



# **CARBON MARKET**

**CDM training program**

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**JICA expert team**

**Shiro Chikamatsu**

# OBJECTIVES

The main objectives of this lecture is for you to understand the basic idea of the market approach and have the “feel” of the carbon market, so that you will recognise its general trend, and be able to see CDM from carbon credit buyers’ perspective.

## Content:

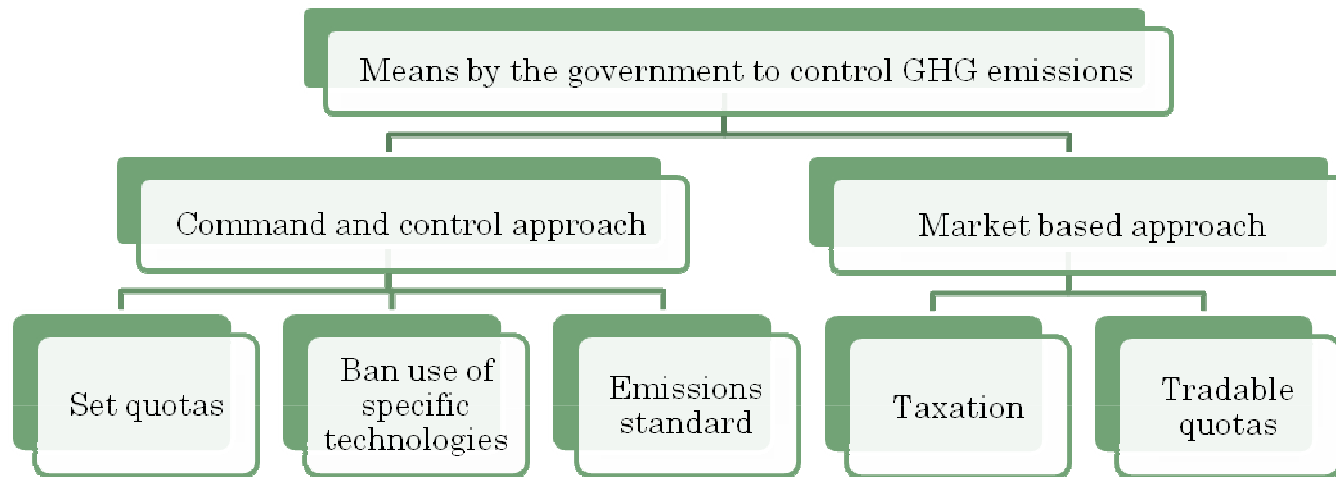
- I. BASIC IDEA OF THE MARKET APPROACH:***  
What is carbon market?  
Why was it created in the first place?
- II. PROFILE OF THE CARBON MARKET:***  
How does carbon market look like?
- III. FACTORS INFLUENCING CARBON CREDIT PRICE:***  
How is the price of the carbon credit affected?

# BASIC IDEA OF THE MARKET APPROACH

## WHAT IS CARBON MARKET?

- Carbon market is a (virtual) place to buy and sell the **rights** (permits) to emit Greenhouse Gas (GHG).
- Carbon market operates in a similar manner as other financial markets. It is bought and sold just like stocks, commodities, and other financial products.
- The price of the carbon credits change constantly according to changes in demand and supply

# MARKET APPROACH



- There are many approaches to achieve GHG emissions reductions.
- Creation of carbon market was chosen by the governments (and the group of governments) as an instrument to reduce GHG emissions.
- Environmental economists believe that market approach, especially tradable quotas, creates incentive for the firms to **innovate**, since there is a potential to make money by inventing low carbon emission technologies.

## WHY CARBON MARKET?

- Carbon market was designed to reduce GHG emissions in the most **economically efficient** manner.
- Carbon credits are bought and sold due to gains of trade:
  - A company will buy the carbon credit from the market to achieve the emissions reduction target if it is cheaper than installing emissions reduction technology
  - A company will invest in a emissions reduction technology if it is cheaper than buying carbon credits to meet the emissions reduction target or they could make a profit from selling carbon credits.
- The price of the carbon credit is determined by the market (“the invisible hand”)
- Price of the carbon credit (in theory) would settle where the supply meets the demand.

