# Carbon Trading 5: Overview of national registry system

6 July, 2010

JICA Expert Team
**Mariko FUJIMORI**



## Objectives of this section

**Objectives of this section are:**

To understand basic structure and function of registry systems under the Kyoto Protocol.

- CDM registry
- National registries

To understand an example of voluntary registry system.

- J-VER registry



## Registry system under the Kyoto Protocol

- Governments of the 38 Annex B Parties are implementing national registries, containing accounts within which units are held in the name of the government or in the name of legal entities authorized by the government to hold and trade units.
- The UNFCCC secretariat, under the authority of the CDM Executive Board, has implemented the CDM registry for issuing CDM credits and distributing them to national registries. Accounts in the CDM registry are held only by CDM project participants, as the registry does not accept emissions trading between accounts

Source: http://unfccc.int/kyoto_protocol/registry_systems/items/2723.php



## CDM registry

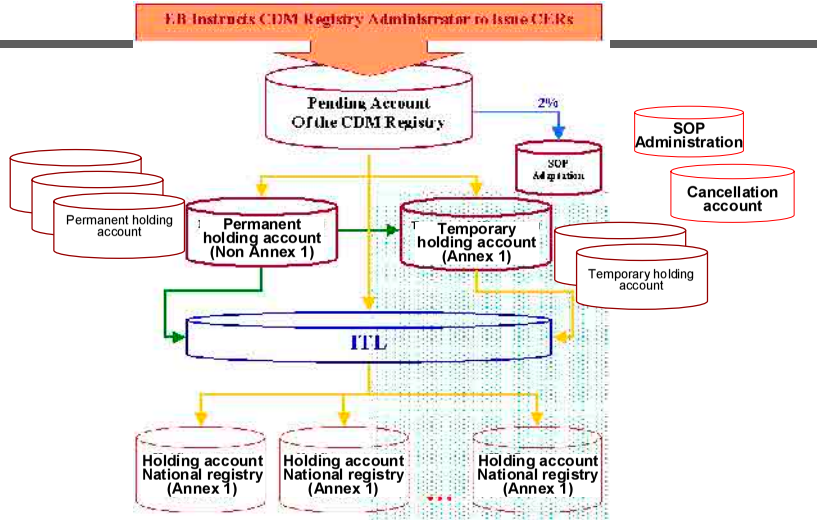
- Pending account for the Executive Board, into which CERs are issued before being transferred to other accounts,
- Holding accounts for each Non-Annex 1 Party hosting a CDM project activity or requesting an account,
- Cancellation accounts for the purpose of cancelling ERUs, CERs, AAUs and RMUs equal to excess CERs issued,
- Accounts for the share of proceeds to cover administrative expenses and to assist in meeting costs of adaptation.

Source: FCCC/KP/CMP/2005/8/Add.1

- Temporary holding accounts for project participants of Annex I Party wishing to receive CERs and whose national registry is not yet connected to the ITL.

Source: FCCC/CP/2004/2

## Transaction types allowed in the CDM registry




Source: Modified from http://cdm.unfccc.int/Registry/transaction/index.html



## National registry – Annex 1 Parties

Each national registry shall have the following accounts:

- Holding account(s) for the Party,
- Holding account(s) for entities authorized by the Party to hold ERUs, CERs, AAUs and/or RMUs,
- Cancellation account(s) for LULUCF activities,
- Cancellation account for non-compliance,
- Cancellation account(s) for other cancellations by the Parties,
- Retirement account for each commitment period,
- Replacement account for tCER,
- Replacement account for lCER.

Source: FCCC/KP/CMP/2005/8/Add.2





## National registry – Registry status report

Each Annex 1 Party report the annual operation status.

Example: Japan, 2009

| Account type | Unit type | | | | | |
|---|---|---|---|---|---|---|
| | AAUs | ERUs | RMUs | CERs | tCERs | lCERs |
| Holding accounts | 6,002,914,428 | 673,835 | 0 | 46,597,828 | 0 | 0 |
| Article 3.3/3.4 net source cancellation accounts | 0 | 0 | 0 | 0 | | |
| Non-compliance cancellation accounts | 0 | 0 | 0 | 0 | | |
| Other cancellation accounts | 0 | 0 | 0 | 20,864 | 0 | 0 |
| Retirement account | 23,000,000 | 0 | 0 | 36,085,909 | 0 | 0 |
| tCER replacement account for expiry | 0 | 0 | 0 | 0 | 0 | |
| lCER replacement account for expiry | 0 | 0 | 0 | 0 | | |
| lCER replacement account for reversal in storage | 0 | 0 | 0 | 0 | | 0 |
| lCER replacement account for non-submission of certification report | 0 | 0 | 0 | 0 | | 0 |
| Total | 6,025,914,428 | 673,835 | 0 | 82,704,601 | 0 | 0 |



## National registry – Independent Assessment Report

Each registry is assessed to determine whether the appropriate requirements are met.

- Initial Independent Assessment Report
  - Test of national registry before connecting the ITL,
- Standard Independent Assessment Report
  - After the connection (to the ITL) and operation of the national registry.

# National registry – Independent Assessment Report

| IAR SUMMARY | | | | | |
|---|---|---|---|---|---|
| General information | Registry Name | National registry of Japan | | | |
| | Date of report | 9/7/07 | Reporting period | N/A | |
| | IAR Type | Standard IAR ☐ | | Initial IAR ☒ | |
| | Components | Initialization Required ☑ | | Operational Performance Required ☐ | Public Availability of Information Required ☐ |
| | Registry URL | http://www.registry.go.jp/ | | | |
| | Consolidated system with other Parties? | Yes ☐ | No ☒ | Parties involved | |
| Overall Registry Assessment | Conclusion | Pass ☒ | Fail ☐ | | |
| | Comments / recom-mendations | The registry has fulfilled all of its obligations regarding conformity with the Data Exchange Standards. These obligations include having adequate transaction procedures; adequate security measures to prevent and resolve unauthorized manipulations; and adequate measures for data storage and registry recovery. The registry is therefore deemed fully compliant with the registry requirements defined in decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding Operational Performance or Public Availability of Information prior to the operational phase.<br><br>Japan successfully completed on time (by 2 July 2007) all tests required by the Data Exchange Standards. However, technical issues outside Japan's control prevented the ITL Administrator from running a procedure to confirm the success of one of the tests. The procedure was eventually run on 6 July 2007 and confirmed the success of this remaining test. The resulting delay in the production of the IAR was thus in no way related to the state of readiness of the national registry of Japan. | | | |
| | Conclusion | Pass ☒ | Fail ☐ | N/A ☐ | |



# International Transaction Log (ITL)

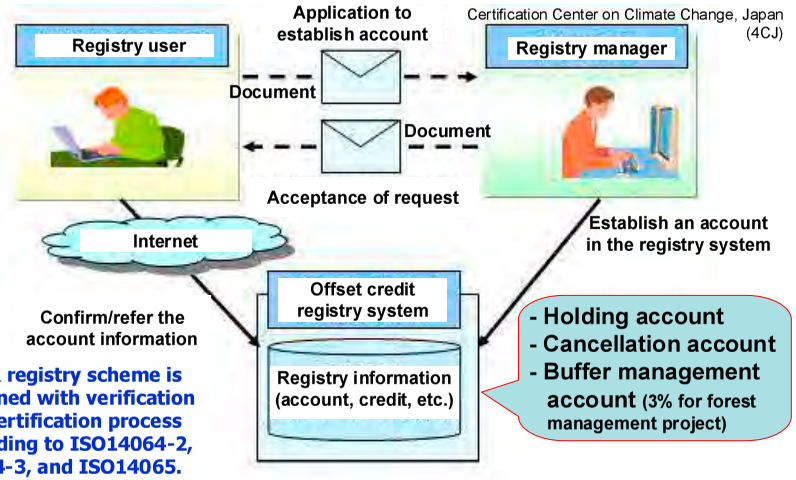
- The secretariat shall establish and maintain an ITL to verify the validity of transactions, including issuance, transfer and acquisition between registries, cancellation and retirement of ERUs, CERs, AAUs and RMUs and the carry-over of ERUs, CERs and AAUs.
- COP requested the secretariat to report annually to the CMP on organizational arrangements, activities and resource requirements and to make any necessary recommendations to enhance the operation of registry systems.
- CMP requested SBI to consider the annual reports, with a view to requesting the CMP to provide guidance, as necessary, in relation to the operation of registry systems.

Source: FCCC/KP/CMP/2009/19





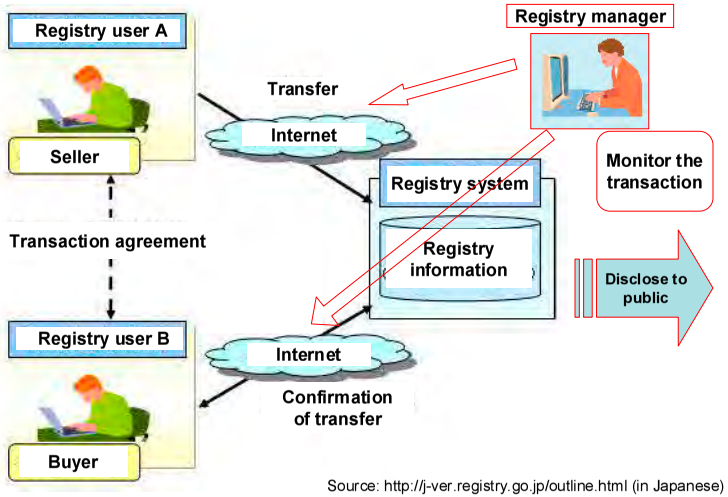
# J-VER Registry system - Account




Source: http://j-ver.registry.go.jp/outline.html (in Japanese)



# J-VER Registry system - transaction




Source: http://j-ver.registry.go.jp/outline.html (in Japanese)

# J-VER Registry


2 accounts

**60 Private entities accounts (for selling and buying)**

# GHG 06
# Japan's Voluntary Emissions Trading Scheme (JVETS)

10th, May, 2011

Deputy chief advisor of JICA Expert Team
**Kazuhito YAMADA**



# Today's Agenda

- What is JVETS?
- JVETS overview
- Key features of JVETS
- JVETS operation infrastructure
- Three core systems of JVETS
- Key guidelines in JVETS
- JVETS third-party verifiers
- Main participant list in JVETS (1st to 4th phases)
- JVETS Phase 4
- Chronological Table of Carbon Emission Trading in Japan



# What is JVETS? (1)

- **JVETS =**

  Japan's Voluntary Emission Trading Scheme

- Ministry of the Environment, Japan (MOEJ) has started JVETS to accumulate knowledge and experience about emissions trading in Japan and to support $CO_2$ emissions reduction activities by Japanese private entities.



# What is JVETS? (2)

## Scheme Overview

- The scheme aims to support voluntary $CO_2$ reduction activities by private entities and to ensure their target achievement in a cost-effective way using (1) a **subsidy** to facilities which contribute $CO_2$ emissions reduction, (2) participants' **commitments** to reduce $CO_2$ emissions below their base year emissions, and (3) **emissions trading**.

# What is JVETS? (3)

## Merits for scheme participants

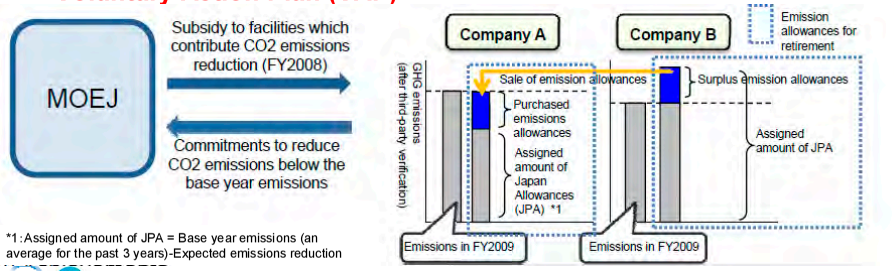
- **Subsidy** to facilities which contribute $CO_2$ emissions reduction (eg. energy saving facilities)
- Opportunity to take third-party **verifications** of their $CO_2$ emissions
- **Sales** revenues from their **surplus** emission allowances
- Acquisition of **know-how** on **domestic emissions trading**
- Acquisition of **know-how** on the established $CO_2$ emissions **calculation system**
- Reduction of **energy costs** for JVETS participants



# JVETS overview (1)

## Scheme outline:

- Launched by MOEJ in 2005.
- Participants of JVETS are counted as participants of **Japanese Experimental Emissions Trading Scheme**.
- Candidates should be factories and offices which are **NOT** included in **Voluntary Action Plan (VAP)**




*1:Assigned amount of JPA = Base year emissions (an average for the past 3 years)-Expected emissions reduction



# JVETS overview (2)

## Achievements:

- Total participants: 232 companies
- Emissions reduction in FY2007 by 2nd phase (FY 2006) participants: **280,192t-$CO_2$** (25% of the total emissions in the base year emissions) cf. their original emissions reduction plan: 19% of the total emissions in the base year emissions
- Total transactions in the 2nd phase: 51 transactions (**54,643t-$CO_2$** in total) with the average price of **¥1,250/t-$CO_2$**.
- Development of infrastructure for emissions trading: Emissions **monitoring**, **reporting** and **verification** guidelines, the registry for emissions trading, and the emissions management system.

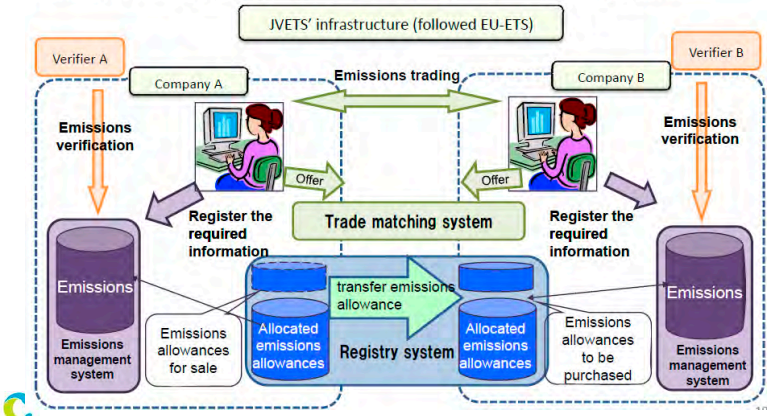


# Key features of JVETS

- **First carbon pricing and emissions trading in Japan**
  - Transactions are available on request for10am-6pm (JST) on business days
  - Settlement is completed by emissions allowance transaction
- **Development of infrastructure for emissions trading**
  - IT system: the registry system, emissions management system, and trade matching system
  - Guidelines: the monitoring and reporting guidelines, emissions verification guidelines
  - Form of documents for a transaction contract
  - Proposals for accounting treatment of emissions allowances in emissions trading
- **Introduction of third-party emissions verification**
  - Third-party verifiers conduct emissions verification for participants' base year emissions and their reduced emissions
  - Third-party verification ensures credibility of emissions allowances as " merchandise"

# JVETS Operation Infrastructure

One of the big contributions of JVETS is that it has established basic infrastructure (the emission monitoring, reporting and verification guidelines, registry system, and emissions management system etc.) which is required for smooth operation.





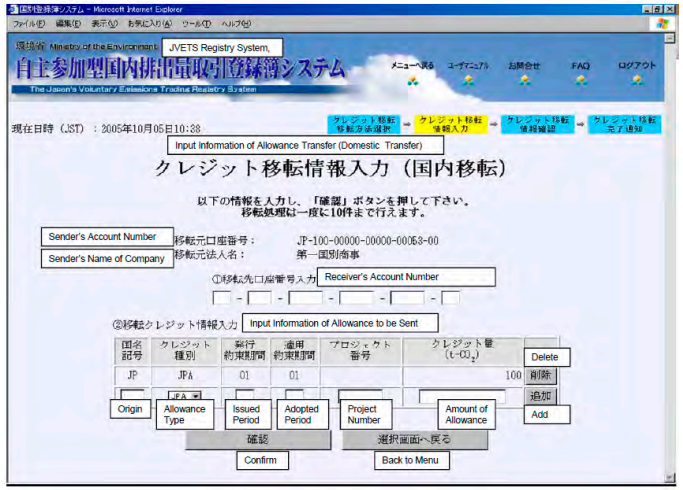

# Three core systems of JVETS

| System | System overview | Contribution |
|---|---|---|
| **Registry system** | - Manages the initial allocations (JPAs), emissions allowance transactions (trading) and retirement<br>- Manages all accepted allowances and credits in JVETS (JPAs and jCER)<br>- Emission allowance transaction time: 10am-6pm (JST) on business days | - No double counting and the same security level of allowance retirement as the national registry in Kyoto Protocol<br>- Open access to the web-based registry system for all participants |
| **Emissions management system** | - Based on the emissions monitoring and reporting guidelines, all participants' emissions base years and their actual emissions amounts in their commitment periods are stored under the system.<br>- The data will be used for third party verification.<br>- Adopts existed monitoring methods (mainly energy purchasing bill)<br>- EU-ETS verifiers voluntarily use similar management systems | - Integrated emissions calculation method<br>- Streamlined emissions calculation and verification processes<br>- Database of all stakeholder information |
| **Trade matching system ("GHG-trade.com")** | - Encourages emission allowance transactions among the participants.<br>- Requires pre contacts before sales of allowances.<br>- Updates allowance prices and amounts for participants' transactions on the notice board. (After confirmation of the contract details, participants should pay to their clients' bank accounts and apply for allowance transactions in the registry system.) | - Opportunities for the participants to find their trading counterparts through the Internet |



# Registry System of JVETS

*Image (1)*

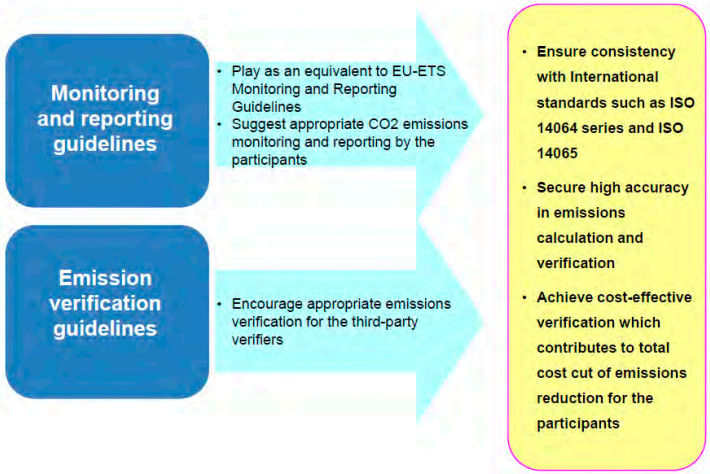





# Three core systems of JVETS

*Image (2)*

# Key guidelines in JVETS






# JVETS third-party verifiers

- KPMG AZSA & Co.
- SGS Japan Inc.
- PricewaterhouseCoopers Arata Sustainability Certification Co., Ltd.
- Deloitte Tohmatsu Evaluation and Certification Organization Co., Ltd.
- Ernst & Young ShinNihon Sustainability Institute Co., Ltd.
- JACO CDM Ltd.
- Japan Quality Assurance Org.
- Japan Management Assn.
- Japan Consulting Inst., JCI CDM center
- Det Norske Veritas AS
- TÜV SÜD Japan Ltd.
- TÜV Rheinland Japan Ltd.
- Nippon Kaiji Kentei Quality Assurance Ltd.
- JIC Quality Assurance Ltd.
- BSI Management Systems Japan K.K.
- Bureau Veritas Japan Co., Ltd.
- Lloyd's Register Quality Assurance Ltd.
- Development Mechanism Inc
- Perry Johnson Registrars Clean Mechanism, Inc.
- Japan Smart Energy Co., Ltd.
- Environment & Quality Assurance International Certification Center





# Main participant list in JVETS (1st to 4th phases)

**1st phase (2005-2007)**

| | |
|---|---|
| Nippon Electric Glass Co., Ltd. | Nissan Shatai Co., Ltd. |
| Mitsubishi Gas Chemical Co., Inc. | Kitasenjyu branch, LUMINE Co., Ltd. |
| Asahi Fiber Glass Co., Ltd. | The SEIYU Co, Ltd. |
| Teijin Techno Products Ltd. | INAX Co. |
| Yamazaki Baking Co., Ltd. | Panasonic Electric Works Gumma Co., Ltd. etc. |

**2nd phase (2006-2008)**

| | |
|---|---|
| Rengo Co., Ltd. | INAX Co. |
| Tokai Senko K.K. | Victor Company of Japan, Ltd. |
| TOTO Ltd. | Suntory Ltd. |
| Suntory Shokuhin Kogyo Ltd. | Calpis Co., Ltd. |
| House Foods Co. | Meiji Dairies Co. etc. |

**3rd phase (2007-2009)**

| | |
|---|---|
| Toyo Kohan Co., Ltd. | Hitachi Seisen Ltd. |
| Teijin Fibers Ltd. | Sumitomo Rubber Industries Ltd. |
| Daiwa House Industry Co., Ltd. | Kikkoman Co. |
| Mitsubishi Plastics Inc. | Nippon Milk Community Co., Ltd. etc. |

