ERUs are issued within a country an equivalent number of AAUs have to be cancelled to keep the market whole.
ETS	The European Union Emissions Trading Scheme, which commenced on 1 January 2005.
EUA	European Union Allowances. EUAs are allocated under the National Allocation Plan of each country within the European Emission Trading Scheme (EU-ETS). Each represents one tonne of CO <sub>2</sub> (other GHG are not yet included in the EU-ETS)
GHG	Greenhouse Gas. Any gas that acts to transmit solar radiation but absorbs infrared radiation. The most important GHGs are: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, along with water vapour.
Green AAUs	Surplus AAUs sold by a country where the buyer specifies that the revenue generated must be spent on a GHG reduction scheme. The opposite is “hot air”.
IPCC	Intergovernmental Panel on Climate Change (IPCC). An organisation formed in 1988 by the World Meteorological Organisation and the UN Environment Programme to assess scientific and technical information relating to climate change, drawing on leading scientists and experts. It has become the de facto advisory body to world governments through its periodic assessments of the state of science of climate change and possible mitigation and adaptation options.
ITL	The International Transaction Log (ITL). For CERs to be transferred to third parties not directly involved in the project. Anticipated to come online during 2007.
JI	Joint Implementation. One of three flexible mechanisms included in the Kyoto Protocol, specified in Article 6. It allows Annex B countries with binding emissions targets to invest in projects — and obtain the resulting carbon credits (ERUs) — from other Annex B developed countries with binding emissions targets.

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Kyoto Protocol	The agreement negotiated in 1997 at COP3, and subsequently refined. It commits developed countries to binding GHG emissions targets but provides three market-based ‘flexible mechanisms’ to minimise the cost to participants of meeting targets.
Linking Directive	CERs can be transferred from one national registry to another when both have adopted the Linking Directive into National law.
LULUCF	The land-use, land-use change and forestry (LULUCF) sector as included in the Kyoto Protocol to take account of human-induced activities remove GHGs from the atmosphere, also known as carbon ‘sinks’. Article 3.3 of UNFCCC deals with forestation, reforestation and deforestation. Article 3.4 provides that additional anthropogenic activities in the agricultural soils. LULUCF categories may be added by Annex Parties to offset their emission targets
NAP	National Allocation Plans. Each Member State in the EU has to establish a national allocation plan for each trading period in the EU-ETS. In this allocation the Member State decides the total number of allowances to be created for the period and the distribution of these allowances to individual emitting plants.
National Authorities and Designated National Authorities	The body delegated by a national government to assess and authorise proposed CDM and JI projects and to issue ERUs from II projects.
Operational Entity	Independent organisations accredited by the CDM Executive Board that validate carbon projects, advise on their eligibility, and verify the appropriate allocation of credits.
PDD: Project Design Document	The key document required of project developers to register a project with the appropriate Kyoto authorising body.
RMU	Removal Units are a carbon offset created under Kyoto and allocated for carbon sink projects
UNFCCC	United Nations Framework Convention on Climate Change. Most countries have joined the United Nations Framework Convention on Climate Change (UNFCCC) to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. Recently, a number of nations have approved an addition to the treaty: the Kyoto Protocol. The UNFCCC secretariat supports all institutions involved in the climate change process, particularly the COP, the subsidiary bodies and their Bureau.
VER	Carbon offset offered by commercial firms whereby the purchaser pays to have an emissions allowance purchased and retired on their behalf to offset the carbon produced by the purchaser. There is no formal market as such yet it is possible to buy them

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## Abbreviations of Key Terms

A/R CDM	:	Afforestation / Reforestation Clean Development Mechanism	JI	:	Joint Implementation
AAU	:	Assigned Amount Unit	KP	:	Kyoto Protocol
CCX	:	Chicago Climate Exchange	ICER	:	Long-term Certified Emission Reduction
CDM	:	Clean Development Mechanism	NGACs	:	NSW Greenhouse Abatement Certificates
CER	:	Certified Emission Reduction	NOx	:	Nitrous Oxide
CH <sub>4</sub>	:	Methane	NSW GGAS	:	New South Wales Greenhouse Gas Abatement Scheme
CO <sub>2</sub>	:	Carbon Dioxide	ONEP	:	Office of Natural Resources and Environmental Policy and Planning
COP	:	Conference of the Parties	PCFs	:	Perfluorocarbons
DEDE	:	Department of Alternative Energy Development and Efficiency	PDD	:	Project Design Document
DNA	:	Designation National Authority	PIN	:	Project Idea Note
DOE	:	Designated Operational Entity	PPs	:	Project Participants
EB	:	Executive Board	RMU	:	Removal Unit
ERU	:	Emission Reduction Unit	SF <sub>6</sub>	:	Sulphur hexafluoride
EUA	:	European Union Allowance	SSC	:	Small-scale CDM
EU ETS	:	European Union Emissions Trading Scheme	tCER	:	Temporary Certified Emission Reduction
GHG	:	Greenhouse Gas	tCO <sub>2</sub> e	:	One Metric ton of Carbon Dioxide Equivalent
GWP	:	Global Warming Potential	UK ETS	:	United Kingdom Emissions Trading Scheme
HFCs	:	Hydrofluorocarbons	UNFCCC	:	United Nations Framework Convention on Climate Change
IET	:	International Emissions Trading			

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