# GAINS OF TRADE: LOGIC BEHIND TRADING

## **Company A**

Address: Rainy Colombo

Current CO<sub>2</sub> emissions: 300,000 tons

- They need to reduce 100,000 tons of CO<sub>2</sub> by next year.
- They could install state of the art fuel cell power generator to reduce their CO<sub>2</sub> emissions
- To reduce 1 ton of CO<sub>2</sub> it will cost them \$30
- They need to invest \$3,000,000 to reduce 100,000 tons of CO<sub>2</sub>

# GAINS OF TRADE: LOGIC BEHIND TRADING

## **Company B**

Address: Sunny Trincomalee

Current CO<sub>2</sub> emissions: 200,000 tons

- They have no obligation to reduce CO<sub>2</sub> emissions
- They could install cheap solar power generator to reduce their CO<sub>2</sub> emissions
- To reduce 1 ton of CO<sub>2</sub> it will cost them \$10
- They could invest \$1,000,000 to reduce 100,000 tons of CO<sub>2</sub> emissions, however there is no need for them to invest on such renewable energy project and it is rather expensive compared to buying electricity from the grid.



# GAINS OF TRADE: LOGIC BEHIND TRADING

## **Scenario 1: No carbon credit market mechanism**

Company A will invest in the \$3 million fuel cell power generator to reduce 100,000 tons of CO<sub>2</sub> emissions

**Emissions reduction cost: \$30/ton of CO<sub>2</sub>**

## **Scenario 2: With carbon credit market mechanism**

- Company B will invest in the \$1 million solar power generator to reduce 100,000 tons of CO<sub>2</sub> emissions.
- This emissions reduction is sold to Company A at the price of \$20/ ton of CO<sub>2</sub>.
- The company B will make \$900,000 profit (\$2million (revenue) - \$1million (solar power generator cost) – \$100,000 (carbon credit administrative cost) )
- Company A will save \$3million – \$2million = \$1million by purchasing 100,000 tons CO<sub>2</sub> of carbon credit

**Emissions reduction cost: 20\$/tons of CO<sub>2</sub>**

## SUMMARY OF THE BASIC IDEA OF THE MARKET APPROACH

### What carbon market?

- Carbon market is the place where emissions rights (permits) are bought and sold, just like any other financial markets.

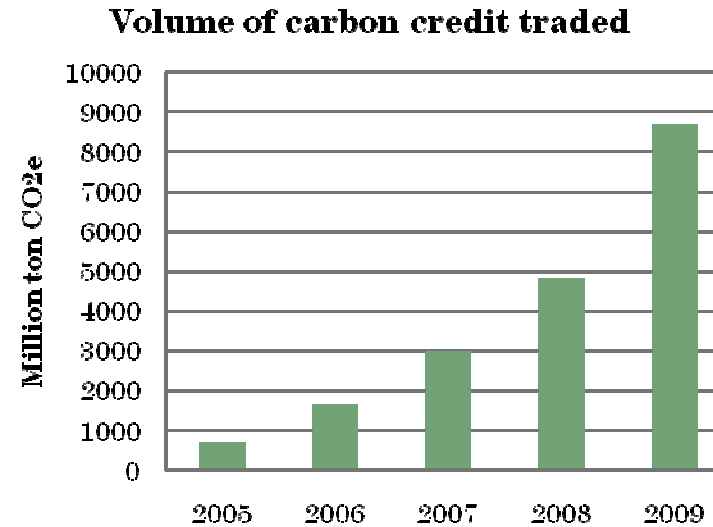
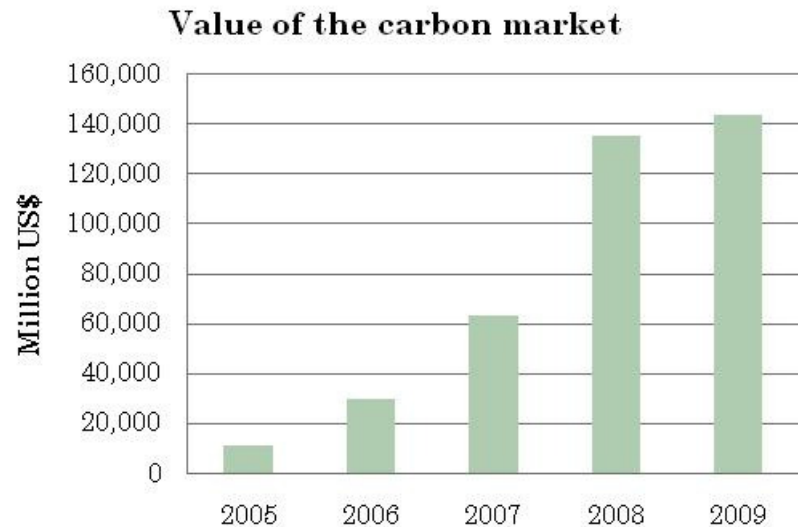
### Why was it created in the first place?