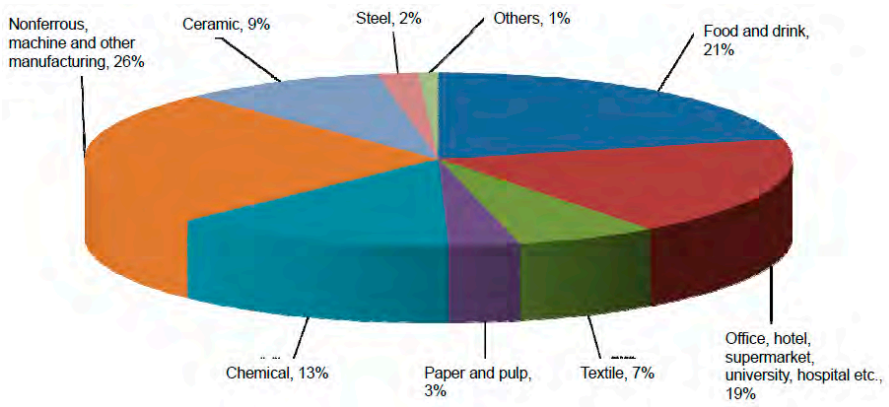
**4th phase (2005-2007)**

| | |
|---|---|
| Takeda Pharmaceutical Co., Ltd. | Isuzu Motors Ltd. |
| TOYOBO Co., Ltd | Epson Imaging Devices Co. |
| Showa Denko K.K. | New Otani Co., Ltd. |
| Sumitomo Light Metal Industries Ltd. | Family Mart Co., Ltd. etc. |

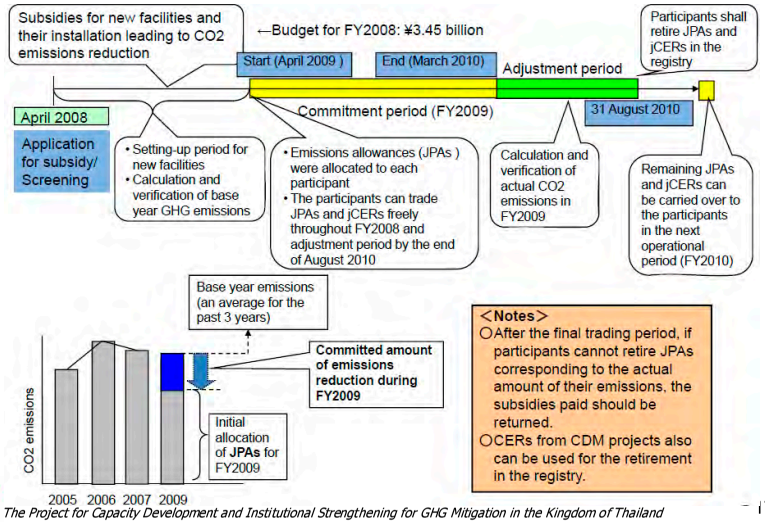
Source: http://www.env.go.jp/earth/ondanka/det/koubo-result.html



# Industrial classification of JVETS participants (1st to 4th phases)



# JVETS Phase 4






# Chronological Table of Carbon Emission Trading in Japan

**2005:**

- Establishment of **JVETS** by MOE

*Lehman Brothers Shock in 2008!*

**2008:**

- Establishment of **Domestic CDM** by METI
- Establishment of **J-VER** by MOE
- Establishment of "**Pilot Operation of Unified Domestic Emissions Trading Market**"
- "Approach to Japanese Emission Trading Scheme Interim Report" Released

**2010:**

- The cabinet decided on the new Japanese bill of the "Basic Act on Global Warming Countermeasures" including the establishment of domestic emission trading scheme in March.
- The committee of ministers related to climate change decided that "domestic emission trading scheme should be considered deliberately" in December.

*Earthquake & Tsunami in March 2011!*

# UNFCCC Structure and Negotiations 1: Overview of UNFCCC and international negotiations: from establishment to present

April, 2010

JICA Expert Team
**Mariko FUJIMORI**

A1-95

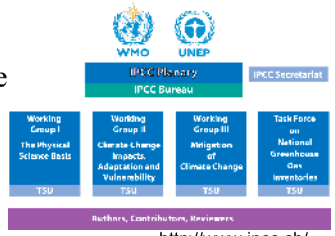
## Contents





## IPCC (1989)

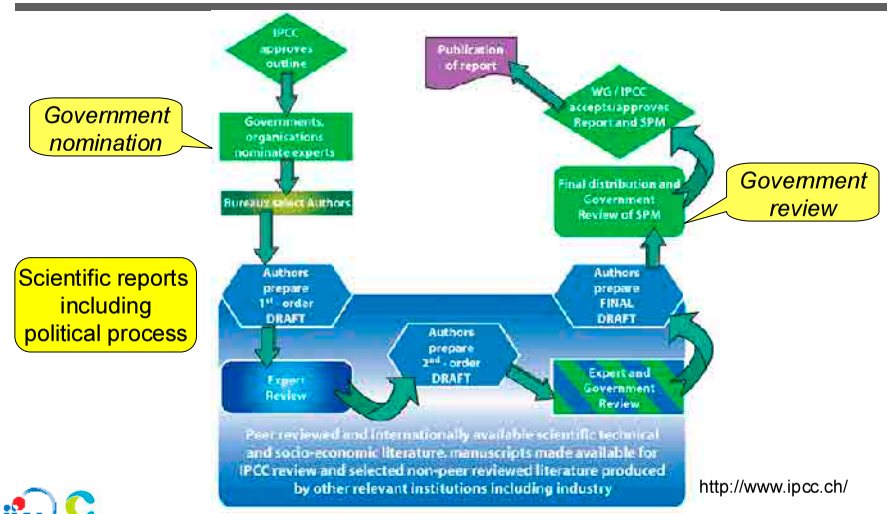
- Establishment of IPCC (UNEP and WMO), by the UN General Assembly Resolution in 1988
- Reviewing scientific papers of all the countries of the world → Putting together latest research developments → making them public after approval by the governments of all the countries of the world,
- Three WGs (WG I: The Physical Science Basis, WG II: Impacts, Adaptation and Vulnerability, WG III: Mitigation of Climate Change) and Task Force on National Greenhouse Gas Inventories (TFI)
- Climate Gate (emails of 10 years ago.... 'gray' scientific papers in the field of impacts, adaptation and vulnerability)




http://www.ipcc.ch/



## How to develop IPCC reports




http://www.ipcc.ch/

# History of IPCC reports

- FAR (1990) : We are certain of the following:

  - there is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be.

  - emissions resulting from human activities are substantially increasing the atmospheric concentration of the GHGs. These increase will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface.
- SAR (1995) : Increase in GHGs concentrations since pre-industrial times (i.e., since about 1750) have led to a positive radiative forcing of climate, tending to warm the surface and to produce other changes of climate.



# History of IPCC reports

- TAR (2001) :Emissions of GHGs and aerosols due to human activities continue to alter the atmosphere in ways that are expected to affect the climate
- AR4 (2007) : Warming of the climate system is unequivocal./Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations.
- AR5 (2013-2014): ?????

- Upcoming Special Reports; on "Renewable energy sources and climate change mitigation", and "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation", both in 2011.





# UNCED and UNFCCC (1992)

- United Nations Conference on Environment and Development (UNCED) was held in Brazil in 1992,
- "Common but Differentiated Responsibility": Rio Declaration on Environment and Development and Agenda 21,
- Three conventions, UNFCCC, UNCBD and UNCCD were adopted at the UNCED,
- Why 'Framework'?
- Relationship among three conventions,
- Present status of UNFCCC (COP15 in Mexico), UNCCD (COP10 in Japan), and UNCBD (COP10 in Korea).



# UNCED and UNFCCC (1992)

Quantified Emission Limitation and Reduction Objectives: (QUELROs)

- USA was opposed to EU that insisted challenging QUELROs.
- Other developed countries including Japan considered that EU' recommendation was unrealistic while recognized the necessity of ambitious QUELROs.
- Russia and EITs such as eastern European countries were opposed to accept same level of QUELROs.

→International negotiation was stagnant and they could not find compromise resolution.

'I agree with the plan in general, but will not compromise on details.'

# UNCED and UNFCCC (1992)

Participation of developing countries:

- Developed countries:

  In order to solve global warming, developing countries should have QUELROs because their GHG emissions will increase more than developed countries in the near future.
- Developing countries:

  Global warming issue has to be solved only by the effort of developed countries because it is sure that present accelerated greenhouse effect is caused by GHG emissions of developed countries.



# From Berlin Mandate (1995: COP1) to Kyoto Protocol (1997: COP3)

Berlin Mandate:

- One of the Decisions was made in COP 1 held at Berlin in 1995.
- The Decision stipulated that the protocol including QUELROs , policy and measures of developed countries shall be adopted in COP 3.
- In COP1, it was reconfirmed that developing countries did not have any QUELROs.
- Based on the output of COP1, Ad-hoc Group for Berlin Mandate was established in order to figure out nature and characteristics of the protocol until COP 3.





# From Berlin Mandate (1995: COP1) to Kyoto Protocol (1997: COP3)

Kyoto Protocol (KP):

- KP was adopted in COP3 held at Kyoto in 1997.
- KP has a provision stipulated the QUELROs of developed countries.
- Targeted GHG: $CO_2$, $CH_4$, $N_2O$, HFC, PFC, $SF_6$,
- Base Year: 1990 (HFC, PFC, $SF_6$:1995),
- Flexibility mechanisms: CDM, JI, ET,
- USA: withdraw in 2001,
- KP came into force in 2005 after the ratification of Russia in 2004.



# Marrakesh Accord (2001,COP7)

- After COP 3, before COP 6
- Main negotiation points in COP6
- What happened in COP6-bis?
- Main negotiation points in COP7

# Marrakesh Accord (2001,COP7)

Main discussion points:

- Kyoto Mechanisms:
  - Supplementality of CER/ERU/AAU,
  - Diversion of ODA,
  - Negative list: refrain from nuclear related activities,
- Carbon Sink
- Adaptation
- National Communication, IPCC-TAR



# From effectuation of Kyoto Protocol to First commitment period

- KP came into force in 2005
- Starting year of KP: 2008
- Various criticisms to KP
  - Developed countries（EU, USA, Japan）,
  - Developing countries（BRICS, oil producing countries, vulnerable LDC）,
  - Business communities in developed countries,
  - Business communities in developing countries,
  - Scientists,
  - NGOs





# From effectuation of Kyoto Protocol to First commitment period

- What kind of activities did they do for their criticisms?
  - Developed countries（EU, USA, Japan）,
  - Developing countries（BRICS, oil producing countries, vulnerable LDC）,
  - Business communities in developed countries,
  - Business communities in developing countries,
  - Scientists,
  - NGOs



# From effectuation of Kyoto Protocol to First commitment period

Major issues after Marrakesh Accord

COP8 2002: Delhi: Ratify the Kyoto Protocol in a timely manner; Details of CDM M&P, etc.

COP9 2003: Milan: Strong support for its immediate entry into force, importance of the CDM as an instrument for capacity-building and a means to forge partnerships, prompt implementation of the CDM, etc.

COP10 2004: Buenos Aires: Effectuation of KP, Buenos Aires programme of work on adaptation, accreditation of DOEs, small scale AR-CDM, etc.

COP11 2005：Montreal: Dialogue on long-term cooperative action, consideration of commitments for subsequent periods for Annex I Parties (AWG, start from 2006), establishment of JISC, etc.

# From effectuation of Kyoto Protocol to First commitment period

Major issues after Marrakesh Accord

COP12 2006: Nairobi: AWG2: Necessary to engage major emitters of GHGs in a common long-term effort, regional balance of CDM projects, etc.

COP13 2007: Bali: Bali Road Map, AWG-LCA, REDD, Adaptation Fund, AWG-KP; "the AWG recognized that the contribution of WGIII to the AR4 indicates that …… potential damage limitation would require Annex I Parties as a group to reduce emissions in a range of 25-40 % below 1990 levels by 2020," etc.

COP14 2008: Poznan: Confirmation of necessary emission reduction (25-40%), sectoral approach, technology transfer (Poznan strategic programme), Adaptation Fund (not from JI and ET), etc.



# Copenhagen Accord

- Recognize the scientific view that the increase in global temperature should be below 2 degrees Celsius, on the basis of equity and in the context of sustainable development, enhance our long-term cooperative action to combat climate change,
- Annex I Parties commit to implement individually or jointly the quantified economy-wide emissions targets for 2020, to be submitted in the format given in Appendix I by Annex I Parties to the secretariat by 31 January 2010. Annex I Parties that are Party to the Kyoto Protocol will thereby further strengthen the emissions reductions initiated by the Kyoto Protocol.
- Non-Annex I Parties to the Convention will implement mitigation actions, including those to be submitted to the secretariat by non-Annex I Parties in the format given in Appendix II by 31 January 2010.
- Mitigation actions taken by Non-Annex I Parties will be subject to their domestic **M**easurement, **R**eporting and **V**erification the result of which will be reported through their national communications **every two years**.





# Copenhagen Accord

- Nationally appropriate mitigation actions seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support. ..... These supported nationally appropriate mitigation actions will be subject to international **M**easurement, **R**eporting and **V**erification in accordance with guidelines adopted by the Conference of the Parties.
- To provide new and additional resources, including forestry and investments through international institutions, approaching USD 30 billion for the period 2010 - 2012 with balanced allocation between adaptation and mitigation. In the context of meaningful mitigation actions and transparency on implementation, developed countries commit to a goal of mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries.
- Call for an assessment of the implementation of this Accord to be completed by 2015.....This would include consideration of strengthening the long-term goal referencing various matters presented by the science, including in relation to temperature rises of 1.5 degrees Celsius.



# Copenhagen Accord

Annex I Parties: Emissions reduction targets for 2020

| Country | Emissions reduction in 2020 | Base year |
|---|---|---|
| Australia | -5% up to -15% or -25% | 2000 |
| Belarus | -5-10% | 1990 |
| Canada | 17% | 2005 |
| Croatia | -5% | 1990 |
| EU | 20%/30% | 1990 |
| Iceland | 30% | 1990 |
| Japan | 25% | 1990 |
| Kazakhstan | 15% | 1992 |
| Liechtenstein | 20%/30% | 1990 |
| Monaco | 30% | 1990 |
| New Zealand | 10-20% | 1990 |
| Norway | 30-40% | 1990 |
| Russia | 15-25 % | 1990 |
| Switzerland | 20% / 30% | 1990 |
| USA | 17% | 2005 |

http://unfccc.int/home/items/5264.php

# Copenhagen Accord

Non-Annex I Parties: Nationally appropriate mitigation actions for 2020

(Abstract: Countries with numerical target)

| Non-Annex I Parties | Actions |
|---|---|
| Brazil | Expected reduction of 36.1% to 38.9%<br>Including reduction in Amazon deforestation, "Cerrado" deforestation, energy efficiency, etc. |
| China | 40-45% by 2020 compared to the 2005 level<br>Including increase the share of non-fossil fuels in primary energy consumption, and increase forest coverage. |
| India | 20-25% compared to 2005 |
| Indonesia | 26% Including sustainable peat land management, 3. development of carbon sequestration projects in forestry and agriculture, etc. |
| Israel | 20% compared to BaU |
| Maldives | Achieve carbon neutrality as a country by 2020 |
| Marshall Islands | 40% compared to 2009 |
| Mexico | 30%, 51 million tons of CO2e by 2012 |
| Papua New Guinea | At least 50% by 2050, Carbon neutral before 2050 |
| Republic of Korea | 30% compared to BaU |
| Republic of Moldova | 25% compared to 1990 |
| Sierra Leone | 40% compared to 1990 |
| Singapore | 16% compared to BaU |
| South Africa | 34% by 2020, 42% by 2025 compared to BaU |
| Thailand | ??? |

http://unfccc.int/home/items/5265.php



# Copenhagen Accord : key points

(1) Increase in global temperature

- Recognize the scientific view of IPCC-AR4 that increase in global temperature should be below 2℃,
- IPCC-AR4-WG2 describes "It is very likely
- that all regions will experience either declines in net benefits or increases in net costs for increases in temperature greater than about 2-3℃.
- Countries including EU insist that the increase in global temperature should be below 2℃, or below 1.5℃.



A1-100

# Copenhagen Accord : key points

(2) Measurement, Reporting and Verification (MRV)

- Confirm the "real" emission reduction,
- Copenhagen Accord distinguish necessary MRVs for "domestic" and "internationally supported" mitigation actions.
- COP15 encountered severe negotiations among Annex 1 Parties, Non-Annex 1 Parties with large amount of GHGs emissions (such as BASIC), and NA1 Parties with less emissions of GHGs but high vulnerabilities to the impact of climate change (such as small island countries).
- Guidelines for MRV will be adopted by the COP, and the details for implementation are future issues.



# Copenhagen Accord : key points

(3) Resources to support developing countries

- 2010 – 2012: US$ 30 billion: for adaptation and mitigation
- by 2020: US$ 100 billion dollars a year: meaningful mitigation actions
- "Copenhagen Green Climate Fund" will be established to flow these funding.
- However, the rules of "How to raise , manage, and allocate the fund" are future issues to be negotiated and defined through COP.

# UNFCCC Structure and Negotiations 2: UNFCCC and key international negotiations after COP3

27th April, 2010

JICA Expert Team
**Mariko FUJIMORI**

A1-101

## Contents

- What were the **biggest changes** before and after COP3?
- **Key players** of COP negotiations,
- Why COP6 was suspended and **COP6-bis** was required?
- Key points (milestones) until the Copenhagen Accord.
- What is the **difference** between "Copenhagen Accord?" and "Marrakesh Accord"?



## What were the biggest changes before and after COP3?

- Emission reduction target to Annex 1 Parties,
- Target GHGs
- Removals by land use change and forestry
- Base year (1990) and target year (2008-2012) ?
- No obligation to Non-Annex 1 Parties
- Kyoto Mechanisms (*Low hanging fruits*) ?

→ However, details were not decided until COP7 (2001); Marrakesh Accord.



## Key players of COP negotiations

Early stage, key players were relatively simple:

- EU, USA, Japan, NA-1, Russia and EIT

Recently, situation is more complicated:

- EU: Drive KP, integrating climate change issues into their growth strategies (renewable energy, ET, etc.).
  - Expansion of EU (from 15 to 27) brought both power and difficulties. ?
- USA: Prefer market mechanisms - withdraw - return
- Japan: Host of COP3, coordinating role, challenging target (-25%).

## Key players of COP negotiations

- Non-Annex 1 Parties: diversified
  - BASIC (Brazil, South Africa, India, China),
  - Countries with less emission than BASIC countries,
  - Most vulnerable countries including small island states.

?

- NGOs have also been diversified.
  - Environment
  - Research/Science
  - Private entities
  - More and more……



## Why COP6 was suspended and COP6-bis was required?

- 2002: Rio + 10 → Target year to make KP enter into force → *Rules should be defined until 2001!!*
- Required ratification:
  - More than 55 Parties,
  - More than 55% of emission from Annex I Parties.
- Difference among EU, Umbrella (Iceland, USA, Ukraine, Australia, Canada, New Zealand, Norway, Russia, Japan), Non-Annex I Parties, and within the groups.
- Most difficult issues: land use (removal)

?

→ COP6 was suspended.





## Why COP6 was suspended and COP6-bis was required?

- January 2001: Change of USA government → withdrew from the KP in March 2001
  - No obligation to Non-Annex 1 Parties
  - Too severe target: adverse effect to their economy,

?

Their basic ideas are not different now.

- Severe criticisms to the USA
- USA Proposed to provide another Protocol until COP6-bis, but it was not developed in time (because of domestic difficulties).
- Key players at COP6-bis: Japan, Canada, EU, Russia, and USA (silence)
- Key issues: LUCF, financial mechanisms

?



## What are the differences between "Copenhagen Accord?" and "Marrakesh Accord"?

- Copenhagen Accord includes very important point for Non-Annex 1 Parties; **MRV**
  - Who?
  - Where?
  - How much?

GHG emission

?

- Correct and organized data is essential to know emission.
- It requires many types of technologies;
  - How to measure?
  - How to monitor? (continuous measurement, data storage, etc.)

?

- Then we can identify who, when should take what kind of mitigation measures.

# What are the differences between "Copenhagen Accord?" and "Marrakesh Accord"?

- Mitigation measures include various types of ideas, technologies and institutions, such as CCS and REDD.
- However, most important points for REAL reduction are who and how to introduce best available technologies in timely manner.
- MRV is most important for such activities.

Registration << Issuance

?

What are the differences between Copenhagen Accord and Marrakesh Accord?

**How Copenhagen Accord relates to Thailand?**

# UNFCCC Structure and Negotiations 3: Overview of international negotiations over post-2012 mechanisms

25th May, 2010

JICA Expert Team
**Mariko FUJIMORI**



## Contents

- Major issues in international negotiations
- Schedule of negotiations until COP16/CMP6
- Important points of Copenhagen Accord
- Targets/NAMAs for 2020
- Importance of Key Players
- Border Measures – impact to other field from climate change world



## Major issues in international negotiations

- Mitigation
  - How can we assure fair, transparent and practical scheme?
  - Legal obligation, emission reduction target/NAMA, MRV.
- Key players
  - USA, China, EU…..