- It is a market base approach for regulating GHG emissions.
- There is an incentive to **innovate**
- Achieve GHG emission in the most economically **efficient** manner
- Prices of carbon credit are **flexible** and move where supply meets the demand

# PROFILE OF THE CARBON MARKET

# SIZE OF THE CARBON MARKET

The World Bank estimated the total value of the carbon market in year 2009 to be 144 billion US\$ and the total volume of traded carbon credit in the same year to be 8.7 billion tons of CO<sub>2</sub>e.



Source: World Bank, States and Trends of the Carbon Market 2010

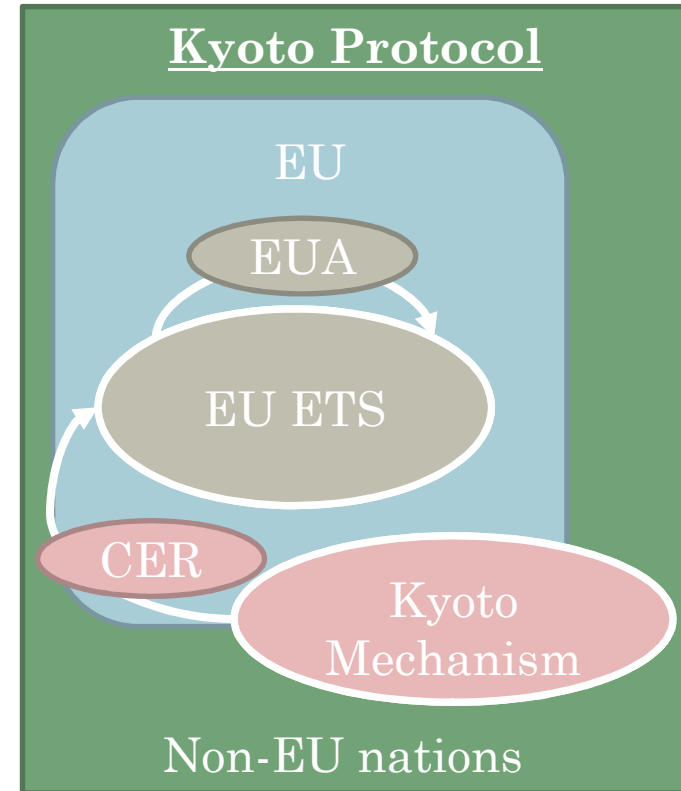
# TYPES OF CARBON CREDITS

Name of the emissions trading scheme		Name of the carbon credit		Traded volume (MtCO <sub>2</sub> e)	Market value (MUS\$)
Regulatory Compliance	Kyoto Mechanism	Clean Development Mechanism (CDM)	Primary CER	211	2,678
			Secondary CER	1,055	17,543
	Joint Implementation (JI)	Emission Reduction Units (ERU)	26	354	
	Emissions Trading (ET)	Assigned Amount Units (AAU)	155	2,033	
Regulatory Compliance	European Union Green House Gas Emission Trading System (EU ETS)		EU Allowance (EUA)	6,326	118,474
	New South Wales Greenhouse Gas Reduction Scheme (NSW-GGAS)		NSW Greenhouse Abatement Certificates	34	117
	Regional Greenhouse Gas Initiative (RGGI)		RGGI Allowance	813	2,667
Voluntary	Over the Counter Voluntary Emission Reduction			51	326
	Chicago Climate Exchange		CCX Carbon Financial Instruments (CFI)	41	50
	Other Exchanges			2	12

- One unit of all carbon credits are 1tCO<sub>2</sub>e
- Source: Ecosystem Marketplace, Bloomberg New Energy Finance, World Bank

# EU ETS MARKET

- By far the largest carbon credit market
- It is a Cap & Trade System
- Companies under the EU ETS has emissions reduction target that could be met either by reducing its own CO<sub>2</sub> emissions, or purchasing EUA or Kyoto Mechanism credits (such as CER) from the carbon market.
- Companies under the EU ETS buy and sell EUA with each other and import CER, which is emissions reduction outside of EU ETS

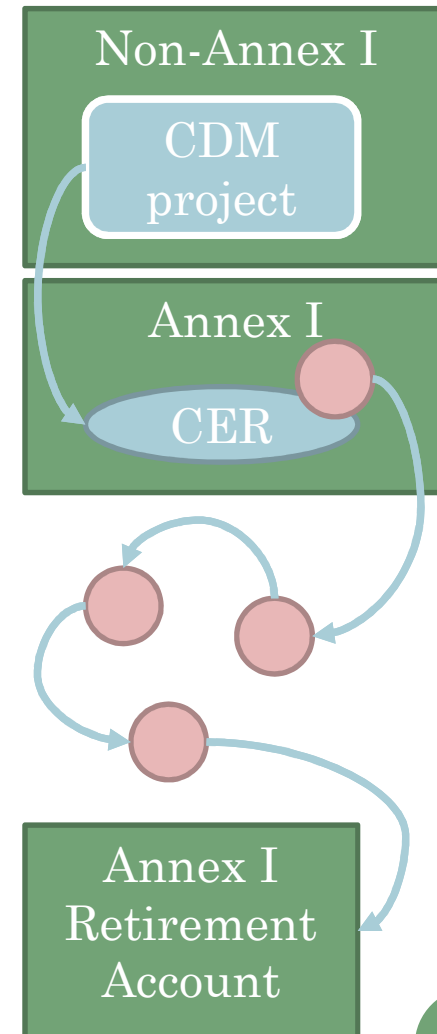


## Some of the limitations to the use of CER in EU ETS

- CER from land use, land use change and forestry activities are not eligible
- Hydro power plants that exceeds 20MW need to follow protocols set by World Commissions on Dams
- CER import limits may be imposed in the future

## CDM MARKET

- Second largest carbon credit market
- Primary CERs are the issued CERs
- When the primary CERs are sold to another party, it is called secondary CERs.
- Secondary CERs fetch higher price than primary CERs, because any amount of “issued” CERs could be obtained anytime, for example from a carbon credit exchange.
- CERs are issued from non-Annex I countries, but anyone could trade it.
- When the CER is transferred to the retirement account of a Annex I country, the CER is “used” by the country to meet its emission target.



# WHO BUYS AND SELLS CARBON CREDIT?

## Sellers

- East European Countries (AAU)
- Utility companies
- Independent Power Producers
- CDM project developers
- Carbon finance companies
- Carbon funds (project finance)

## Buyers

- Annex I countries
- Utility companies
- Steel companies
- Government institutions
- Private companies (for CSR)
- Individuals (voluntary)

## Brokers

- Exchange platforms
- Banks
- Hedge funds
- Carbon funds
- Carbon offset companies

Any companies , institutions or countries that have legally binding emissions reduction targets are potential carbon credit buyers



# CER SELLERS AND BUYERS

Buyer countries	Number of projects
Austria	89
Belgium	29
Canada	77
Czech Republic	3
Denmark	87
Finland	42
France	81
Germany	238
Greece	
Hungary	
Iceland	
Ireland	13
Italy	90
Japan	532
Latvia	
Luxembourg	33
Netherlands	465
New Zealand	1
Norway	51
Portugal	7
Spain	159
Sweden	260
Switzerland	712
United K.	1328
CDCF	1
WBCF	1
NEFCO	1
IBRD	1
CCAC16	
n.a.	1713
Total	6014

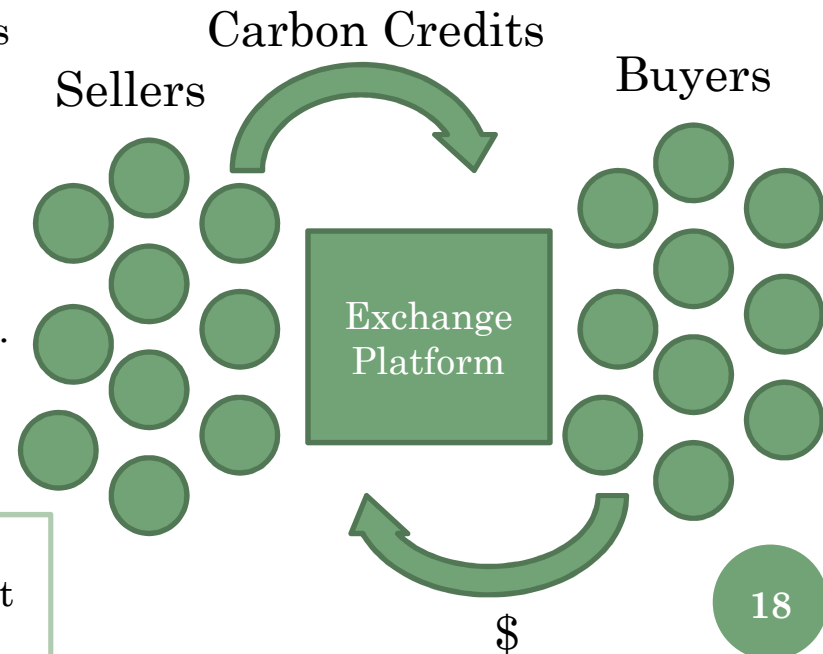
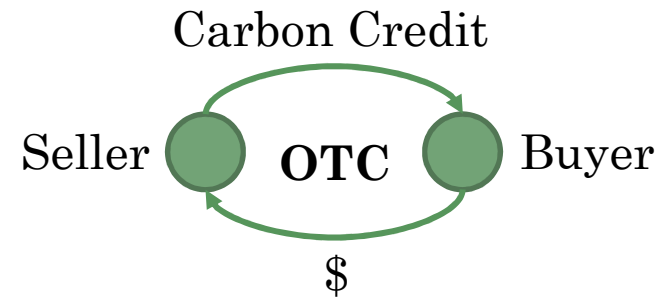
Top 20 buyers	Projects
EcoSecurities	292
Tricorona Carbon Asset Management Sweden	172
EDF Trading	111
Vitol	108
Mitsubishi	105
RWE	99
AgCert	96
Carbon Resource Management	88
CAMCO	71
Trading Emissions	71
Danish Ministry of Climate & Energy	65
MGM Carbon Portfolio	62
Cargill International	62
ENEL	62
Kommunalkredit	60
Marubeni	59
Agrienergy	55
Climate Change Capital	49
IBRD	46
Energy Systems International	45