- Adaptation
  - Urgent to most vulnerable countries but also important for all other countries.
- Funding mechanism
  - Copenhagen Green Climate Fund, 30 and 100 bil $.
- Technology transfer



## Major issues in international negotiations

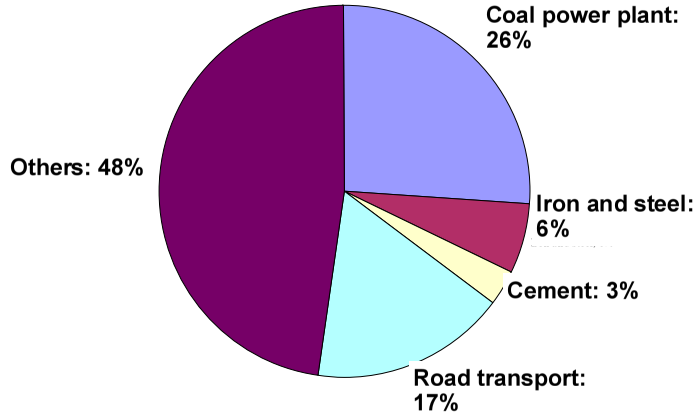
- Mitigation
  - How can we assure fair, transparent and practical scheme?
  - We should learn from the experience concerning the Kyoto Protocol.

  →***What are the ultimate objectives?***

  - Legal obligation: Who should reduce GHG emission? Where, when, how?
  - Will the emission reduction targets and mitigation actions be enough?
  - Why and how the MRV of mitigation actions are important?

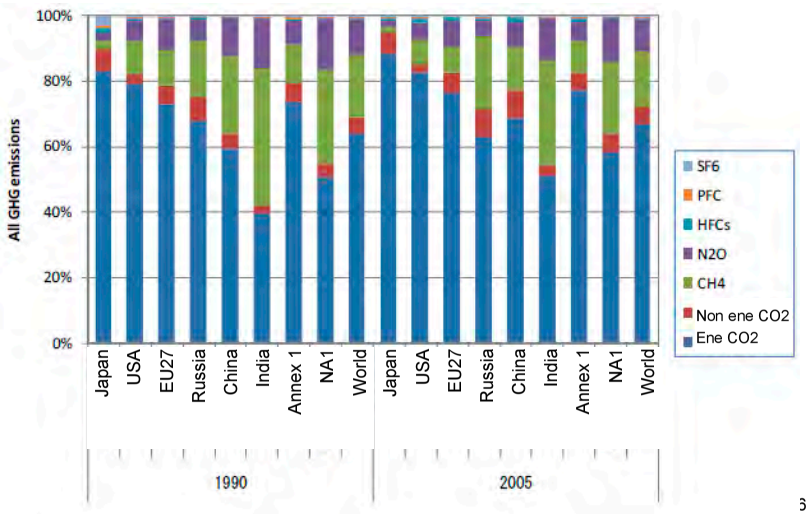
## Major issues in international negotiations

- CO2 emissions from fuel combustion: 27 billion tCO2






## Major issues in international negotiations








## Schedule of negotiations until COP16/CMP6

- April 9-11: AWG-LCA 9 and AWG-KP 11 (Bonn)
- May 31 – June 11: SB32 (Bonn)
- June: G8 Summit, Muskoka, Canada
- June: G20 finance ministers' meeting, Toronto, Canada
  - 19 countries and EU --- (Argentina, Australia, Brazil, Canada, China, France, Germany, India,Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, Korea, Turkey, UK, USA), and IMF and Worldbank
- September: UN General Assembly, USA
- November: G20 Summit, Korea
- 29 November – 10 December: COP16/CMP6, Mexico



## Important points of Copenhagen Accord *(Remind, please.)*

- Copenhagen Accord includes very important point for Non-Annex 1 Parties; **MRV**
  - Who?
  - Where?
  - How much?
- Correct and organized data is essential to know emission.
- It requires many types of technologies;
  - How to measure?
  - How to monitor? (continuous measurement, data storage, etc.)
- Then we can identify who, when should take what kind of mitigation measures.

# Targets/NAMAs for 2020
*(Remind, please.)*

## Annex I Parties: Emissions reduction targets for 2020

| Country | Base year | Emissions reduction in | from 1990 | from 2005 |
|---|---|---|---|---|
| Australia | 2000 | -5 - -25% | +13 - -11% | -10 - -29% |
| Canada | 2005 | -17% | +3% | -17% |
| EU | 1990 | -20%/-30% | -20%/-30% | -13%/-24% |
| Japan | 1990 | -25% | -25% | -30% |
| New Zealand | 1990 | -10 - -20% | -10 - -20% | -28 - -36% |
| Russia | 1990 | -15 - -25% | -15 - -25% | -18 - -33% |
| USA | 2005 | -17% | -4% | -17% |



# Targets/NAMAs for 2020
*(Remind, please.)*

## Non-Annex I Parties: Nationally appropriate mitigation actions for 2020
(Abstract: Countries with numerical target)

| Non-Annex I Parties | Actions | from 2005 |
|---|---|---|
| Brazil | Expected reduction of 36.1% to 38.9% (from BaU) Including reduction in Amazon deforestation, "Cerrado" deforestation, energy efficiency, etc. | -23% |
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# Importance of Key Players

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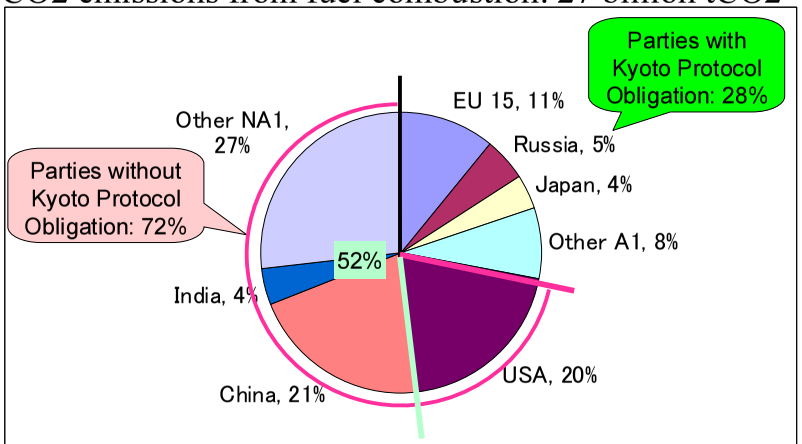
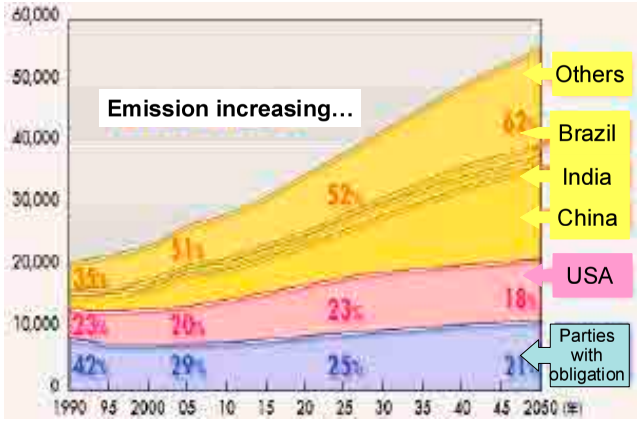




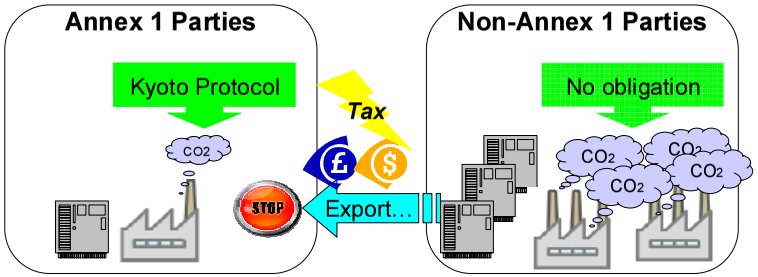

# Importance of Key Players

- Key players



## Border Measures - impact to other field from climate change world

- Climate change and international trade






## Border Measures - References

UNFCCC, Article 3, 5

The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.





## Border Measures - References

GATT (The General Agreement on Tariffs and Trade),

Article XX, General Exceptions

Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

(b) necessary to protect human, animal or plant life or health;

(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption;

*The Project for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand*

# UNFCCC Structure and Negotiations 4: Overview of international negotiations by EU and the USA over post-2012 mechanisms *and* Carbon Trading 3: Overview of emission trading systems in the USA and future international trading system in post 2010

22nd June, 2010


Deputy Chief Advisor of JICA Expert Team
**Kazuhito YAMADA**

JICA Expert Team
**Mariko FUJIMORI**


A1-108

## Contents

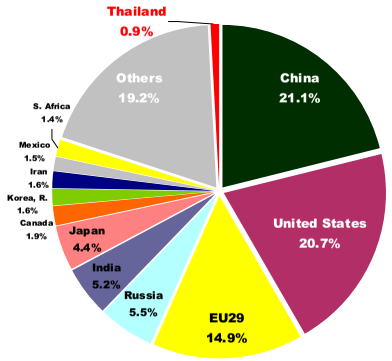




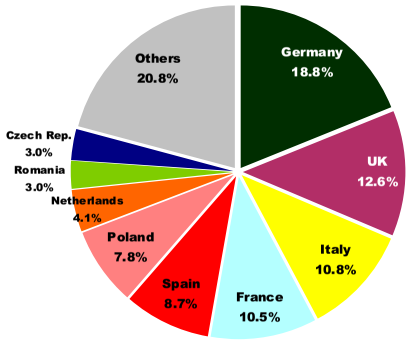
## Important characteristics of EU-ETS GHG emissions

*Remind, please.*

**World (212) $CO_2$ (2006)**




**EU-ETS (29) GHG (2007)**






## EU: Major institutions to reduce national GHG emission

Emission reduction target

- -20 – -30 % until 2020 compared to 1990

Examples of major institutions/activities to reduce GHG (legislative resolution);

- EU-ETS,
- Promotion of renewable energy utilization,
- Shared effort by communities,
- Promotion of energy efficiency,
- Development of CCS (carbon capture and storage),
- Emission reduction in transport sector (improvement of passenger cars efficiency, and fuel quality), and
- Utilization of international carbon credit

# EU: Proposal/stance for post 2012

NAMA (Nationally Appropriate Mitigation Actions):

- Support NAMA as a mechanism to promote voluntary emission reduction by developing countries

SCM (Sector Crediting Mechanism):

- Propose introduction of SCM
- SCM by No-lose target, utilization of credit from SCM for the emission reduction target of developed (Annex 1) countries

***Details of NAMA/SCM will be introduced next week.***



# USA: Major institutions to reduce national GHG emission

Emission reduction target

- -17 % until 2020 compared to 2005

State-of-the-union speech by President Obama (Jan. 2010)

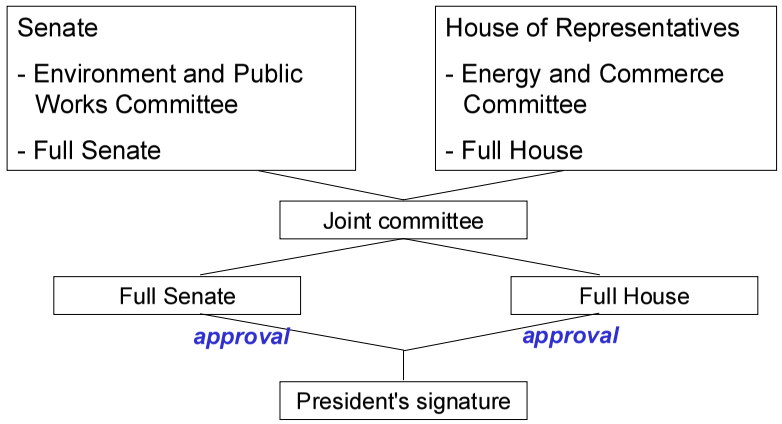
- Create more clean energy jobs, more production, more efficiency, more incentives.
- Passing a comprehensive energy and climate bill with incentives that will finally make clean energy the profitable kind of energy in America.





# USA: Process to pass a bill

(in case of recent climate related bills)






# USA: Major institutions to reduce national GHG emission

US-EPA: Clean Air Act

- US Congress has decided to oblige GHG emitter (above a certain level) to report their emission amount,
- The new rule is enforced from 29th December 2009
- Emission amount from 1st January 2010 have to be reported until 31st March 2011,
- Covered entities: Emit 25,000t $CO_2$/year and above
- Covered GHGs: Kyoto 6 gases and fluorides

# USA: Major institutions to reduce national GHG emission

American Power Act (Kerry-Lieberman)

- Achieve national pollution reduction target,
- Refunds the money raised right back to American consumers and businesses,
- Not a plan that enriches Wall Street speculators, nore to prow the government.
- Cap-and-trade scheme:
  - Power and industrial sectors: emission from fixed sources of 25,000 $tCO_2$ and above,
  - Household and transport sectors: emission from refined fuel utilization and natural gas,
  - Covers more than 85 % of total emission of the USA,
  - The scheme will enter into force from 2013, with 3 years delay for household and transport sectors.



# USA: Major institutions to reduce national GHG emission

American Power Act (Kerry-Lieberman)

- Control of credit price
  - Upper limit: fixed price of 25 \$/$tCO_2$ in 2013, and the price will increase at +5 % per annum,
  - Lower limit: set the floor price for the auction.
- Offset credit program for domestic/international emission reduction
  - Allowed 2 billion per year,
  - 75 % for domestic credit and 25 % for international credit, and if the domestic credit comes short, international credit can be used up to 50 %.
  - International credit includes sector credit, credit issued by international organizations, and REDD.





# USA is considering bilateral carbon crediting system...

- **Bilateral/multilateral Sectoral crediting system:**

  Targets: Developing countries who agree to the system
  - not each company/factory but specified sector
  - competitive sectors with USA's industries

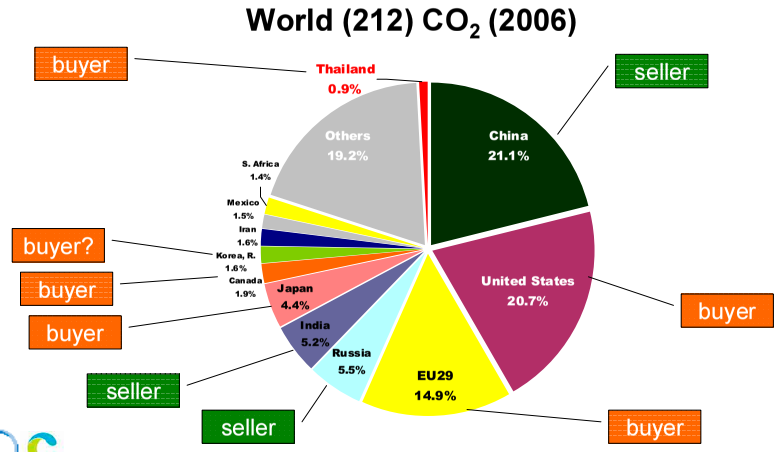
  MRV: Targeted DC has to develop MRV capacity

**UNFCCC crediting system can survive if EPA administrator confirms their possibility to use the system.**

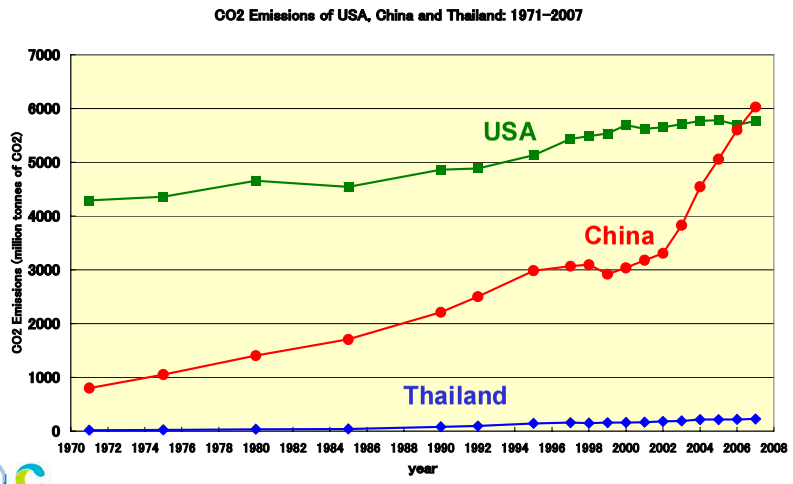
**Japan is also considering bilateral carbon crediting system.**



# Carbon credit until 2020 buyers and sellers



## Carbon credit until 2020
## NO.1 buyer and NO.1 seller



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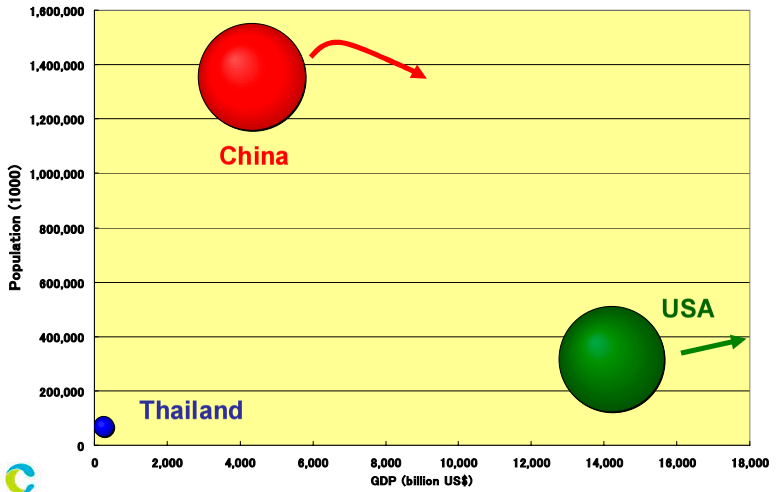
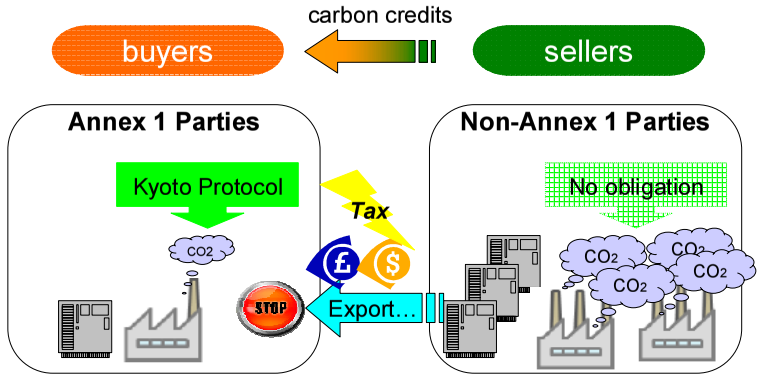





A1-111

## Border Measures - impact to other field
## *Remind, please.* from climate change world

- Climate change and international trade






## Discussion

- How does Thailand address future international trading system?
- What kind of GHG emission reduction projects should be developed in Thailand?
- Who are main partners to develop the projects and to sell carbon credits from them?
  - USA
  - EU
  - Japan
  - Canada etc.

# UNFCCC Structure and Negotiations 5 and 6: MRV, NAMA, SCM

29th June, 2010

JICA Expert Team

**Mariko FUJIMORI**

A1-112

## Objectives of this section

- To understand:

  Basic concept and latest situation of NAMA, MRV and SCM,

- To discuss:

  Feasibility, possibility and difficulty of MRV about example NAMA projects (assumption) in certain sectors.



## What is NAMA?
### Bali Action Plan (COP13, 2007)

1. Decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia:

(b) Enhanced national/international action on mitigation of climate change, including, inter alia, consideration of:

(i) Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all **developed** country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances;



## What is NAMA?
### Bali Action Plan (COP13, 2007)

(ii) Nationally appropriate mitigation actions by **developing** country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner;

(iv) Cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1(c), of the Convention;

(v) Various approaches, including opportunities for using markets, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries;

# What is NAMA?

## Latest negotiation text at AWG-LCA

- Developing country Parties, in the context of sustainable development, **will undertake nationally appropriate mitigation actions**, enabled and supported by finance, technology and capacity building.
- The extent to which these Parties will implement mitigation actions will depend on effective provision of finance, technology and capacity-building support as embodied in Article 4.7 of the Convention.

Source: Advanced draft of FCCC/AWGLCA/2010/8



# *Reference: UNFCCC*

## Article 4.7 of the Convention

- The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties.





# What is NAMA?

## Latest negotiation text at AWG-LCA (cont.)

- Developing country Parties will also undertake **domestically funded mitigation actions** in accordance with their respective capacities.
- LDC Parties and small island developing states may undertake nationally appropriate mitigation action at their discretion.
- Mitigation actions (…by developing countries…) will aim at achieving in aggregate a substantial deviation in emissions relative to the business as usual emissions in 2020.

Source: Advanced draft of FCCC/AWGLCA/2010/8



# What is MRV?

- Measurable, reportable and verifiable
- Measurement, reporting and verification

→of mitigation actions

How, and who?

# What is MRV?

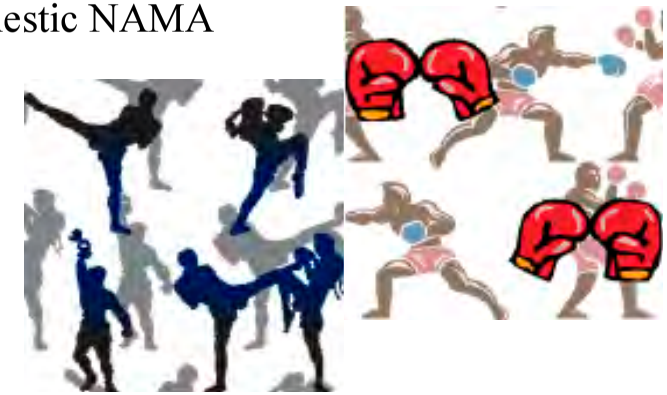
Definitions of "Measure":

- The terms "measure" and "measurability" do not have any agreed definition in international environmental law or in international law more generally.
- Quantifiable attributes: e.g., volume, mass, distance, area, time, temperature, amount of GHG emission, etc.
- Virtual/semi-quantifiable attributes: e.g., levels of earthquake, assessment of performance (excellent, good, fair, poor), etc.