Source: CD4CDM

- EcoSecurities is a U.K. based company.
- However, U.K. has already achieved the 2012 Kyoto Target.
- Why is U.K. company still purchasing CERs?

# TYPES OF TRANSACTIONS

- Over The Counter (OTC)
  - Individual sellers sell the carbon credit to an individual buyer in a direct manner.
  - Emissions Reductions Purchase Agreement could be concluded between the two parties
  - Basic form of credit transaction
- Exchange
  - Collective sellers trade with collective buyers using an exchange platform
  - Individual buyers does not meet with individual sellers face to face.
  - Example of exchange platform includes European Climate Exchange (ECX), Nord Pool, BlueNext, Climex and etc.
  - ECX trades largest volume of EUA and CER. ECX is a good price indicator just like New York Mercantile Exchange for international price of the crude oil (WTI)



## Why use exchange platform?

- High credibility and reliability of the carbon credit
- Fast transaction
- Transparent pricing mechanism
- Handles futures as well as spot trading

## SUMMARY OF THE PROFILE OF THE CARBON MARKET

### How does carbon market look like?

- Carbon market traded 8.7 billion tons CO<sub>2</sub> of carbon credit worth 144 billion US\$ in year 2009.
- There are many types of carbon market mechanisms, but **EU ETS is by far the largest one followed by CDM.**
- EU ETS trades EUA between the companies under the EU ETS with specified emissions reduction targets.
- EU ETS could import CER.
- Secondary CER could be traded by anybody, but eventually it will be placed in the retirement account upon its “use”.