# NAMA and MRV: examples

- Supported NAMA
- Domestic NAMA







# What kind of MRV is required?

- International support NAMA: finance, technology and capacity building

  → Recorded in a ***mechanism*** – under negotiation…

  – Incremental costs, indication of type of support, mitigation benefits, time frame, technical analysis(?), etc…

  → MRV: subject to the international level guidelines, to be adopted at COP XX.

Source: Advanced draft of FCCC/AWGLCA/2010/8
FCCC/AWGLCA/2010/6



# What kind of MRV is required?

- Domestically-funded NAMA

  → MRV: subject to the domestic MRV

- NAMA covered by carbon market mechanisms

  → MRV: apply rules of relevant carbon market mechanisms


Source: Advanced draft of FCCC/AWGLCA/2010/8

# Requirement to developing country Parties

- Prepare national communications every 6 years
- Prepare biennially (from 20XX):
  - National GHG inventories,
  - Status of implementation of NAMA and estimated emission reductions by the NAMA,
  - Methodologies and assumptions to quantify the reductions,
  - Information of receipt of finance, technology and capacity building support,
  - Result of domestic verification of domestic NAMA

Source: Advanced draft of FCCC/AWGLCA/2010/8



# Requirement to developing country Parties

- International consultation and analysis (ICA) shall apply to the national communications and above mentioned biennial submissions such as national GHG inventories,
- Guiding principle: respects national sovereignty, based on technical expertise, spirit of mutual respect.
- Analysis will be undertaken by an independent panel of experts, representing all regions for consideration of the SBI, under auspices of the SBI.

Source: Advanced draft of FCCC/AWGLCA/2010/8





# Other issues related to NAMA

- Developing country Parties will prepare low-emission development plans. These plans will **not** be a precondition for support for NAMAs.
- LDC Parties and small island developing states may prepare low-emission development plans at their discretion.

Source: Advanced draft of FCCC/AWGLCA/2010/8)



# Targets/NAMAs for 2020
## *(Remind, please.)*

Non-Annex I Parties: Nationally appropriate mitigation actions for 2020

(Abstract: Countries with numerical target)

| Non-Annex I Parties | Actions | from 2005 |
|---|---|---|
| Brazil | Expected reduction of 36.1% to 38.9% (from BaU) Including reduction in Amazon deforestation, "Cerrado" deforestation, energy efficiency, etc. | −23% |
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| Thailand | ??? | |

**Please refer to the appendix.**

# What is SCM?

- Cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1(c), of the Convention;

Source: Advanced draft of FCCC/AWGLCA/2010/8)

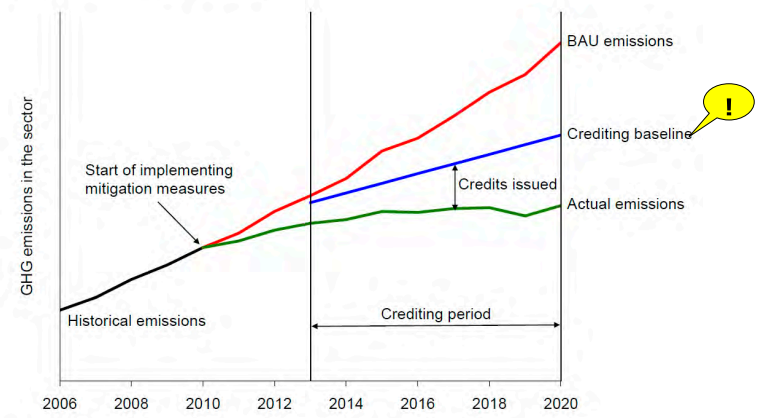
Reference: Article 4, para (1) of the Convention

Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;



# What is SCM?

*Figure 1: Illustration of a SCM*



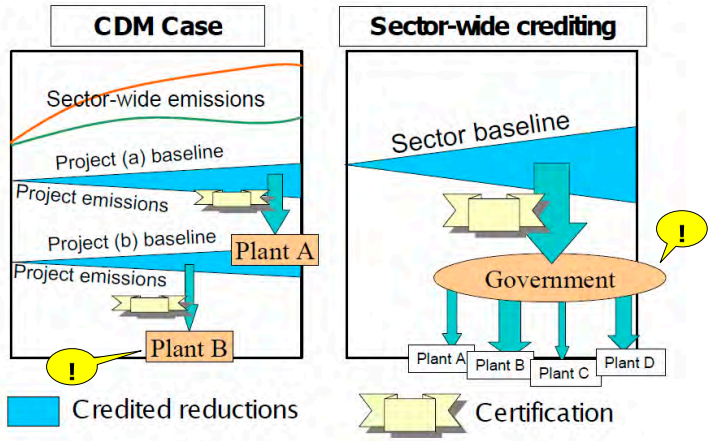

Source: A framework for a sectoral crediting mechanism in a post-2012 climate regime (Oko-Institute, 2009)



A1-116

# What is SCM?

Figure 1: Sectoral crediting versus the Clean Development Mechanism

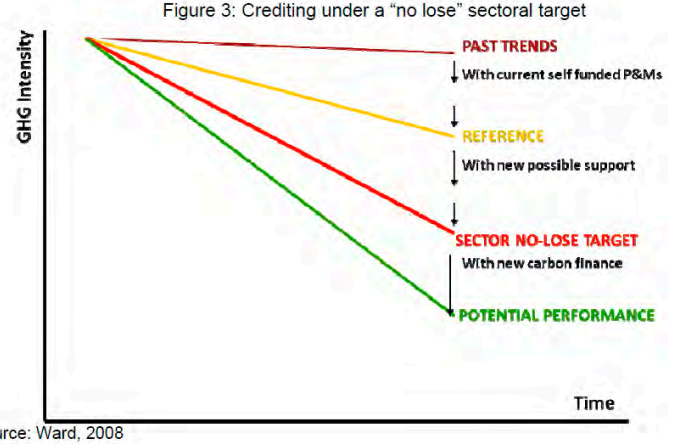



Source: Sectoral Approaches to GHG Mitigation: Scenarios for Integration (OECD/IEA, 2006)



# What is SCM?

Figure 3: Crediting under a "no lose" sectoral target




Source: Ward, 2008

Source: Sectoral Crediting Approaches and the Carbon Markets (OECD, 2009)

# Issues of SCM baseline setting

- Intensity goal
  - Use GHG emission per unit of production of the sector (e.g., tCO2/kWh、tCO2/t-cement、tCO2/t-crude steel), set emission factor of each sector (sub-sector) and apply it as baseline of the sector.
- Fixed sectoral targets
  - Apply the total amount target as baseline of the sector. It is useful to upper limit allowance to the sector, but on the other hand, it will not be flexible to change/adjust the allowance when the sector activity increased rapidly within short period.



# Issues of SCM baseline setting

- Technology-based approaches
  - Set “technical goal” of introducing technologies to each sector.
  - Developing countries can set each target in accordance with their own condition, and the monitoring of technology introduction itself will not be very difficult,
  - However, it will be difficult to quantify the GHG emission reduction by the introduced technology, including monitoring of the reduction,
  - Distribution of credit will be difficult.





# Discussion

- Please discuss the feasibility, possibility and difficulty of MRV, concerning following NAMA/SCM project examples.
- PJ-A: Reforestation projects in rural areas
- PJ-B: Municipal solid waste management projects in urban areas



# Discussion

PJ-A: Reforestation projects in rural areas

- Small areas in remote communities,
- Planting local tree species,
- Including both humid and semi arid regions,
- Contributing employment opportunities for the communities.

# Discussion

## PJ-B: Municipal solid waste management projects in urban areas

- Dumping sites locate urban areas, collecting wastes from small and medium towns,
- Majority of the waste component is organic matters (50 – 60 %),
- Contributing environment improvement of the community (odor and water pollution).

## Appendix: Submission of NAMAs according to the Copenhagen Accord (extract)

| Country | Emission reduction | Mitigation actions with numerical targets | Mitigation actions without numerical targets |
|---|---|---|---|
| Brazil | 36.1% to 38.9% by 2020<br><br>***No definition of base year*** | - Reduction in Amazon deforestation (564 mil tCO2e)<br>- Reduction in "Cerrado" deforestation (104 mil tCO2e)<br>- Restoration of grazing land (83 to 104 mil tCO2e)<br>- Integrated crop-livestock system (18 to 22 mil tCO2e)<br>- No-till farming (16 to 20 mil tCO2e)<br>- Biological N2 fixation (16 to 20 mil tCO2e)<br>- Energy efficiency (12 to 15 mil tCO2e)<br>- Increase the use of biofuels (48 to 60 mil tCO2e)<br>- Increase in energy supply by hydroelectric power plants (79 to 99 mil tCO2e)<br>- Alternative energy sources (26 to 33 mil tCO2e)<br>- Iron & steel (replace coal from deforestation with coal from planted forests, 8 to 10 mil tCO2e) | |
| China | 40-45%:<br>per unit of GDP by 2020 compared to the 2005 level | - Lower CO2 emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level,<br>- Increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020, and<br>- Increase forest coverage by 40 million ha and forest stock volume by 1.3 billion m3 by 2020 from the 2005 levels. | |
| Ethiopia | NA | **1. Electricity Generation from Renewable Energy for the Grid System**<br>1.1. Hydro Power<br>1.1.1. Beles Project, with 460 MW electric power generation capacity; to be completed in 2010<br>1.1.2. Gibe III Project, with 1870 MW electric power generation capacity; to be completed in 2013 ~~~ [10 projects]<br>1.2. Hydro Power Projects under Study<br>1.2.1. Tekeze Project, with 450 MW electric power generation capacity; the study to be completed in 2012<br>1.2.2. Beko Abo Project, with 1600 MW electric power generation capacity; the study to be completed in 2010 ~~~ [11 projects]<br>1.3. Wind Projects ~~~ [7 projects]<br>1.4. Geothermal Projects ~~~ [6 projects]<br>**2. Bio-fuel Development for Road Transport and for household use**<br>2.1. Project to produce 63.36 million litters of ethanol starting from 2010 up to 2015<br>2.2. Project to produce 621.6 million litters of biodiesel starting from 2010 up to 2015<br>**3. Electricity Generation from Renewable Energy for Off-grid Use and Direct Use of Renewable Energy**<br>3.1. Project to install 150000 solar home systems starting from 2010 up to 2015<br>3.2. Project to construct 65000 small hydro electric power generation facilities starting from 2010 up to 2015 ~~~ [12 projects]<br>**4. Transport**<br>Railway Projects with Trains to Run with Electricity Generated from Renewable Energy<br>4.1. Route 1 (Addis Ababa-Modjo-Awash); 656 Km, to be completed in 2015<br>4.2. Route 2 (Modjo - Shashemene - Awassa – Konso – Woyito – including Konso – Moyale); 903 km, date of completion to be determined ~~~ [9 projects]<br>**5. Forestry/forests**<br>5.1. enhanced district level reforestation actions for the increment of vegetation cover of 214440 square kilometres of degraded lands, lands affected by gullies and slopes including through the management of community areas closed off to grazing<br>5.2. 28736.70 square kilometres of natural high forest area sustainably managed in order to reduce GHG emissions from deforestation and forest degradation ~~~ [7 projects]<br>**6. Agriculture**<br>6.1. application of compost on 80000 square kilometers of agricultural land of rural local communities for increased carbon retention by the soil<br>6.2. implementation of agroforestry practices and systems on 261840 square kilometers of agricultural land for livelihood improvement and carbon sequestration<br>**7. Waste management**<br>7.1. Repi-Addis Abeba project to reduce the generation of methane from 14.56 million cubic meters of deposited urban waste<br>7.2. Addis Abeba project to reduce the generation of methane from 1 million cubic meters of urban waste with a growth rate 2.3%/year | |
| India | 20-25%:<br>per unit of GDP by 2020 compared to the 2005 level | *agricultural sector will not be a part of the emission intensity | |
| Indonesia | 26% by 2020<br><br>***No definition of base year*** | | 1. Sustainable peat land management<br>2. Reduction in Rate of deforestation and land degradation<br>3. Development of carbon sequestration projects in forestry and agriculture<br>4. Promotion of energy efficiency |

Source: http://unfccc.int/home/items/5265.php (as of 27th June 2010)

<table>
<tr><th>Country</th><th>Emission reduction</th><th>Mitigation actions<br>with numerical targets</th><th>Mitigation actions<br>without numerical targets</th></tr>
<tr><td></td><td></td><td></td><td>5. Development of alternative and renewable energy sources<br>6. Reduction in solid and liquid waste<br>7. Shifting to low emission transportation mode</td></tr>
<tr><td>Islarel</td><td>20%:<br>by 2020 compared to BaU</td><td>Main actions for achieving reduction target include:<br>- 10% renewable energy in electricity generation by 2020<br>- 20% reduction of electricity consumption by 2020</td><td>Significant areas: energy efficiency, renewable energies, green building; and transportation.</td></tr>
<tr><td>Korea</td><td>30%<br>by 2020</td><td>To reduce national GHG emissions by 30% from the business-as-usual emissions by 2020.</td><td></td></tr>
<tr><td>Maldives</td><td>(100%)<br>Carbon neutrality as a country by 2020.</td><td>The Government is presently undertaking detailed work on implementation of this action and will register a request for technological, financial and capacity building support for implementation.</td><td></td></tr>
<tr><td>Marshall Islands</td><td>40%:<br>below 2009 level</td><td>- Pursuant to the 2009 National Energy Policy and Energy Action Plan, and with subject to the provision of adequate international support.</td><td></td></tr>
<tr><td>Mexico</td><td>30%:<br>with respect to the BaU by 2020</td><td>- Reduction in total annual emissions of 51 mill tCO2e by 2012</td><td></td></tr>
<tr><td>Moldova</td><td>25%:<br>compared to 1990</td><td></td><td>Through implementation of global economical mechanisms focused on the climate change mitigation, in accordance with the Convention’s principles and provisions.</td></tr>
<tr><td>Papua New Guinea</td><td>50%:<br>by 2030,<br>Carbon neutral: (100%) by 2050</td><td>1. Increase GDP per capita more than 3 times by 2030;<br>2. Decrease GHG emissions at least 50% before 2030 while becoming carbon neutral before 2050;<br>3. Increase adaptation investments per annum by $80 - $90 million to reduce expected losses by $230 - $250 million.<br><br>Appropriate mitigation actions (51-73%)<br>Forestry 26-32%, Agriculture 15-27%, Oil and gas 5.1-7.3%, Transportation 2.8-3.8%, Power generation 0.2-0.8%, Mining and fire 2.5%<br><br>
<table>
<tr><th colspan="4">Preliminary Climate Compatible Development Plan: Actions and Objectives</th></tr>
<tr><th>High-Level Policy Objectives</th><th>Est. 2010*</th><th>BAU 2030*</th><th>Objectives of Policy or Action</th></tr>
<tr><td>1. Sustainable Growth</td><td>$,1000</td><td>$3,000</td><td>Increase GDP / capita by more than 3 times by 2030</td></tr>
<tr><td>2. Emissions Reductions</td><td>82 – 99</td><td>99 - 141</td><td>Decrease GHG emissions by at least 50% by 2030 (75% technically possible subject to enabling finance)<br>Carbon Neutral before 2050</td></tr>
<tr><td>3. Adaptation Investments</td><td></td><td></td><td>$80-90m investment required to reduce expected loss by $230-250m</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Appropriate Mitigation Actions</td><td></td><td></td><td></td></tr>
<tr><td>1. Forestry</td><td>50 – 52</td><td>53 - 64</td><td>26 – 32</td></tr>
<tr><td>2. Agriculture</td><td>25 – 38</td><td>31 - 58</td><td>15 – 27</td></tr>
<tr><td>3. Oil and Gas</td><td>0.4 – 0.6</td><td>5.3 – 7.5</td><td>5.1 – 7.3</td></tr>
<tr><td>4. Transportation</td><td>1.6 – 2.4</td><td>3.3 – 4.5</td><td>2.8 – 3.8</td></tr>
<tr><td>5. Power Generation</td><td>0.3 – 0.5</td><td>1.4 – 2.0</td><td>0.2 – 0.8</td></tr>
<tr><td>6. Mining & Fire</td><td>5</td><td>5</td><td>2.5</td></tr>
<tr><td>Total</td><td>82 – 99</td><td>99 - 141</td><td>51 – 73</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Adaptation Investments</td><td>Expected annual loss</td><td></td><td>Costs and benefits of counter-measures</td></tr>
<tr><td>1. Coastal Sea Level Rise</td><td>$20m</td><td>$90-100m</td><td>$35-40m p.a. to reduce expected loss by $80m</td></tr>
<tr><td>2. Inland Flooding</td><td>$10-15m</td><td>Tbd</td><td>Tbd</td></tr>
<tr><td>3. Malaria</td><td>$130m</td><td>$210-250m</td><td>$45-50m p.a. to reduce expected loss by $150-170m</td></tr>
<tr><td>4. Agricultural Yield Change</td><td>N.a.</td><td>Tbd**</td><td>Tbd</td></tr>
<tr><td>5. Coral Reef Damage</td><td>N.a.</td><td>Tbd***</td><td>Tbd</td></tr>
</table></td><td>Adaptation investments<br>1. Coastal sea level rise<br>2. inland flooding<br>3. malaria<br>4. agricultural yield change<br>5. coral reef damage</td></tr>
<tr><td>Sierra Leone</td><td>40%:<br>compared to 1990</td><td>4. Improve forest governance to maintain the proportion of land area covered by forests to at least 3.4 million ha by 2015,</td><td>1. Establishment of the National Secretariat for Climate Change (NSCC)<br>2. Institutional strengthening and capacity building.<br>3. Increase conservation efforts in Sierra Leone,<br>5. Setting/developing air, water and soil quality pollution standards,<br>6. Introducing conservation farming and promoting the use of other sustainable agricultural practices,<br>7. Development of an Integrated Natural Resources and Environmental Management programme for Sierra Leone,<br>8. Expanding clean energy utilization,<br>9. Development of energy efficiency programmes,<br>10. Development of alternative energy sources such as biofuels,<br>11. Developing agricultural and urban waste incineration programmes for energy production,<br>12. Improved waste management through composting and recycling of waste,<br>13. Development and enforcement of regulations on regular Maintenance of vehicles.</td></tr>
<tr><td>Singapore</td><td>16%:<br>below BAU in 2020</td><td></td><td>- Although a legally binding agreement has yet to be achieved, Singapore will nonetheless begin to implement the mitigation and energy efficiency measures announced under the Sustainable Singapore Blueprint in April 2009.<br>- When a legally binding global agreement on climate change is reached, Singapore will implement additional measures to achieve the full 16% reduction below BAU in 2020.</td></tr>
<tr><td>South Africa</td><td>34%:<br>by 2020 compared to BaU<br>42%:<br>by 2025 compared to BaU</td><td></td><td></td></tr>
</table>



Source: http://unfccc.int/home/items/5265.php (as of 27th June 2010)

# UNFCCC Structure & Negotiations 7 & 8: REDD/ Carbon Sink

6 July, 2010

Deputy Chief Advisor of JICA Expert Team
**Kazuhito YAMADA**

A1-121

## Objectives of this section

### Objectives of this section are:

To understand basic concept and major issues of 'Reduced Emission by Deforestation and forest Degradation: REDD',

To discuss:

What are the possible 'REDD' project candidates in Thailand?



## UNFCCC Structure & Negotiations: REDD

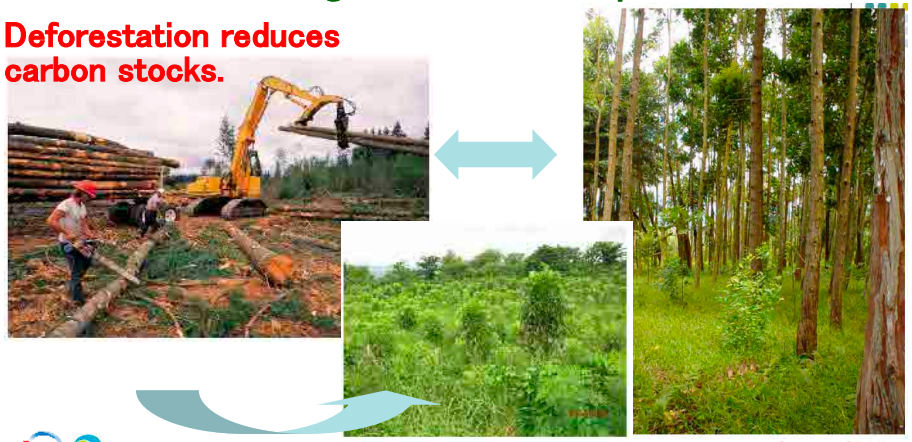
- Deforestation and forest degradation
- What is 'RED' and 'REDD' ?
- Presentation by the expert of forestry sector in Thailand
- Main causes of deforestation and forest degradation
  - General, Amazon, Cameroon, Kalimantan -
- Critical issues to be discussed in UNFCCC negotiation
- Introduction of 'Payment for Environmental Service: PES'
- UN-REDD Programme
- Group Discussion



## Deforestation and forest degradation (1)

**Avoiding deforestation keeps carbon stocks.**

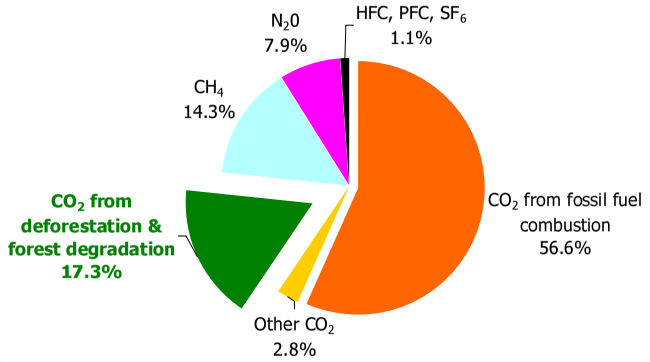
**Deforestation reduces carbon stocks.**



Source: ICRAF

## Deforestation and forest degradation (2)

**$CO_2$ from deforestation and forest degradation is one of important anthropogenic GHG sources.**






## What is the 'REDD' ? (1)

**REDD is referred as:**

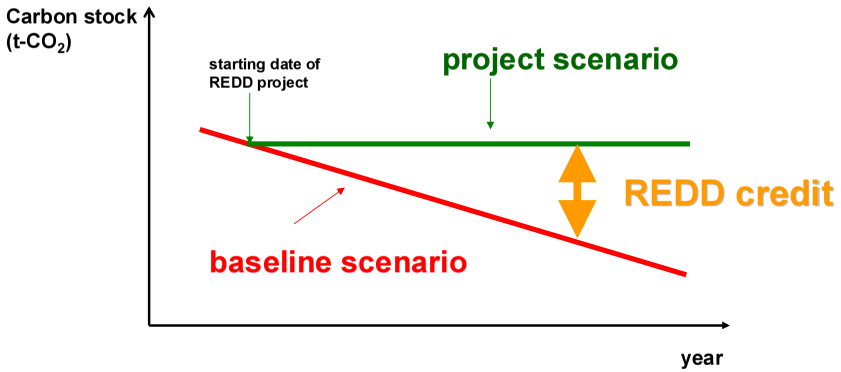
- Policy approaches and positive incentives on issues relating to **R**educed **E**mission by **D**eforestation and forest **D**egradation in developing countries





## What is the 'REDD' ? (2)

**Basic concept of crediting to REDD**






## What is the 'REDD' ? (3)

**REDD+ is referred in the UNFCCC text as:**

- Policy approaches and positive incentives on issues relating to REDD in developing countries;

PLUS

- the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

## What is the 'REDD' ? (4)

### IISD (2009) described REDD and others as:

- RED = Reducing emissions from (gross) deforestation: only changes from "forest" to "non-forest" land cover types are included, and details very much depend on the operational definition of "forest";
- REDD = as above, plus (forest) degradation, or the shifts to lower carbon-stock densities within the forest; details very much depend on the operational definition of "forest";



## What is the 'REDD' ? (5)

### (continued)

- REDD+ = as REDD, plus restocking within and towards "forest"; in some versions REDD+ will also include peatlands, regardless of their forest status; details still depend on the operational definition of "forest"; and
- REDD++ = as above plus all transitions in land cover that affect carbon storage, whether peatland or mineral soil, trees-outside-forest, agroforest, plantations or natural forest. It does not depend on the operational definition of "forest."



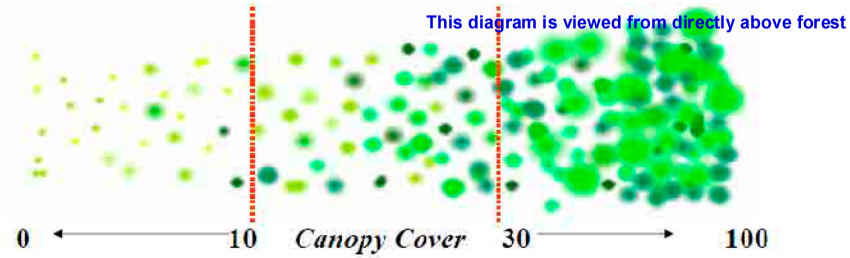


## What is the 'REDD' ? (6)

### Definition of 'forest'

Each country can define a forest within the following guidelines:

- Minimum tree crown cover between 10 and 30%
- Minimum tree height between 2 and 5 m
- Minimum land area between 0.05 and 1.0 ha






## Presentation by the expert of forestry sector in Thailand

### The presentation includes:

1. History of forest cover in Thailand
2. Main causes of forest deforestation and forest degradation in Thailand
3. Present countermeasures against forest deforestation and forest degradation in Thailand

# Main causes of deforestation and forest degradation (1)

## General:

1. Population increase
2. Agricultural expansion by disordered 'slash and burn'
3. Road construction
4. Wood extraction
5. Interactive effect of above mentioned causes....

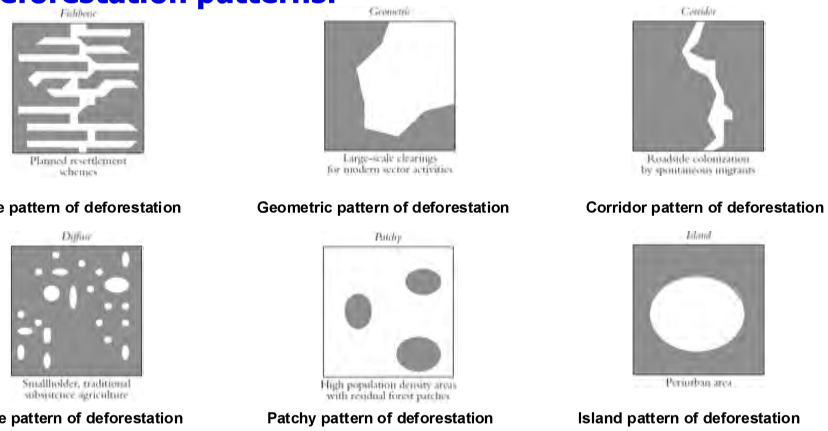
**However, there is no united explanation of main causes of deforestation and forest degradation.**

**It may depend on the characteristics of the 'site'.**



# Main causes of deforestation and forest degradation (2)

## Deforestation patterns:




Fishbone pattern of deforestation | Geometric pattern of deforestation | Corridor pattern of deforestation

Diffuse pattern of deforestation | Patchy pattern of deforestation | Island pattern of deforestation

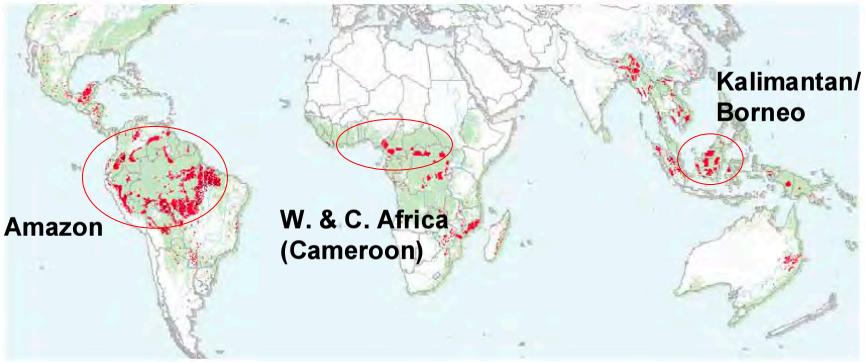
Source: Helmut J. Geist & Eric F. Lambin、2001





# Main causes of deforestation and forest degradation (3)

## Major deforested area




Source: ICRAF



# Main causes of deforestation and forest degradation (4)

## Amazon

### Main direct causes:

1. Road construction
2. Ranching
3. Soy bean production

### Main indirect causes:

1. Economic development policy based on road construction in 1970s
2. Preferential policy for large scale ranching by the govt.
3. Price increase of crops including soy bean

# Main causes of deforestation and forest degradation (5)

## Amazon

- Deforestation caused by ranching have been induced by road construction




# Main causes of deforestation and forest degradation (6)

## Cameroon:

### Main direct causes:

1. Accelerated export of timber as an important source of foreign exchange
2. Agricultural expansion by rural people

### Main indirect causes:

1. Fall in the value of coffee and cocoa
2. Migration of people from city to rural area because of the recession





# Main causes of deforestation and forest degradation (7)

## Kalimantan:

### Main direct causes:

1. Unregulated woodcutting under the concession by the govt.
2. Expansion of oil palm plantation

### Main indirect causes:

1. Weak management ability of decentralized local govt.
2. Increasing price of palm oil



# Main causes of deforestation and forest degradation (7)

## Kalimantan:

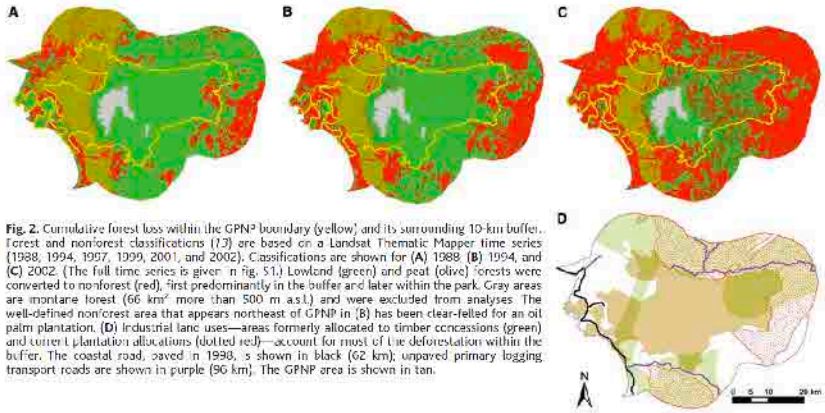



Fig. 2. Cumulative forest loss within the GPNP boundary (yellow) and its surrounding 10-km buffer. Forest and nonforest classifications (13) are based on a Landsat Thematic Mapper time series (1988, 1994, 1997, 1999, 2001, and 2002). Classifications are shown for (A) 1988, (B) 1994, and (C) 2002. (The full time series is given in fig. S1.) Lowland (green) and peat (olive) forests were converted to nonforest (red), first predominantly in the buffer and later within the park. Gray areas are montane forest (66 km² more than 500 m a.s.l.) and were excluded from analyses. The well-defined nonforest area that appears northeast of GPNP in (B) has been clear-felled for an oil palm plantation. (D) Industrial land uses—areas formerly allocated to timber concessions (green) and current plantation allocations (dotted red)—account for most of the deforestation within the buffer. The coastal road, paved in 1998, is shown in black (62 km); unpaved primary logging transport roads are shown in purple (96 km). The GPNP area is shown in tan.

# Critical issues to be discussed in UNFCCC negotiation

## Critical issues:

- How to define baseline scenario?
  - possible alternative land use (ranching, cash crop, oil palm, etc.)
  - probable value of these land use (How much money can these land use produce?)
- How do we treat 'additionality'?
- How to monitor 'avoided CO2 emissions' from REDD project?
- How to design a modality and procedure of REDD?

*The most important thing is that the credit of REDD need to have substantial positive effect to 'real causer' of deforestation and forest degradation!



# Introduction of 'Payment for Environmental Service: PES'

- 'Payment for Environmental service' can be used for quantifying possible monetary value of baseline land use scenario.
- Using this method, you can estimate necessary monetary value of carbon credit of REDD project.
- Estimated necessary costs of carbon credit of REDD project vary from low price (3-10 US$/t-$CO_2$) to very high cost (more than 50 US$/t-$CO_2$??)

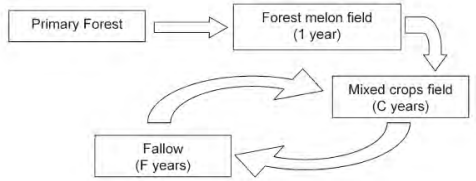



Fig. 1– The process of shifting cultivation (based on Brown's description).





# UN-REDD Programme (1)

## UN-REDD Programme:

- The UN-REDD Programme assists developing countries to prepare and implement national REDD+ strategies.
- Designed collaboratively by a broad range of stakeholders, national UN-REDD Programmes are informed by the technical expertise of FAO, UNDP and UNEP.
- Priority is given to developing sustainable national approaches that promote equitable outcomes and ensure that countries use reliable methodologies to assess emission reductions.



# UN-REDD Programme (2)

## UN-REDD Programme: Pilot Countries

- Bolivia
- Democratic Republic of Congo
- Indonesia
- Panama
- Papua New Guinea
- Paraguay
- Tanzania
- Viet Nam
- Zambia

# Discussion

- What are the possible project candidates of REDD in Thailand?

# UNFCCC Structure & Negotiations 9 & 10: Technology Transfer

11, January, 2011

JICA Expert Team
**Mariko FUJIMORI**

A1-128

## Today's Agenda

1. What is "Technology" and "Technology Transfer"?
2. Major fields of "Technology Transfer" in Climate Change
3. History of "Technology Transfer" in UNFCCC
4. TT:CLEAR (Technology Transfer Clearing House)
5. Expert Group on Technology Transfer (EGTT)
6. "Technology Development and Transfer" in COP16
7. Newly created " Technology Executive Committee"
8. Newly created " Climate Technology Centre"
9. Major issues to be discussed in "Technology Transfer"
10. Examples of "Technology Transfer" by JICA : Semi-aerobic landfill
11. Exercises



## What is "Technology" and "Technology Transfer"? -1-

**"Technology"**

is the usage and knowledge of tools, techniques, crafts, systems or methods of organization in order to solve a problem or create an artistic perspective.

**"Technology Transfer"**

is the process of sharing of skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services.

Source: Wikipedia



## What is "Technology" and "Technology Transfer"? -2-

**IPCC Special Report: Methodological and Technological Issues in Technology Transfer (2000)**

**"Technology Transfer"**

is defined as a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions.

# What is "Technology" and "Technology Transfer"? -3-

**UNFCCC: Article 4: Commitments**

1. All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:

   .....

(c). Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;



# What is "Technology" and "Technology Transfer"? -4-

**UNFCCC: Article 4: Commitments**

5. The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.



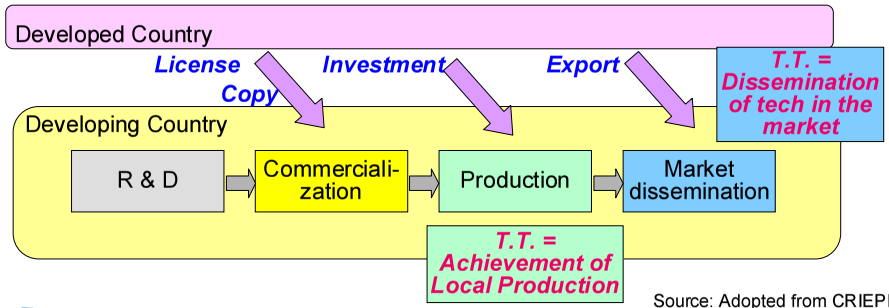


# What is "Technology" and "Technology Transfer"? -5-

**"Technology Transfer": Issue**

**What are the technologies to be transferred?**

***- Difficult point to proceed the negotiation.***




Source: Adopted from CRIEPI



# Major fields of "Technology Transfer" in Climate Change -1- Mitigation

| Technology sector | Developing world mitigation potential (2030/y) | Responsive technology examples | Methods of encouragement | International T.T. and investment: special issues |
|---|---|---|---|---|
| Renewable electricity sources | 0.63GtCO2eq | Wind Photovoltaic | Private market Subsidy Regulation | Transfer of product or of industry? |
| Carbon-based energy production | 0.39GtCO2eq | CCS | Regulation Research support | Public R&D |
| Biofuels | 0.46GtCO2eq | Ethanol | Private market Regulation Subsidy | Market competition |
| Industrial efficiency | 0.16GtCO2eq (Steel alone) | Steel and cement production | Regulation | Market competition |
| Consumer conservation | 1.50GtCO2eq | More efficient appliances | Regulation Subsidy | Willingness to subsidize consumer? |
| Nuclear | 0.72GtCO2eq | Nuclear facilities | Subsidy Research support | International security, Commercial competition |

Source: Mitigating Climate Change Through Technology Transfer (Barton J. H., Chatam House)

# Major fields of "Technology Transfer" in Climate Change -2- Adaptation

## Technologies for adaptation in coastal zones

| Protect | Retreat | Accommodate |
|---|---|---|
| •Hard structures – dykes, sea-walls, tidal barriers, detached breakwaters<br>•Soft structures – dune or wetland restoration or creation, beach nourishment<br>•Indigenous options walls of wood, stone or coconut leaf, afforestation | •Establishing set-back zones<br>•Relocating threatened buildings<br>•Phasing out development in exposed areas<br>•Creating upland buffers<br>•Rolling easements | •Early warning and evacuation systems<br>•Hazard insurance<br>•New agricultural practices, such as using salt-resistant crops<br>•New building codes<br>•Improved drainage<br>•Desalination systems |

Source: IPCC, UNFCCC, etc



# History of "Technology Transfer" in UNFCCC

1995 **Various Issues**
- **Projects inventory, Financing, Networks of centres**

1998 **Consultative Process**
- **Regional workshops**

2001 **Implementation of the Technology Framework**
- **Tech Needs assessment, Tech information, Enabling environments, Capacity building, Mechanisms (EGTT: Expert Group on Technology Transfer)**

2006 **Enhancing the Implementation of the Technology Framework**

Source: The First Ten Years, UNFCCC (2004)



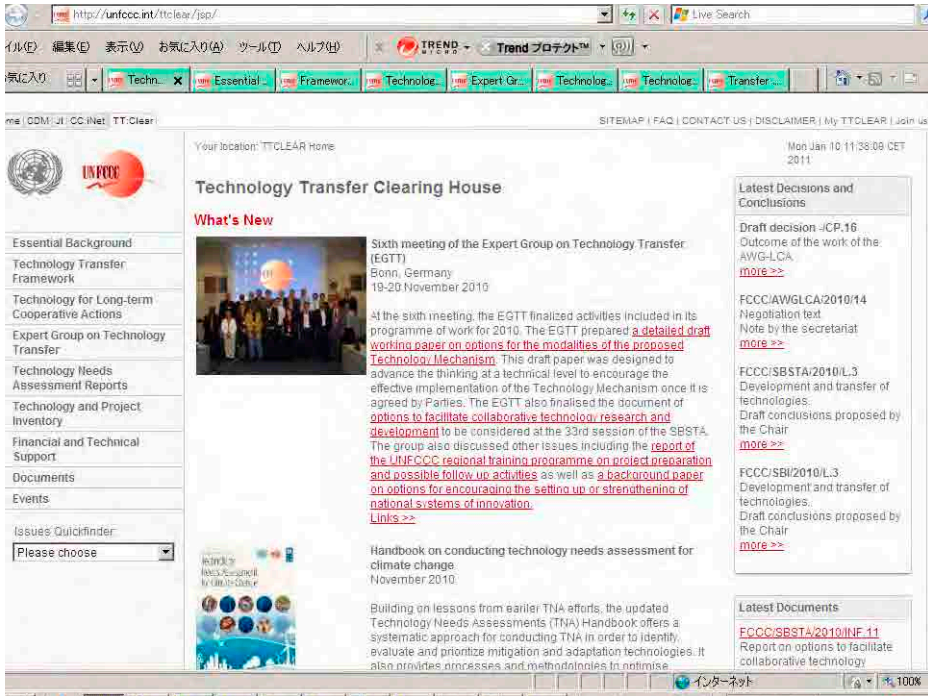


# TT:CLEAR (Technology Transfer Clearing House)

- **To improve access to information on environmentally sound technologies, including:**
  - **Technology transfer projects and programmes,**
  - **Case studies of successful technology transfer,**
  - **Environmentally sound technologies and know-how,**
  - **Organizations and experts,**
  - **Methods, models, and tools to assess mitigation and adaptation options and strategies,**
  - **Relevant internet sites for technology transfer,**
  - **Ongoing work of the Parties and the Expert Group on Technology Transfer, such as issues under negotiation, documents and meetings, and implementation of the technology framework.**

Source: http://unfccc.int/ttclear/jsp/





# Expert Group on Technology Transfer (EGTT) -1-

- Established at COP7 (2001)
- Objectives are to enhance the implementation of technology transfer framework and to advance the technology transfer activities under the Convention.
- Total members are 19, including 3 each from Africa, Asia & Pacific, Latin America & Caribbean, 1 from SIDs, 1 from other non Annex 1 Parties, and 8 from Annex 1 Parties. In addition, 4 resource persons are invited from international organizations.
- Main output



# Expert Group on Technology Transfer (EGTT) -2-

- Function

(a) Analyze and identify ways to facilitate and advance the development and transfer of technology activities,

(b) Help implement results of technology needs assessments,

(c) a set of performance indicators to monitor and evaluate the effectiveness of the TT framework,

(d) Assess strategies and innovative funding opportunities or incentives for relevant stakeholders, etc.





# "Technology Development and Transfer" in COP16

## Main decisions

✓ Establishment of a Technology Mechanism:
- Technology Executive Committee
- Climate Technology Centre

✓ Priority areas in developing countries:
- To develop/enhance endogenous capacities and technologies;
- To deploy and diffuse **environmentally sound technologies and know-how**;
- To Increase **public and private investment** in technology development, deployment, diffusion and transfer;
- Deploy **soft and hard technologies** for the implementation of adaptation and mitigation actions;
- Strengthen national systems of **innovation** and technology innovation centres;
- Develop/implement **national technology plans** for mitigation and adaptation;

etc.