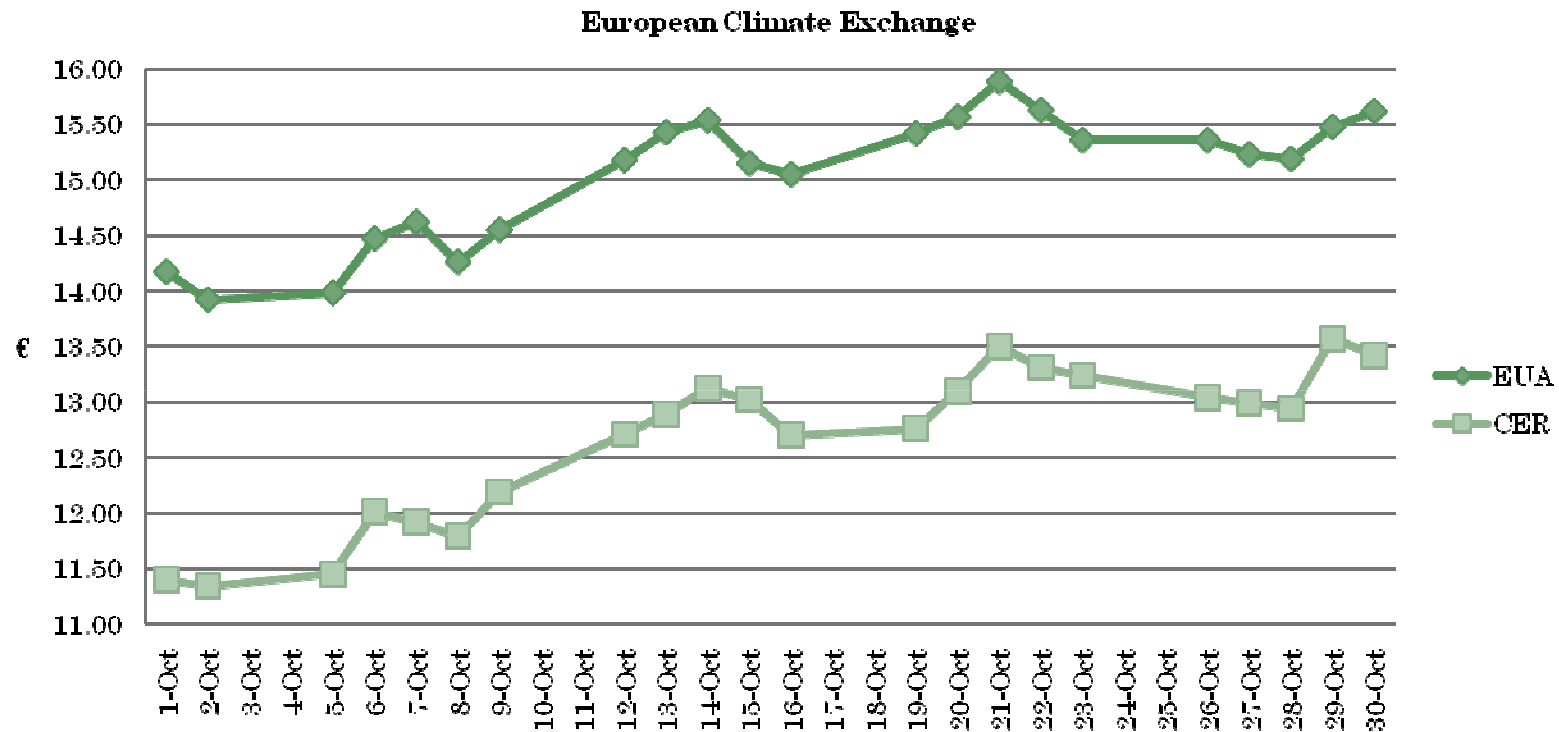
# FACTORS INFLUENCING CARBON CREDIT PRICE

# WHAT EFFECTS THE PRICE OF CARBON CREDITS?

- Price of dominant carbon credits
- Policies and regulations
- Price of the energy
- General economic trend
- Project type  
and etc.

As with other commodities, it is very difficult to predict the future price of the carbon credit.