# Newly created " Technology Executive Committee" -1-

- 20 expert members (AN1:9, NA1:9 (Af, AP, LA), SIDs:1, LDCs:1)
- Decisions: consensus base
- Functions:

(a) **Provide** an overview of **technological needs** and analysis of policy & technical issues related to the development and TT for M&A;

(b) **Consider** and recommend **actions to promote TD&T** in order to accelerate action on M&A;

(c) **Recommend** guidance on **policies and programme priorities** related to TD&T with special consideration given to the **LDCs**;

(d) **Promote** and facilitate **collaboration** on TD&T for M&A between governments, the private sector, NPOs and academic and research communities;

## Newly created
## " Technology Executive Committee" -2-

- Functions (continue):

(e) Recommend actions to address the barriers to TD&T in order to enable enhanced action on M&A;

(f) Seek cooperation with relevant international technology initiatives, stakeholders and organizations, promote coherence and cooperation across technology activities, including activities under and outside of the Convention;

(g) Catalyse the development and use of technology road maps or action plans at international, regional and national levels through cooperation between relevant stakeholders, particularly governments and relevant organizations or bodies, including the development of best practice guidelines as facilitative tools for action on mitigation and adaptation;



## Newly created
## " Climate Technology Centre"

- **Objective:**

The Centre facilitates a Network of national, regional, sectoral and international technology networks, organizations and initiatives with a view to engaging the participants of the Network effectively.

- **Functions:**

(a) At the request of a developing country Party:

(i) Provide advice and support related to the identification of technology needs and the implementation of environmentally sound technologies, practices and processes;

(ii) Facilitate the provision of information, training and support for programmes to build or strengthen developing country capacity to identify technology options, make technology choices and operate, maintain and adapt technology;

(iii) Facilitate prompt action on the deployment of existing technology in developing country Parties based on identified needs;





## Newly created
## " Climate Technology Centre"

- **Functions (continue):**

(b) Stimulate and encourage, through collaboration with the private sector, public institutions, academia & research institutions, the development and transfer of existing and emerging environmentally sound technologies, as well as opportunities for N&S, S&S and triangular technology cooperation;

(c) Facilitate a Network of national, regional, sectoral and international technology centres, networks, organization and initiatives, etc.



## Main issues to be discussed in "Technology Development and Transfer"

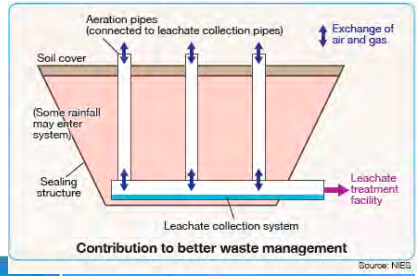
**Main discussions:**

- ✓ What kind of technology development and transfer is required in Thailand?
- ✓ Which sectors should be prioritized for technology development and transfer?
  - ✓ Mitigation,
  - ✓ Adaptation,
  - ✓ Others - cross cutting,
- ✓ What is the desirable training course for technology transfer?

## Examples of "Technology Transfer" by JICA : Semi-aerobic landfill -1-

**Semi-aerobic landfill**

The semi-aerobic "Fukuoka Method" developed in Japan is an economically viable and effective way to manage landfill sites. This method has multiple benefits, including the reduction of local environment impacts (odors, toxic leachate, etc.), stabilization of landfill sites, and reduction of CH4 emissions.




An example of this "co-benefits" approach is currently under way as CDM projects in Malaysia and Thailand, in cooperation with the Ministry of the Environment, Japan.



## Examples of "Technology Transfer" by JICA : Semi-aerobic landfill -2-

### Training for Technology Transfer of Semi-aerobic Landfill:

- ✓ Target trainee: Technicians of landfill management
- ✓ Training period: 5.5 days

| Days | Training hrs | Type | Program |
|---|---|---|---|
| 1 | 3.0 | practice | Assessment of major issues about landfill management in home country |
| | 4.0 | lecture | Introduction of case examples of present landfill management in developing countries |
| 2 | 3.0 | lecture | A Road to Sanitary Landfill - Semi-aerobic Landfill - |
| | 4.0 | practice | Classification of the landfills in home country |
| 3 | 7.0 | lecture | Introduction of improved case example of, and design/construction of semi-aerobic landfill in developing countries |
| 4 | 7.0 | site visit | Japanese successful examples |
| 5 | 3.0 | lecture | Significant points of concern for applying semi-aerobic landfill |
| | 4.0 | practice | Re-assessment of major issues about landfill management in home country |
| 5.5 | 3.0 | practice | Consideration of countermeasures to major issues about landfill management in home country |





## Commercial building and household Sector

### Exercise:

***What kinds of technology....***

- **Who are implementers? owners/government/tourist?**
- **How to implement the mitigation measures?**

  Possible tools: regulation/economic incentives/carbon credits (T-VER)/carbon foot print/subsidies/etc.
- **What is the role of TGO?**

**Attachment**

# Handbook for Conducting Technology Needs Assessment for Climate Change

(UNDP, November 2010)

## Priority sectors for climate change mitigation and adaptation

- First, development priorities are identified for the country concerned.
- These priorities can be used as criteria for selecting strategic (sub) sectors for mitigation and adaptation.

**Step 1** Initially identifying (sub)sectors

1. For mitigation: (sub)sectors with high GHG relevance based on IPCC sector categorization
2. For adaptation: (sub)sectors that provide the most effective actions for adaptation based on existing vulnerability assessments or National Adaptation Program of Action

**Step 2** Describing (sub)sectors in terms of sustainable mitigation and adaptation priorities

1. For mitigation:
   - Review national GHG inventory to identify data gaps, collect information on new technologies, identify key GHG emitting (sub)sectors, and analyze their interrelationships
   - Assess sectoral and development plans to understand future trends
   - List (sub)sectors by their share of GHG emissions until a cumulative share of 75% of the country's overall GHG emission is reached
2. For adaptation:
   - Assess and discuss available information on climate change impacts on the country with stakeholder groups
   - Characterize the (sub)sectors, including existing technologies used and impacts on the country's sustainable development

**Step 3** Finalizing a short list of prioritized (sub)sectors according to their maximum mitigation and adaptation benefits

1. Utilize simple performance matrix procedure for prioritizing (sub)sectors
2. Justify the scores given
3. Prioritize (sub)sectors in terms of mitigation and adaptation benefits

## Example of performance matrix for prioritizing (sub) sectors

| Subsector | Economic priorities | Social priorities | Environmental priorities | GHG reduction potential | Total benefit |
|---|---|---|---|---|---|
| Energy supply | 5 | 5 | 5 | 5 | 20 |
| Transport | 4 | 4 | 3 | 2 | 13 |
| Biological treatment of solid waste | 4 | 2 | 3 | 4 | 13 |
| Enteric fermentation | 1 | 1 | 1 | 3 | 6 |
| Other process use of carbonates | 2 | 1 | 0 | 1 | 4 |

) — no benefit
1 — faintly desirable
2 — fairly desirable
3 — moderately desirable
4 — very desirable
5 — extremely desirable





## Training for Technology Transfer of Semi-aerobic Landfill:

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# GHG mitigation measures 1: International trend in GHG mitigation measures

28th September 2010

Chief Advisor of JICA Expert Team
Masahiko FUJIMOTO



## Training Program of GHG Mitigation Measures (1)

- Topic 1. International **trend in GHG mitigation measures**
- Topic 2. **Monitoring of contribution to the sustainable development** by mitigation measures, including **co-benefit approach**
- Topic 3. Importance of **low carbon society/low carbon city**
- Topic 4. Mitigation measures in **commercial building and residential sectors**
- Topic 5. Exercise: Quantification of GHG emission reduction with MRV (**commercial building and residential sectors**)
- Topic 6. Mitigation measures in **waste management sector**
- Topic 7. Exercise: Quantification of GHG emission reduction with MRV (**waste management sector**)



## Training Program of GHG Mitigation Measures (2)

- Topic 8. Mitigation measures in **energy and industry sectors**
- Topic 9. Exercise: Quantification of GHG emission reduction with MRV (**energy and industry sectors**)
- Topic 10. Mitigation measures in **transportation sector**
- Topic 11. Exercise: Quantification of GHG emission reduction with MRV (transportation sector)
- Topic 12. Mitigation measures in **agriculture, land use change, and forestry sectors**
- Topic 13. Exercise: Quantification of GHG emission reduction with MRV (**agriculture, land use change, and forestry sectors**)
- Topic 14. Other issues (e.g., **aviation, maritime transport**, etc)



## Contents

- Why should GHG mitigation measures be implemented?
- Current trend of GHG mitigation in Japan
- Group Practice

# Why should GHG mitigation measures be implemented?

- Copenhagen Accord (2009, COP15)
  - Long term Goal
    - Increase in global temperature should be below 2 degrees Celsius
  - Mitigation Target/Actions by 2020
    - Report mitigation targets (developed countries) or mitigation actions (developing countries)
    - International MRV for supported mitigation action
    - Report GHG emission through national communication every 2 years with international consultation
  - The Accord is associated by more than 120 parties, and is regarded as an important step and good basis for further negotiation.



# Targets/NAMAs for 2020

| Nation | Base year | Emission Reduction in 2020 | From 1990 | From 2005 |
|---|---|---|---|---|
| Australia | 2000 | -5 % ~ -25% | 13%~-11% | -10%~-29% |
| Canada | 2005 | -17% | 3% | -17% |
| EU | 1990 | -20%~-30% | -20%~-30% | -13%~-24% |
| Japan | 1990 | -25% | -25% | -30% |
| New Zealand | 1990 | -10%~-20% | -10%~-20% | -28%~-36% |
| Russia | 1990 | -15%~-25% | -15%~-25% | -18%~-33% |
| USA | 2005 | -17% | -4% | -17% |
| Brazil | - | -36.1%~-38.9%(from BAU) | - | -23% |
| Korea | - | -30%(from BAU) | - | -4% |
| China | 2005 | -40%~-45%(in GDP unit) | - | 8% growth<br>1.9 times emission |
| India | 2005 | -20%~-25%(in GDP unit) | - | 7% growth (until 2015)<br>6% growth (from 2015)<br>2.1 times emission |





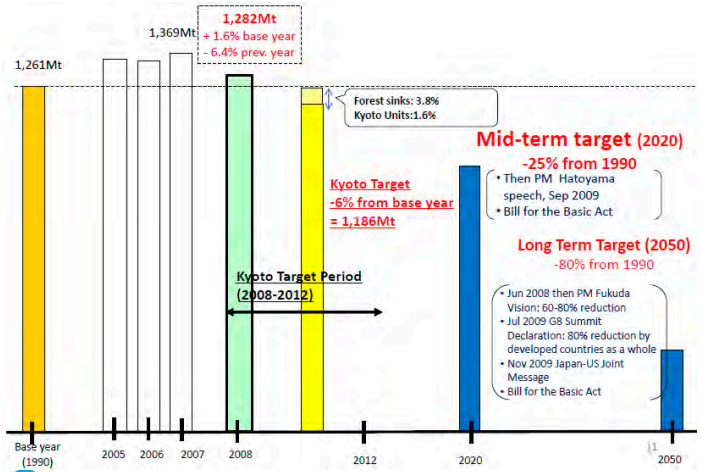
# Question:

- Why Thailand has to implement GHG mitigation measures?
  - International contribution to climate change mitigation
  - Others?
  - Others?



# Current trend of GHG mitigation in Japan

# Japanese GHG reduction target in mid-term and long-term




Source: "Japan's Climate Change Policies and MRV Initiatives" (Ministry of environment, Japan)



# Japanese Current Continuous Actions for GHG mitigation

- Revised Kyoto Target Achievement Plan in 2008
- Enhancement of energy efficiency legislations for vehicles, electric appliances and factories ("Top Runner System")
- Fossil fuel tax relief of E3 (Gasoline mixed with 3% Bio Ethanol)
- Transportation Management: Promotion of modal shifts and efficient transportation
- Forest Management: Urban planting, regeneration of forests which have been neglected





# Bill of Basic Law on Climate Change

- The bill of Basic Law on Climate Change was decided by the Cabinet
  - submitted to the National Diet on March 2010.
- But it did not become law due to the election.
  - The Cabinet might submit the bill to the next Diet session.
- Law sets Mid and Long-term Goals
  - 25% CO2 reduction below 1990 level by 2020
  - 80% CO2 reduction below 1990 level by 2050
- Key Policy Measure
  - Introduction of Emissions Trading Scheme (ETS)
  - Global Warming Tax
  - Feed-in Tariff system for renewable energy



# Challenge 25: Roadmap in middle-long term

- "Challenge 25" : middle-long term roadmap on GHG mitigation measures of Japan, MOE in Japan (March on 2010)
- GHG mitigation measures by 2020 (25% CO2 reduction target) in 5 sectors:
  - Manufacturing, Home, Industrial, Transport, Energy Supply
- Estimated economic effectiveness
  - Needed investment (approximately 60 - 100 trillion yen) for 2011-2020
  - Half of investment can be pay-backed by 2020, all of investment can be pay-backed by 2030 due to energy cost reduction
  - Approximately 0.4% of GDP and Employment will be increased
  - Demand (45 trillion yen) and Employment (1.25 million) will be increased in 2020

# Major target of Challenge 25

- Daily Life (in home/ industrial/ transportation sector)
  - 100% achievement rate of a higher energy efficiency standard for all newly built homes and buildings by 2020
  - 2.5 million sales of next-generation vehicles (e.g. hybrid, plug-in, EV, etc.) by 2020
- Community Development
  - 10% reduction of per passenger automobile use by 2020
- Manufacturing
  - Energy consumption reduction by 30-40% by 2050
- Energy Supply
  - 10 % of primary energy supply to be renewable energy sources by 2020
- Core Social Systems for Creating a Low-Carbon Society
  - A cap and trade domestic emission trading scheme, Global Warming Tax



# GHG mitigation measures in Home/Industrial Sector in Challenge 25

- Promotion of zero emission housing/building

| GHG mitigation measures | Target in 2020 |
|---|---|
| −Improvement of Environmental performance in housing/building | −100% Achievement Rate of a higher Energy Efficiency Standard for all newly built homes and buildings |
| −High efficient water heater | −Max 41 million units |
| −High efficient air conditioner in housing | −Max energy efficiency rate: up to COP6 |
| −High efficient air conditioner in building | −Max energy efficiency rate: up to COP5 |
| −High efficient lightings in housing/building | −Max energy efficiency rate: up to 80% |
| −Building Energy Management System | −Max penetration rate up to 80% |
| −Efficiency improvement of other electric appliances in housing | −Energy efficiency rate:35% will be increased |
| −Efficiency improvement of other electric appliances in building | −Energy efficiency rate:45% will be increased |
| −Solar power generation in housing | −Max 24.4 million kW(10 million housings) |

COP:Coefficient performance, It is defined as the ratio of heat removal/delivered to energy input to the compressor in refrigerant based systems.



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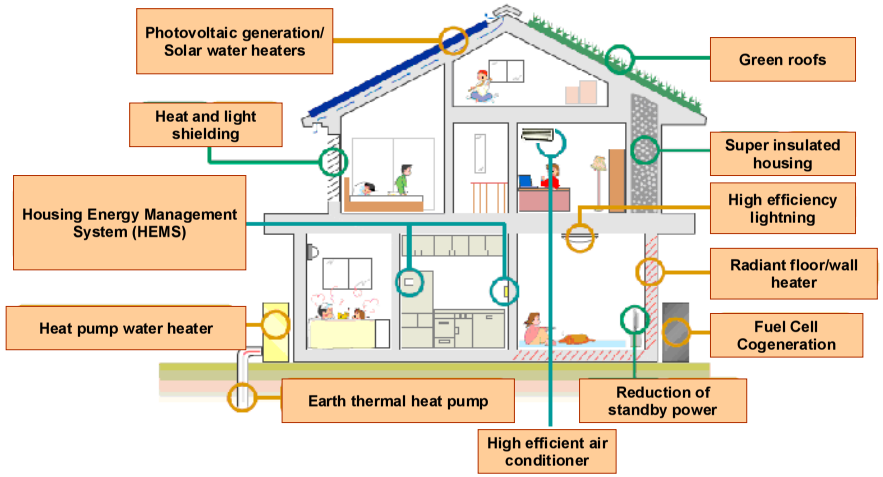
# Measures in housing



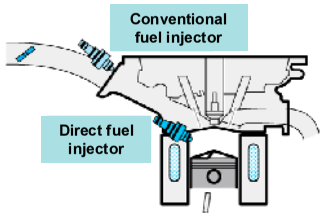



# GHG mitigation measures in Transportation Sector in Challenge 25

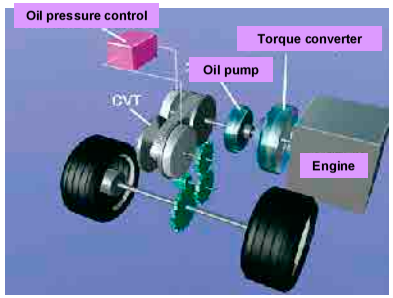
- Promotion of environment-responsive vehicles

| GHG mitigation measures | Target in 2020 |
|---|---|
| −Improvement of energy efficiency of existing passenger vehicle | −Max energy efficiency rate: up to 13%(compared with 2005) |
| −Hybrid vehicles promotion | −Annual sales: 1.2 million vehicles |
| −Plug-in hybrid vehicles promotion | −Annual sales: 400,000 vehicles |
| −Electric vehicles promotion | −Annual sales: 700,000 vehicles |
| −Promotion of eco drive to automobile drivers | −Energy efficiency rate:10% will be improved. |

# Improvement of energy efficiency of vehicle




Direct injection Engine

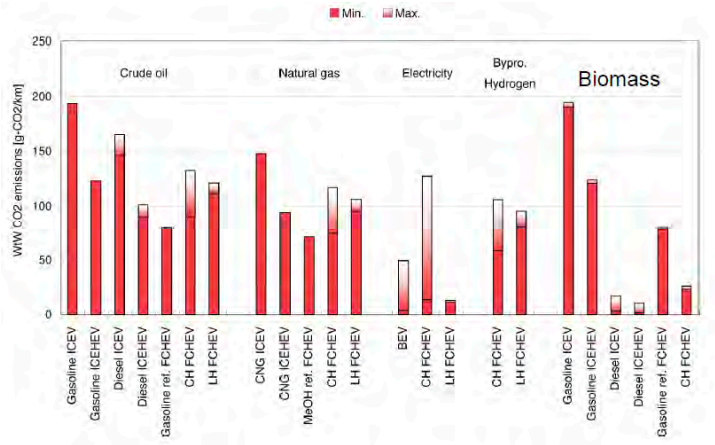



Continuous Variable Transmitter (CVT)

JAMA (Japan Automobile manufactures Association)



# Well to Wheel CO2 Emission by technology




ICEV: Internal Combustion Engine Vehicle

ICEHEV: Internal Combustion Engine Hybrid Electric Vehicle

FCHEV: Fuel Cell Hybrid Electric Vehicle

BEV: Battery Electric Vehicle

CH: Compressed Hydrogen

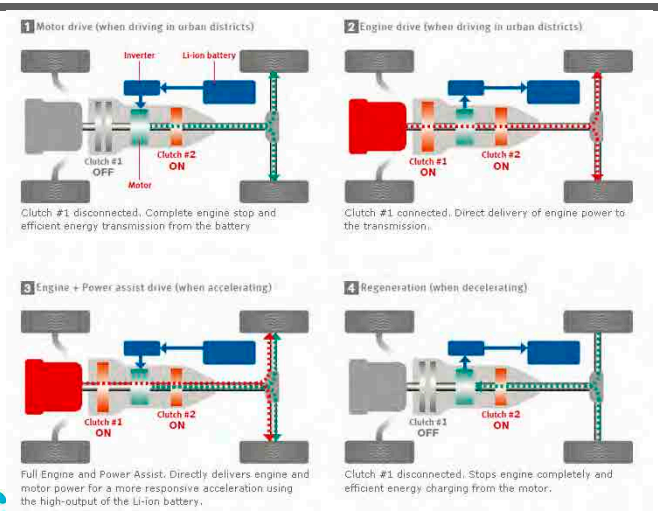
LH: Liquid Hydrogen

Japan Hydrogen & Fuel Cell Demonstration Project(2007)



A1-139

# Overview of Hybrid system




Source: NISSAN



# GHG mitigation measures in Transportation Sector in Challenge 25

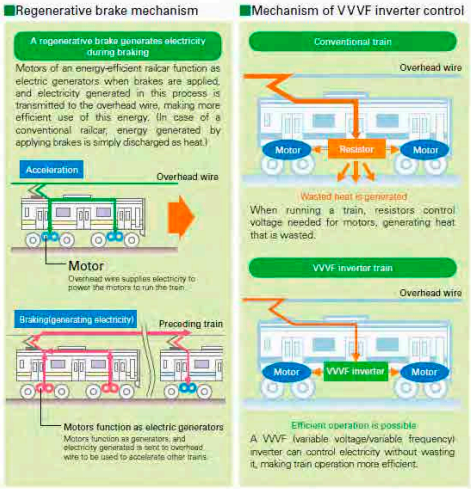
- Change to energy-saving railway rolling stocks, ships and aircraft

| GHG mitigation measures | Target in 2020 |
|---|---|
| –**Improvement of energy efficiency of railway rolling stocks**<br>Installation of energy-saving rolling stocks with VVVF (variable voltage and variable frequency) and regenerative brake | –Energy efficiency rate will be improved by maximum 10% compared with 2005 |
| –**Improvement of energy efficiency of ships**<br>Introduction of technology such as friction reduction, improvement of propulsion system and weight saving | –Energy efficiency rate will be improved by maximum 20% compared with 2005 |
| –**Improvement of energy efficiency of aircraft**<br>Installation of low-fuel consumption aircraft and efficient navigation system, application of GPU (ground power unit) | –Energy efficiency rate will be improved by maximum 24% compared with 2005 |

# GHG mitigation measures of Railways

E2 series, VVVF inverter railcars used for Shinkansen "Asama" and "Hayate" trains.

E231 series, VVVF inverter cars for commuter and suburban transportation.

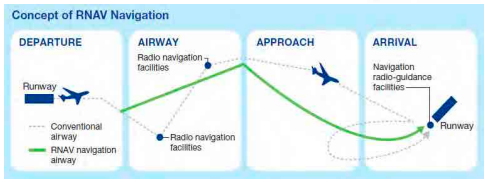



Source: JR East Group Sustainability Report 2009, Japan



# GHG mitigation measures of Aircrafts


Source: JAL CSR Report 2009, Japan


Source: ANA CSR Report 2009, Japan

RNAV:aRea NAVigation)

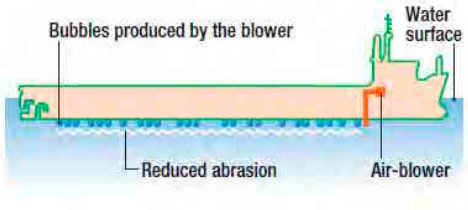


# GHG mitigation measures of Ships

M-EASI attached just forward of the propeller

**Energy conservation device:**

Multi blade device that ca be attached to the ship's hull just in front of the propeller to catch the lost energy from the swirl flow generated by propeller rotation. It can save 5% of fuel consumption.




**Air lubrication system:**

System has an air blower at the front of the ship's hull that blows the air over the ship bottom. The ship bottom is covered with bubbles that lubricate against the seawater and resultantly reduce abrasion resistance. It can reduce CO2 on the order of 10%.

Source: NYK Group CSR Report 2010, Japan



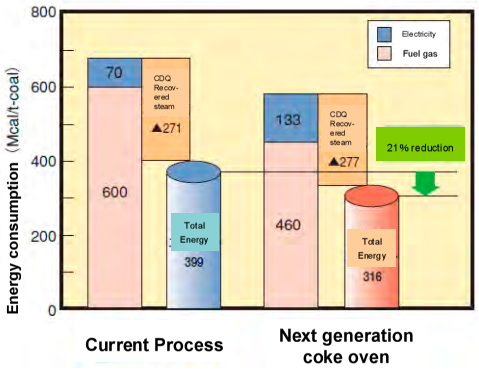
# GHG mitigation measures in Manufacturing Sector in Challenge 25

- Promotion of energy saving measures

| GHG mitigation measures | Target in 2020 |
|---|---|
| –**Promotion of existing GHG mitigation measures** | |
| • Iron and steel:Next generation Coke oven | • 1 equipment (current) to 6 equipment |
| • Cement:Waste heat recovery power generation | • 77 % (current) to 88 % |
| • Chemistry:High efficiency cogeneration | • 0 % (current) to 100 % |
| • Pulp and paper:High performance re-pulping technology | • 17 % (current) to 71 % |
| –**Promotion of Cross-cutting technology to all manufacturing sectors** | • Reduction : 9.50million ton-CO2 |
| • (High efficiency industrial furnaces, High efficiency boiler, Industrial heat pomp ) | |
| –**CFC's substitute (F gases) reduction measures** | • 24 % (current) to 60 % |
| • Rate of installing F gases removal equipment in semiconductor manufacturing | • 63 % (current) to 100 % |
| • Rate of installing F gases removal equipment in liquid crystal manufacturing | |

# Iron and steel : Next generation Coke oven

**Next generation coke oven**



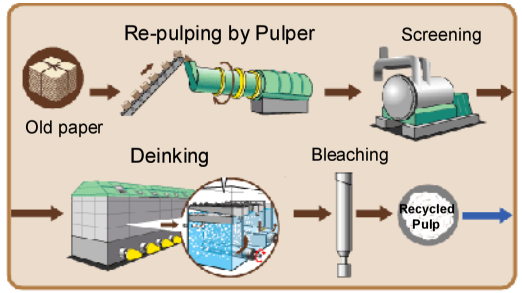

In current process, the temperature of coke oven is 1200 degree Celsius.
In next generation coke oven, coke will be pre-heated up to 350 degree Celsius and installed to 850 degree Celsius.
This results in lower energy consumption. 21% of total energy will be reduced.

Source: Nippon Steel Cooperation



# Pulp and paper : high performance re-pulping technology

**High performance re-pulping technology**




Source: Oji Paper Group

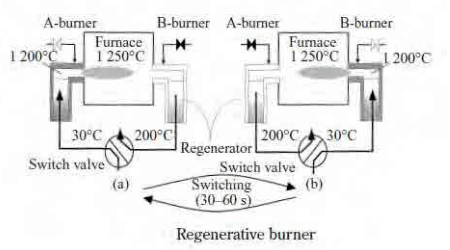
The old paper moves by conveyor to a Pulper, which contains water and chemicals. The high efficient Pulper breaks the paper down more efficiently into tiny strands of cellulose called fibers than the conventional type. It results the energy reduction.



A1-141

# High efficiency industrial furnaces

- Regenerative Burner
  - Pre-heated combustion air temperature: increased to 1200-1250℃
  - Fuel consumption: 15-25% reduced
  - NOx concentration: reduced to 30ppm




Source: JFE steel

Fukuyama Steel Works in JFE Steel



# F gases removal in semiconductor/liquid crystal manufacturing

**F gases removal facility**

It enables removal of PFC, SF 6, and NF 3 as HF during semiconductor dry etching processes at low temperature (less than 600 degree Celsius) with a high decomposition rate.

Source: Syowa Denko

**F gases recovery and recycle system**

Recovered HF + Ca(OH)2 ⇨ CaF2

Fluorite: CaF2

# GHG mitigation measures in Energy Supply Sector in Challenge 25

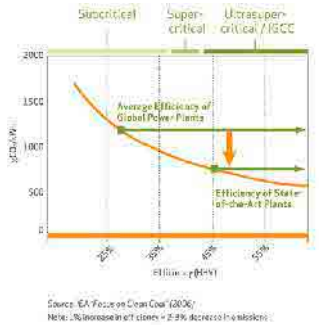
- Installation of high efficiency electricity generation technology to thermal power plant
- Rate of smart meter installation will be increased up to over 80% by 2020
- 10% of primary energy supply to be renewable energy sources by 2020

| GHG mitigation measures | Target in 2020 |
|---|---|
| –Solar power generation (excluding housing) | –Max 25,600 MW |
| –Wind power generation | –Max 11,310 MW |
| –Hydro power generation(large scale) | –Max 21,560 MW |
| –Hydro power generation(middle and small scale) | –Max 6,000 MW |
| –Geothermal power generation | –Max 1,710 MW |
| –Biomass power generation | –Max 7,610 MW |



# High efficiency electricity generation technology

**CO2 emission from Ultra-supercritical Coal Power Plant**




**Ultra-supercritical Coal Power Plant**

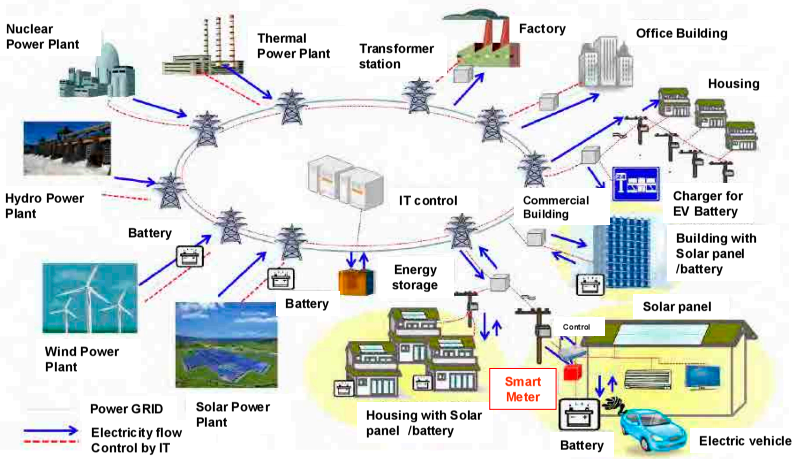
Conventional coal-fired power plants, which make water boil to generate steam that activates a turbine, have efficiency of about 20-35%.

Supercritical (SC) and ultra-supercritical (USC) power plants operate at higher temperatures and higher pressures above the critical point of water, i.e. above the temperature and pressure at which the liquid and gas phases of water coexist in equilibrium.
This results in higher efficiencies – above 45%.



A1-142

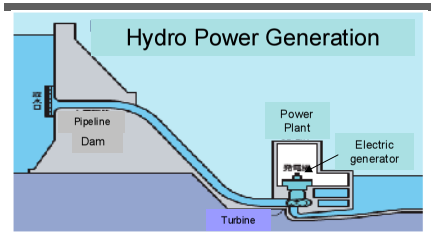
# Image of Smart Grid



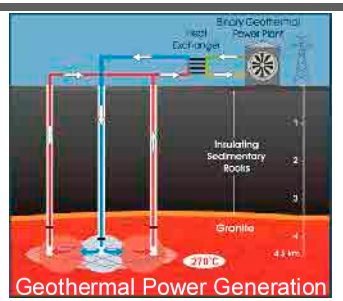

METI,Japan(2010)



# Renewable Energy









Source: Treehuger

# GHG mitigation measures in daily life and community development in Challenge 25

- For urban community

| GHG mitigation measures | Targets in 2020 |
|---|---|
| −**Reduction the vehicle travel amount by one passenger**<br>• Increase of population density in DID (densely inhabited district)<br>• Increase of public transportation utilization<br>• Extension of LRT and BRT | −10% Reduction compared with 2005<br>• 60 to 80 persons/ha in 2030<br>• Increase up to twice compared with 2005<br>• Improved distance: 1,500km in 2030 |
| −**Reduction of share of automobile transportation** | −50 to 60% decrease in 2020 |
| −**District heating system(Usage of urban waste heat)** | −Reduction potential : 1 million ton-CO2 |



# Development of land use and transportation system for low-carbon compact city

LRT and P&R, K&R

Railway side residential area

Central city area yield to pedestrians (Transit mall)

Bicycle system (no motorcycle)

Car Sharing

Green space in urban area


Source: GHG mitigation project by local government planning manual (2009), MoE, Japan



A1-143

# Light Rail Transit in Toyama city (movie)

Toyama city, Toyama Pref.
Old route of Japan Railway switched to new LRT services from Apr.2006.
Length of route:7.7km, 13 stations, every 10 minutes in the morning
People uses new LRT service to commute to the companies and schools etc.
For the people from outer area, feeder bus services are available.

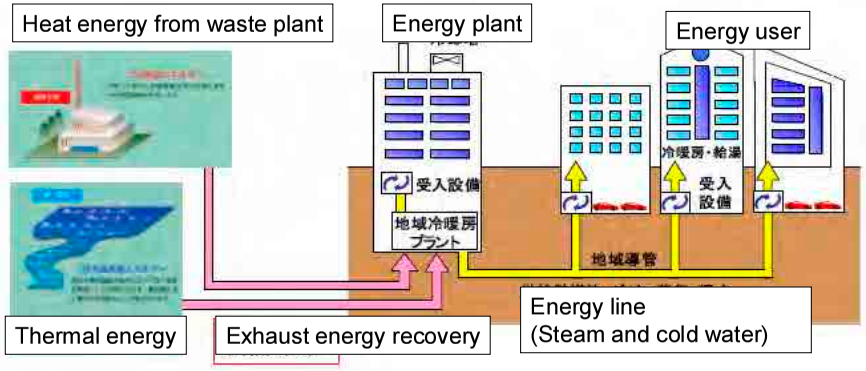


# Urban heat system (movie)

Heat energy from waste plant

Energy plant

Energy user




Thermal energy

Exhaust energy recovery

Energy line (Steam and cold water)

Osaka Cosmo-square (seawater thermal system)
Koraku-en area (sewage thermal system)
Temmabashi area (river water thermal system)
Marunouchi, Sinagawa-station, Shinjuku-station etc.

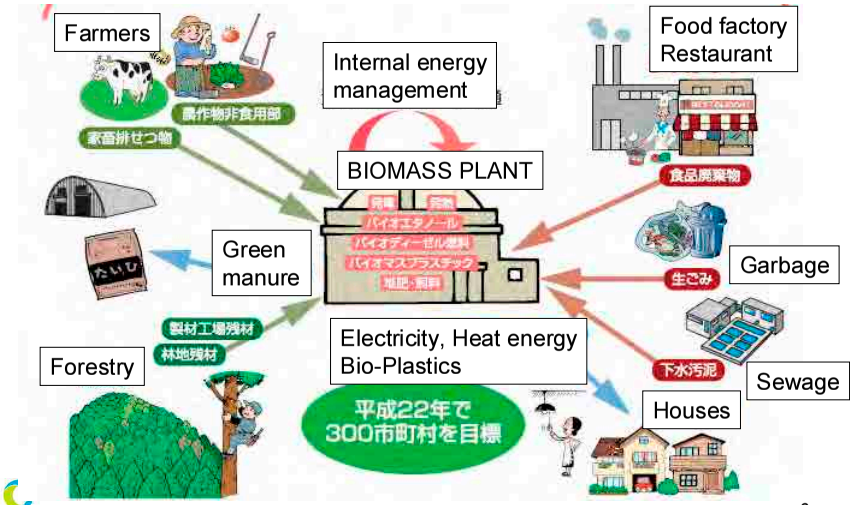
# GHG mitigation measures in daily life and community development in Challenge 25

- For rural community

| GHG mitigation measures | Targets in 2020 |
|---|---|
| **–Utilization of unused biomass for energy generation**<br>**–Installation of renewable energy facilities**<br>**–Utilization of forest and farmland as sink** | –Utilization of unused lumber in forest, unused farm waste and manure<br>–Installation of small scale hydro power plant in irrigation ditch, solar panel in unused land |
| • Forest management<br>• Farmland management | • Tree thinning : 550 thousand ha/year<br>• Increase of area with green manure from 98 thousand ha to 216 thousand ha |
| • Wood products | • Increase products made with national wood |



# Biomass Town Strategy in Japan








# Hita Biomass recycle energy plant


Place : Hita city, O-ita Pref. from 2006
Biomass energy from waste and manure : 50 tons/day (max 80tons/day)
Bio-methane fermentation



# Small scale civic hydro in Tsuru city (movie)

Place : Kachu-river, Tsuru city, Yamanashi Pref. from 2005
Small hydro energy plant (GENKI-KUN No.1 and GENKI-KUN No.2)
Investment program with citizen of the city
15% reduction of power usage of the city office

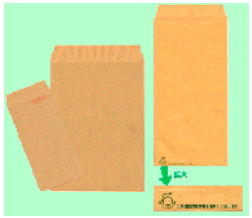
## Forest management and tree thinning

- Forest management

Donation, voluntary activities

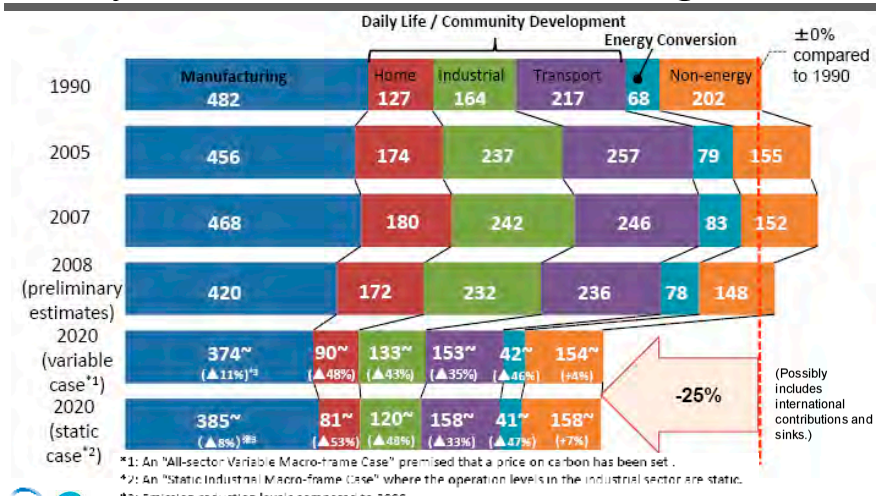
Forestry cooperative

Utilization of forest thinning





## A Look at Greenhouse Gas Emissions by Sector in 2020 in Challenge 25






A1-145

## Group Practice

- Let's make up the charts of GHG mitigation measures
  - Group Discussion and fill out blank of Figure (40min)
  - Presentation from each group (20 min)

# GHG Mitigation 2: Monitoring of contribution to the sustainable development by mitigation measures including co-benefit approach

20, October, 2010

Deputy Chief Advisor of JICA Expert Team
**Kazuhito YAMADA**



# Today's Agenda

- What is sustainable development (SD)?
- Contribution of CDM to SD
- SD criteria in major host countries: Mexico, Brazil, India, China, and **Thailand**
- What is 'Co-benefit Approach'?
- Examples of Co-benefit Approach
- Examples of estimation of 'Co-benefit'



# What is SD ? (1)

- Believing that **sustainable development**, which implies meeting the **needs of the present without compromising the ability of future generations to meet their own needs**, should become a central guiding principle of the United Nations, Governments and private institutions, organizations and enterprises,
- Agrees further that an **equitable sharing of the environmental costs and benefits of economic development** between and within countries and between present and future generations is **a key to achieving sustainable development**;

**Source: Report of the World Commission on Environment and Development**



# What is SD ? (2)

- SD is essential concept not only for developing countries, but also for developed countries;
- However, the concept of SD is too ambiguous to translate it into reality;
- For example, the targeted actions for SD in China will be completely different from those in Tuvalu;
- In other words, we can not express SD by only simple and uniform concept;
- Therefore, we need to translate SD into materialized concepts by each country in order to discuss it.

# What is SD ? (3)

- **Top-down approach:**

  **CDM-SD approach**

- **Bottom-up approach:**

  **Co-benefit approach**



# Contribution of CDM to SD (1)

**Decision 3/CMP.1**

- Bearing in mind that, in accordance with Article 12, the purpose of the CDM is to assist Non-Annex I Parties in achieving **sustainable development** and in contributing to the ultimate objective of the Convention, and to assist Annex I parties in achieving compliance with their quantified emission limitation and reduction commitments under Article 3 of the Kyoto Protocol,

**Decision 17/CP.7**

- Affirming that it is the **host Party's prerogative** to confirm whether a CDM project activity assists it in achieving **sustainable development**,





# Contribution of CDM to SD (2)

- In the CDM, we don't have any official method to evaluate or monitor the contribution of CDM-PJ to SD because it is the host Party's prerogative;
- Therefore, many host Parties developed their own system to confirm the contribution of CDM-PJ to SD of each country;
- CDM-EB didn't express any comment about this matter.



# SD criteria in major host countries: Mexico

- **Contribution of environmental aspects**: conservation of biodiversity, decrease of waste and pollutants, improvement of soil and waster quality
- **Contribution of economic aspects**: improvement of economic condition and competitiveness of Mexico by investment, employment creation, technology transfer, etc.
- **Contribution of social aspects**: improvement of living level of local community by creating stable employment, constructing necessary infrastructure

# SD criteria in major host countries: Brazil

- Contribution to SD in **local environment**
- Creating of **employment**, improvement of the condition of employment
- Improvement of **income distribution**
- Contribution to **capacity building** and **technological development**
- Contribution to **local economy** and partnership among sectors



# SD criteria in major host countries: India

- **Social welfare**: poverty alleviation by creation of employment, improvement of living level
- **Economic welfare**: promotion of additional investment which meets the needs of local people
- **Environmental welfare**: consideration of sustainability of natural resources, adverse impacts to local people
- **Technical welfare**: promotion of technology transfer to contribute environmental improvement, technical innovation





# SD criteria in major host countries: China

- Complement national economic and environmental strategy;
- Transfer of technology and financial resources;
- Sustainable ways of energy production;
- Increasing energy efficiency and conservation;
- Poverty alleviation through income and employment generation;
- Local environmental co-benefits



# SD criteria in major host countries: Thailand

**Dr. Paweena Panichayapichet will make a presentation about**

**'SD criteria in Thailand'**

**Thank you very much!**

# What is 'Co-benefit Approach'?

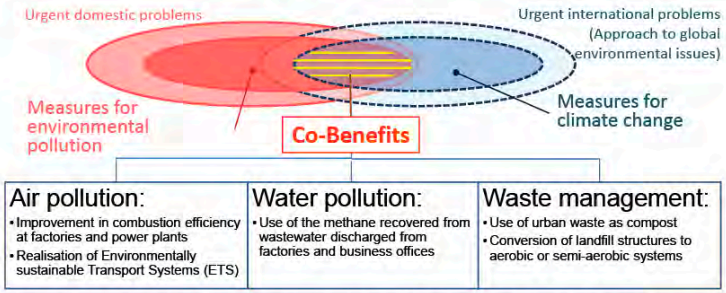
- A **co-benefits approach** is an approach aimed at achieving highest synergies between climate mitigation actions and sustainable development actions.
- This approach can address developing countries' **urgent developmental needs** while achieving climate change mitigation, by the most efficient use of extremely scarce resources available for them.
- For such purpose, quantitative measurement, reporting, and verification of co-benefits are extremely important.