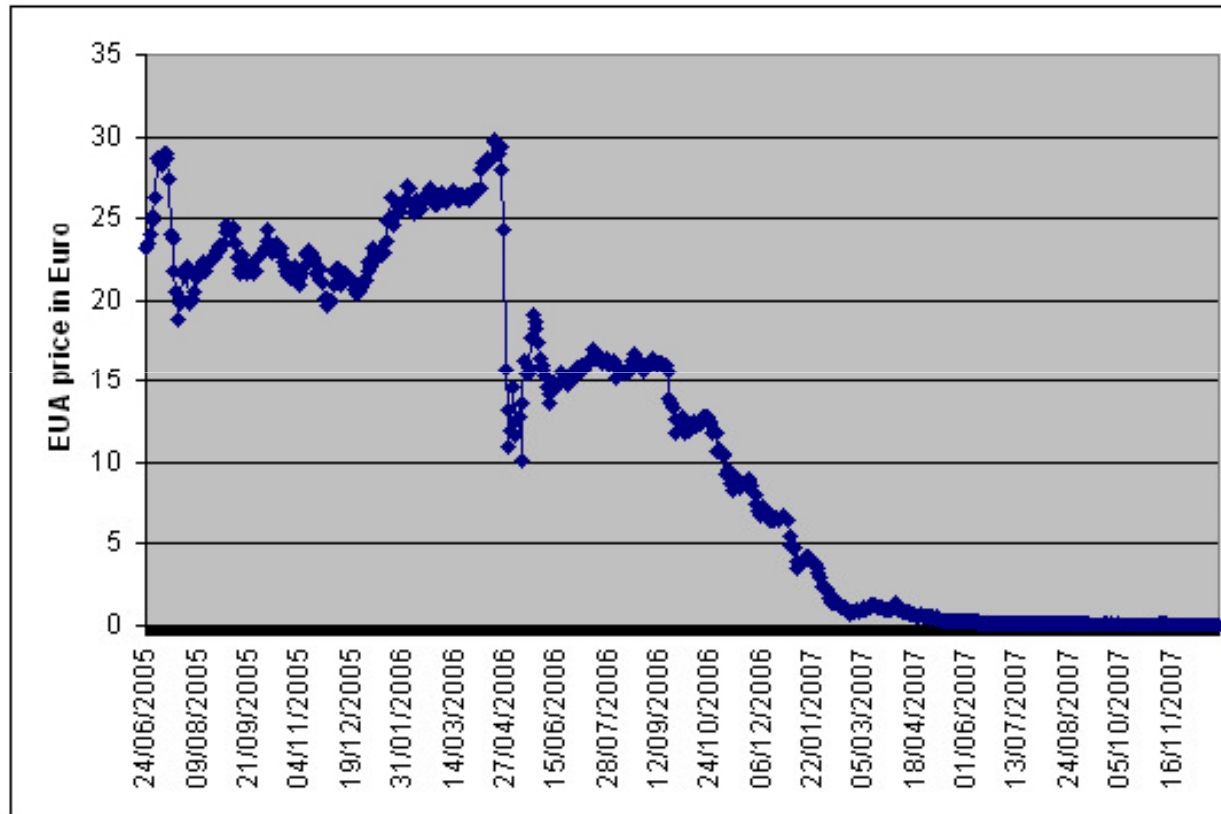
# EUA & CER PRICES



Data source: European Climate Exchange

- EUA and CER follow similar patterns
- The price of the EUA is higher than CER
- EUA price is the dominant factor over CER

# EFFECT OF OVER ALLOCATION OF ALLOWANCES ON THE EUA PRICE

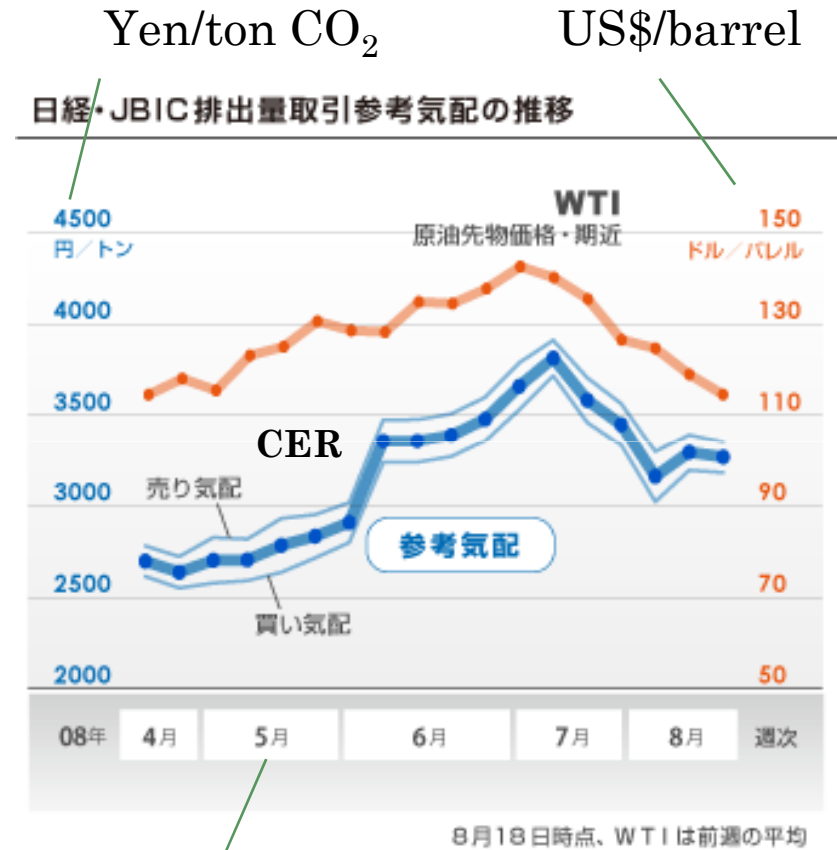


- Over allocation of EUA during the phase I of EUETS created a collapse in price
- The demand for carbon credit is artificially created by regulation

Source: IVM Institute for environmental studies

# THE EFFECT OF ENERGY PRICE ON THE CARBON CREDIT MARKET

- The energy price does affect the carbon credit price.
- But there is no clear correlation
- General economic growth may increase the energy and the carbon credit price.
- Increase in petroleum and decrease in the natural gas prices may encourage fuel switch to less carbon intensive natural gas, but at the same time, if the coal price is low it will also promote development of coal fired power plants.

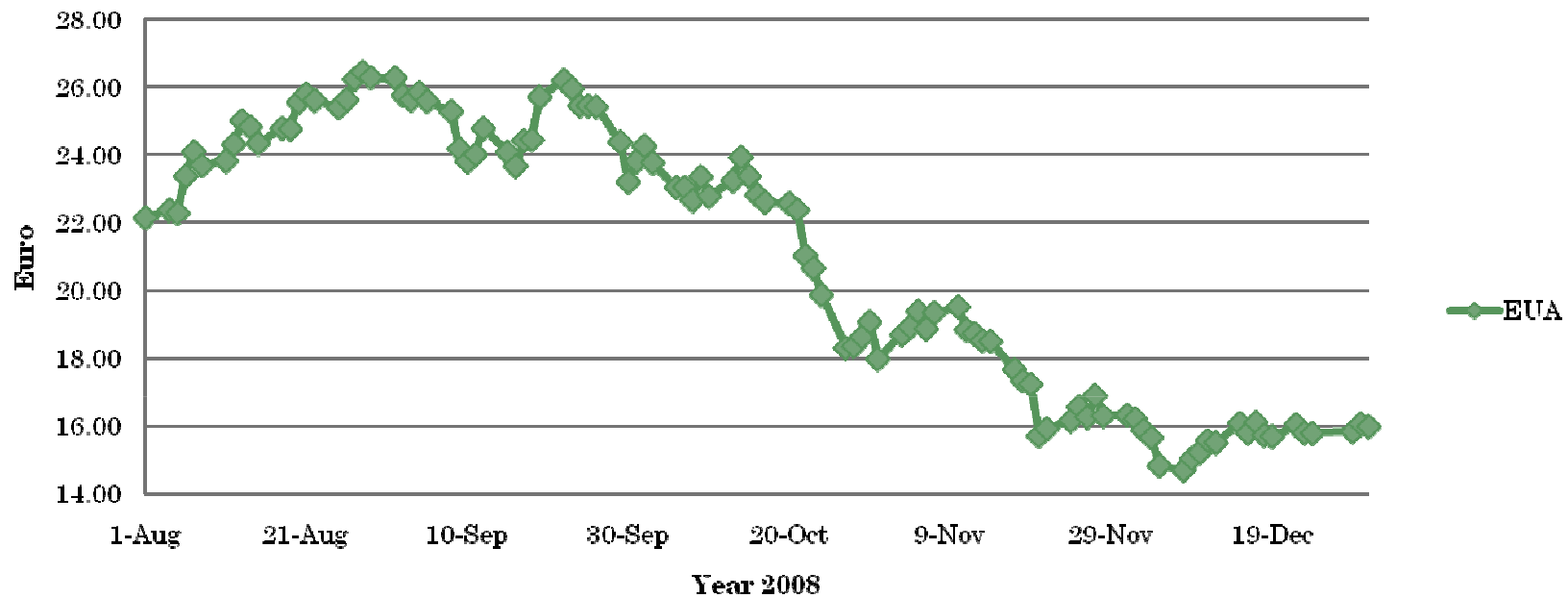


Month

Source: Nikkei



# GENERAL ECONOMIC TREND

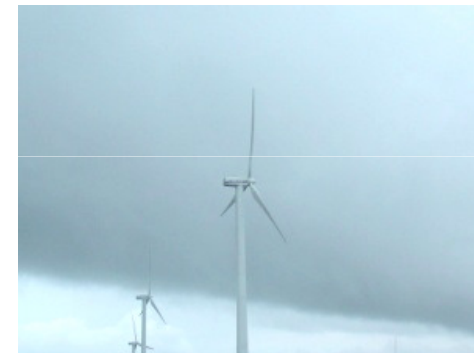


Data source: European Climate Exchange

- Lehman shock in September 2008 caused the fall in EUA price.
- Manufacturing industries were hit hard and CO<sub>2</sub> emissions decreased. Therefore the emissions reduction target was met literally by “doing nothing”.
- Therefore the demand for EUA decreased.
- The price of the EUA has not yet recovered to the pre-Lehman shock level (just like the global economy).

## THE EFFECT OF PROJECT TYPE

- CER issued from Gold Standard certified CDM projects fetch higher price in comparison to normal CDM projects.
- There are other standard such as Climate Community and Biodiversity Alliance(CCBA).
- Buyers that would use carbon credit for their Corporate Social Responsibility (CSR) may prefer CDM projects with “good image” such as wind power projects.
- CER from large scale hydro-dam projects may fetch lower than average price, since large scale hydro dam derived CER is difficult to import into the EU ETS.
- CER from HFC project generally fetch lower than average price as well.



## SUMMARY OF THE FACTORS INFLUENCING CARBON CREDIT PRICE

### **How is the price of the carbon credit affected?**

- CER price follows the pattern of EUA price
- Over-allocation of EUA caused the collapse of the EU-ETS phase I
- Energy price does have influence over the carbon market, but it is difficult to estimate its effect
- Global economic crisis impacted the carbon credit price.
- CER Project type differentiates the CER price.

Regulation artificially generates demand in the carbon market

## SOME USEFUL LINKS

- World bank carbon finance (<http://www.worldbank.org/> )
  - Publishes annual carbon market report
- European Climate Exchange (<http://www.ecx.eu/>)
  - Could obtain the latest price information for the CER and EUA traded in the exchange.
- Ecosystem Marketplace (<http://www.ecosystemmarketplace.com/> )
  - Has information on various environmental market schemes