Source: Taka Hiraishi's presentation in COP15



# What is 'Co-benefit Approach'?

An Approach aimed at reducing greenhouse gas emissions and preventing environmental pollution at the same time




- Achieving highest synergies between climate change mitigation actions and sustainable development actions
- Addressing developing countries' urgent developmental needs while achieving climate change mitigation

Source: MOE's presentation in COP15





# Examples of Co-benefit Approach

- **Utilization of Solar Energy in Nigeria**

This project contributed to the reduction of poverty in rural areas. The residents' quality of life was improved through electrification by means of effective use of solar energy which is abundantly available in these areas. Such use of renewable energy serves as an effective countermeasure for global warming.

**Children gathering under a street light which has freed them from the threat of assaults, snakes and scorpions.**

Source: JICA



# Examples of Co-benefit Approach

**Non-Revenue Water Reduction in Jordan**

As the water demand increases in proportion to its population growth, Jordan faces constant water shortages. Water supplied from the water works for which fees cannot be collected is collectively called non-revenue water. Leakage, illegal connection and inaccurate meter installation are the main factors of high non-revenue water. Non-revenue water was over 50% of the total water supply across Jordan in 2002, leading to an increased deficit for the Water Authority of Jordan (WAJ). JICA provides support for capacity development of WAJ on-the-job training in pilot areas and raising public awareness.

The WAJ will be able to supply more water using the same power consumption. This will result in reducing the emissions of GHGs from power generation.

Source: JICA

# Examples of Co-benefit Approach

- **Treatment of Sewage Sludge using Composting Technology in Kagoshima, Japan**




# Examples of estimation of 'Co-benefit' (1)

## Pollution Control Plan in Panzhihua City in China

- Goal for 5 years during 2006-2010
  - 22% energy consumption reduction
  - **$SO_2$ emission reduction 33,741t/year**

**National Level**
11th Five Year Plan for Environmental Protection (2006-2010)

**Province Level**
11th Five Year Plan for Environmental Protection (2006-2010)

**City Level**
11th Five Year Plan for Environmental Protection (2006-2010)

Pollutant Control Plan

Source: OECC



# Examples of estimation of 'Co-benefit' (2)

## Methodologies

Sorting out pollutant emission reduction measures in Panzhihua's plan


Identifying methodologies for calculation of pollutant emission reduction measures
- -Goal of pollutant emission reduction for 5years
- -Methodologies for calculation
- -Guidance for pollutant control and reduction (published in 2008)

Source: OECC

Converting to methodologies for GHG emission reduction from methodologies for calculation of pollutant emission reduction



# Examples of estimation of 'Co-benefit' (3)

Case Study: **Closure of Power Generation Unit (50MW)**

Pollutant Emission Reduction

- $SO_2$ Emission Reduction = $SO_2$ Emission from the facility

$$E(SO_2) = M \times S \times 1.6 \times 10^2$$
$$= 11.14 \times 0.72 \times 1.6 \times 10^2$$
$$= 1,283\ (t\text{-}SO_2)$$

- $E(SO_2)$: $SO_2$ emission from the facility
- M: Coal consumption for power generation 64,000t
- S: Average sulfur content of coal 0.44%

Source: OECC

## Examples of estimation of 'Co-benefit' (4)

**GHGs Emission Reduction**

- $CO_2$ Emission Reduction =
  $CO_2$ Emission from the facility

$$E(CO_2) = M \times C \times (44/12 \times 0.8) \times 10^2$$
$$= 11.14 \times 50 \times (44/12 \times 0.8) \times 10^2$$
$$= 163{,}281 \text{ (t-}CO_2\text{)}$$

- $E(CO_2)$: $CO_2$ emission from the facility
- C: Average nitrogen content of coal 50%
- 44/12: Mass ratio between C and $CO_2$
- 0.8: Combustion efficiency of coal 80%

Source: OECC



## Conclusion

- SD is essential concept not only for developing countries, but also for developed countries;
- However, the concept of SD is too ambiguous to translate it into reality;
- There are two approaches to translate the concept of SD into reality; top-down approach and bottom-up approach;
- In CDM world, host countries have translated SD into several key actions using top-down approach. In ODA world, co-benefit approach tries to relate SD to climate change using bottom-up approach;
- Unfortunately, it may be rare case to monitor the contribution to the SD by mitigation measures in both approaches;
- We have to consider how to monitor the contribution to SD by mitigation measures, if possible, by establishing quantitative assessment methodology.

# GHG Mitigation 3: Importance of Low Carbon Society

20th October 2010

Chief Advisor of JICA Expert Team
Masahiko FUJIMOTO



# Contents





# What is a Low-Carbon Society?

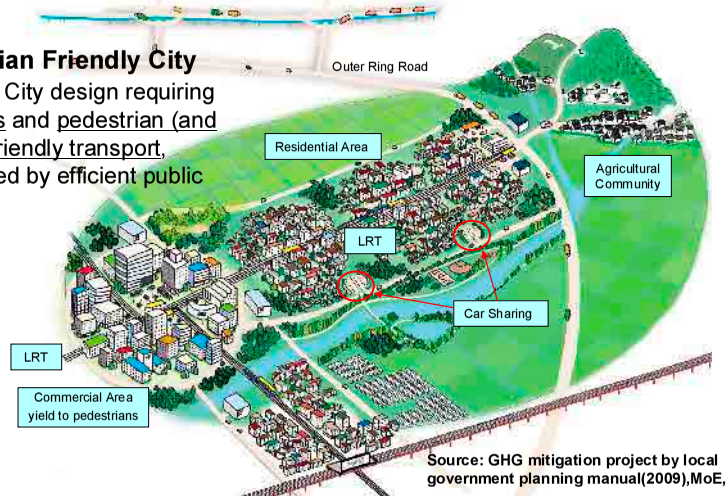
- A low-carbon society means the society which:
  - i) Takes actions that are compatible with the principles of sustainable development, ensuring that the development needs of all groups within society are met.
  - ii) Makes an equitable contribution towards the global effort to stabilize the atmospheric concentration of CO2 and other GHG such as CH4 at a level that will avoid dangerous climate change, through deep cuts in global emissions.
  - iii) Demonstrates a high level of energy efficiency and use low-carbon energy sources and production technologies.
  - iv) Adopts patterns of consumption and behavior that are consistent with low GHG emissions.

Source: Japan-UK Joint Research Project "Developing Vision Developing Vision for a Low-Carbon Society through Sustainable Development"



# One of Images of a Low-Carbon Society

**Pedestrian Friendly City Design:** City design requiring short trips and pedestrian (and bicycle) friendly transport, augmented by efficient public transport.




**Source: GHG mitigation project by local government planning manual(2009),MoE,Japan**

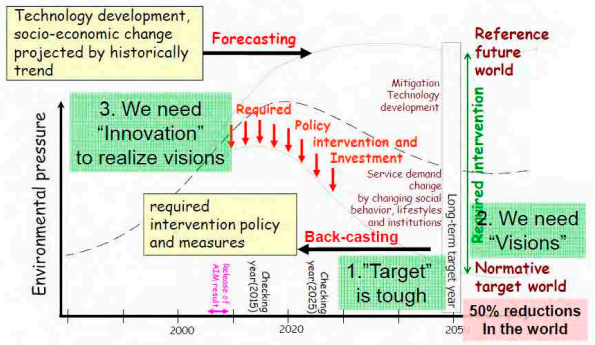
# Necessity of implementing Low-Carbon Society

- The overconcentration of GHGs is producing global warming that affects long-term climate, with negative impacts on humanity in the future.
- Therefore, the society needs to adopt a lifestyle that makes more use of energy efficient devices and renewable energy technologies.
- A low-carbon society (LCS) is proposed as a means to avoid catastrophic climate change, and as a pioneer to the more advanced, zero-carbon society and renewable-energy economy.
- Co-benefits of LCS
  - Reduction of energy procurement risk
  - Promotion of low carbon related business
  - Improvement of local air/water quality



# Procedure to create Low-Carbon Society scenario

- In order to create a local low-carbon society scenario, the method of "back casting" is used, which sets a desirable goal first, and then seeks a way to achieve it.

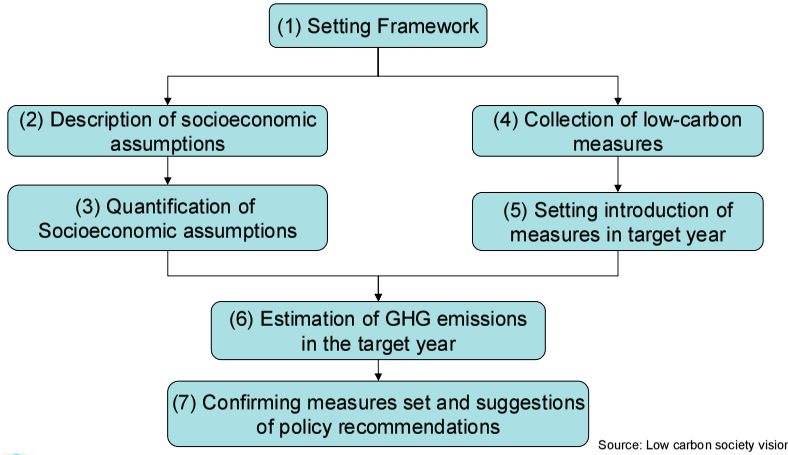



Source: Japan and Asian Low-Carbon Society Scenarios and Actions (Dr.Fujino, CTC2010)



A1-153

# Procedure to create Low-Carbon Society scenario




Source: Low carbon society vision 2030, Thailand(October,2010)



# Procedure to create Low-Carbon Society scenario

(1) Setting framework
- The framework of an LCS scenario includes; target area, base year, target year, environmental target, and number of scenarios.

(2) Description of socioeconomic assumptions
- Before conducting quantitative estimation, a qualitative future image should be written. It is an image of lifestyle, economy and industry, land use, and so on.

(3) Quantification of socio-economic assumptions
- Socio-economic indices of the target year such as population, GDP, output by industry, transport demand, and so on are estimated using a macroeconomic model.

(4) Collection of low-carbon measures
- Counter measures are used which are thought to be available in the target year, for example, high energy efficiency devices, transport structure such as public transport, use of renewable energy, energy saving behavior, and carbon sinks

# Procedure to create Low-Carbon Society scenario

(5) Setting introduction of counter measures
- Since there can be various portfolios of the measures, one must choose appropriate criteria. For example, cost minimization, acceptance to the stakeholders, or probability of technological development.

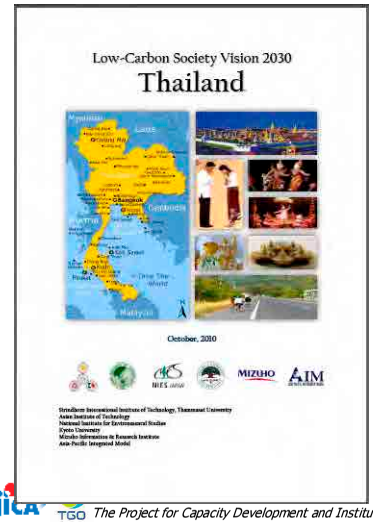
(6) Estimation of GHG emission in the target year
- Based on socio-economic indices and assumption of measures, GHG emissions are calculated.

(7) Confirming measures set and suggestions of policy recommendations
- A policy is set to introduce the measures. Available policies depend on the situation of the municipality or the country in which it belongs.

Source: Low carbon society vision 2030, Thailand(October,2010)



# Introduction of Low-Carbon Society Scenario (Thailand in 2030)




This scenario is one of the joint research outcomes of support and collaboration among
- Sirindhorn International Institute of Technology (SIIT) Thammasat University Thailand,
- Asian Institute of Technology,
- the National Institute for Environmental Studies (NIES) Japan,
- Kyoto University, and
- Mizuho Information and Research Institute Japan.

Source: Low carbon society vision 2030, Thailand(October,2010)



A1-154

# Introduction of Low-Carbon Society Scenario (Thailand in 2030)

- Estimated socio-economic indicators in 2030

| | 2005 | 2030 | 2030/2005 |
|---|---|---|---|
| Population (persons) | 60,991,000 | 68,815,004 | 1.13 |
| No. of households | 19,016,784 | 36,265,390 | 1.91 |
| GDP (million Baht) | 8,016,595 | 30,802,306 | 3.84 |
| GDP per capita (Baht/capita) | 131,439 | 447,610 | 3.41 |
| Gross output (million Baht) | 18,755,884 | 68,456,651 | 3.65 |
| Floor space for commercial (million $m^2$) | 88 | 394 | 4.47 |
| Passenger transport demand (million p-km) | 191,520 | 216,088 | 1.13 |
| Freight transport demand (million t-km) | 188,524 | 589,859 | 3.13 |

- Summary of GHG mitigation measures in 2030

Unit:kt-CO2e

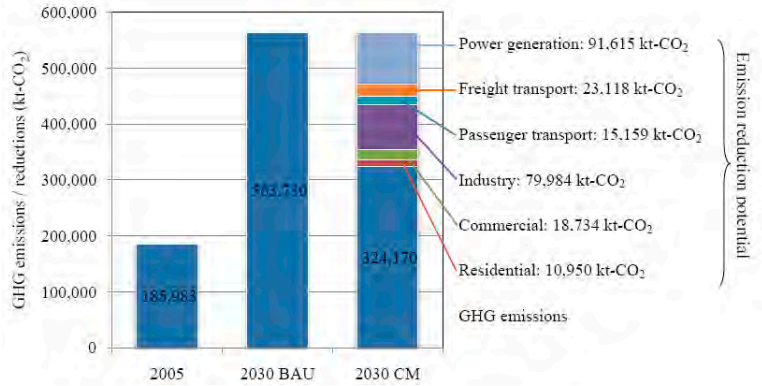
| Mitigation Measures | GHG emission reduction |
|---|---|
| 1. Energy efficiency improvement (EEI) in households | 10,950 (1.94%) |
| 2. Energy efficiency improvement in buildings | 16,384 (2.91%) |
| 3. Building codes | 2,350 (0.42%) |
| 4. Energy efficiency improvement in industries | 38,648 (6.86%) |
| 5. Fuel switching in industry | 41,336 (7.33%) |
| 6. Fuel economy improvement in transportation | 10,739 (1.90%) |
| 7. Fuel switching in transportation | 9,983 (1.77%) |
| 8. Modal shift in transportation | 17,556 (3.11%) |
| 9. Efficiency improvement and fuel switching in the power sector | 91,614 (16.25%) |

Source: Low carbon society vision 2030, Thailand(October, 2010)



# Introduction of Low-Carbon Society Scenario (Thailand in 2030)

- Results of GHG emission reduction forecast




BAU: Business as usual
CM: Counter measure

Source: Low carbon society vision 2030, Thailand(October,2010)

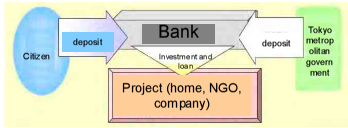
# Introduction of Activities of Low-Carbon Society in Japan



# Case of Tokyo Metropolitan Government

- **Target: 25% reduction of GHGs by 2020** (compared with 2000)
  (Approximately 15million ton)
- **Mitigation Measures within next 3 years:**
  - Tokyo cap and trade system for large scale business/industrial facilities(2010)
  - Climate change mitigation report for middle-small scale business/industrial facilities(2010)
  - Solar Power Plant in 6,700 kilowatt
  - Promotion of Solar Energy Utilization Facilities in households(until 2020)
    - Photovoltaic electricity generation 100,000 yen per kilowatt
    - Solar water heater 9,000 yen per square meter
    - Solar thermal system 33,000 yen per square meter
  - Installation of " Eco fund project" which assists to implement environmental activities
  - Park and bus ride in Shinjyuku Area, Promotion campaign of public transportation utilization in seaside area.

Solar water heater (Tokyo Gas)




Scheme of Eco fund project

Bus used in park & ride in Shinjyuku area





# Case of Tokyo Metropolitan Government

- **Mitigation Measures within next 3 years:**
  - Emission reduction crediting scheme for middle-small scale business/industrial facilities
  - Energy saving potential diagnostics for 1800 middle-small scale business/industrial facilities
  - Reduction tax of ½ of cost of metropolitan government designated energy efficiency equipment (limitation: 10 million yen)
  - Solar Power Plant increased to 9000 kilowatt
  - Promotion of bio fuel for vehicles
  - Photovoltaic electricity generation in sewage treatment plants, small scale hydro power plant in water utilities.
  - Promotion of energy saving in existing housing
  - Penetration of 1500 next generation passenger vehicles, installation of 80 battery charging facilities(2013)
  - Subsidiary of ¼ of price difference between next generation car and traditional car for middle-small scale companies.

Photovoltaic electricity generation in sewage treatment plant

Fast battery charging facility (Takaoka Electric MFG. Co.Ltd)

Next generation passenger vehicles (Nissan)



# Case of Kyoto City

- **Target: 40% reduction of GHGs by 2030, 60% by 2050** (compared with 1990)
- **Mitigation Measures:**
  **"Pedestrian-centered Urban Planning"**
  - **Mobility management**
    - Expand the city's policies for "eco-commuting" to 200 local government and public offices and 700 other offices over a certain size (some 190,000 employees).
  - **Transit Mall**
    - Secure space for pedestrians with wider sidewalks and give preference to public transportation with special lanes on roadways.
  - **Restricting vehicle access to narrow streets**
  - **Low-carbon public transportation**
    - Connect the southern region of the city with Kyoto Station by high-frequency, highly reliable buses. Continue to power city buses with biodiesel.
  - **Transitioning the city's fleet to "eco-cars**
    - Transition the entire city fleet to "eco-cars" (fuel-efficient vehicles) an electric vehicles by 2018. Develop the necessary infrastructure to support recharging of vehicle (EV) batteries.

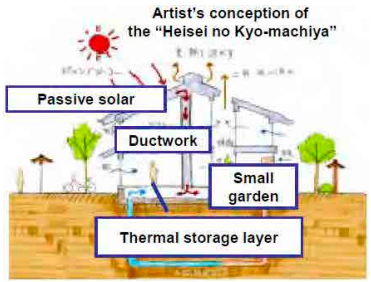
Transit Mall

# Case of Kyoto City

**"Low-Carbon Building and Use of Local Materials"**

– **CASBEE Kyoto-certified Buildings**
  - Promote the construction of low-carbon buildings (energy-saving, long-lasting structures built using locally produced materials that shorten transport routes) that still retain the elegance of old Kyoto through CASBEE Kyoto certification

– **Local lumber, local consumption**
  - Promote local production and local consumption of lumber through Kyo no Yama.






# Case of Kyoto City

**"Lifestyle Changes"**

– **An "eco-fund"**
  - Establish an "eco-fund" to implement environmental policy by promoting activities in the community and at schools and businesses.
  - **Eco-neighborhood Associations**: Use "eco-points" and carbon offsets to promote energy conservation and the collection, conversion, and reuse of waste oil and garbage for waste biomass.
  - **"Eco-schools":** Award points to schools for "eco-friendly" efforts that translate into bonus money for the school budget.
  - **"Eco-business":** Work to increase "eco-commuting" and the use of fuel-efficient company cars. Allow businesses to use reductions they have achieved to offset emissions reported and disclosed in accordance with ordinances.

Learning the concept and method of energy saving in community





# Case of Shiga Prefecture

- **Target: 50% reduction of GHGs by 2030** (compared with 1990)
- **Mitigation Measures:**

– **Businesses**
  - Introduction of high efficiency production equipment: improvement of the total efficiency by 22%;
  - Switching of fuel for production: increase in the share of natural gas from 8.6% (2000) to 26.8% (2030);
  - Increase in the ratio of recycled industrial waste: e.g. ratio of recycled waste plastics/rubber from 76% (2004) to 94% (2030);
  - More efficient logistics: reduction of transport volume per production by 30%;
  - Modal shift: substitution of railway transport for freight for 50% of road transport to distant prefectures;
  - Introduction of biomass fuel to freight vehicles: penetration rate of 10%;



# Case of Shiga Prefecture

– **Businesses**
  - Use of heat insulating buildings for business: compliance with the heat insulation standard for energy saving buildings in 90% of buildings.
  - Improvement of farming methods: reduction of fertilizer application by all farmers; 100% return of animal waste to farms.
  - Introduction of high efficiency business equipment: improvement of total efficiency by 40%;
  - Use of renewable energy in business buildings: introduction of photovoltaic power generation in 50% of buildings and biomass heating in 10%;

Source: www.pref.shiga.jp

# Case of Shiga Prefecture

- **Local governments**
  - Maintenance of forests: proper thinning, etc. in all plantation sites (42% of forest area);
  - Formation of compact cities: reduction of average distance of intra-city travel by 25%,
    and conversion of unused space to green zone 20%;
  - Planting of reeds: increase in the area to 260 ha including existing communities

Source: www.pref.shiga.jp



# Case of Shiga Prefecture

- **Citizen**
  - Introduction of high efficiency equipment: improvement of total efficiency by 40%;
  - Use of heat insulating buildings: compliance with the next-generation heat insulation standard in 90% of buildings;
  - Use of renewable energy in houses: introduction of photovoltaic power generation in 20% of houses, solar hot water system in 20%, biomass heating in 10%,
    and passive solar in 10%;
  - Penetration of fuel-efficient passenger vehicles: increase in average fuel efficiency
    by 60% (share of hybrid vehicles:90%);
  - Introduction of biomass fuel for passenger vehicles: penetration rate of 10%

Source: www.pref.shiga.jp



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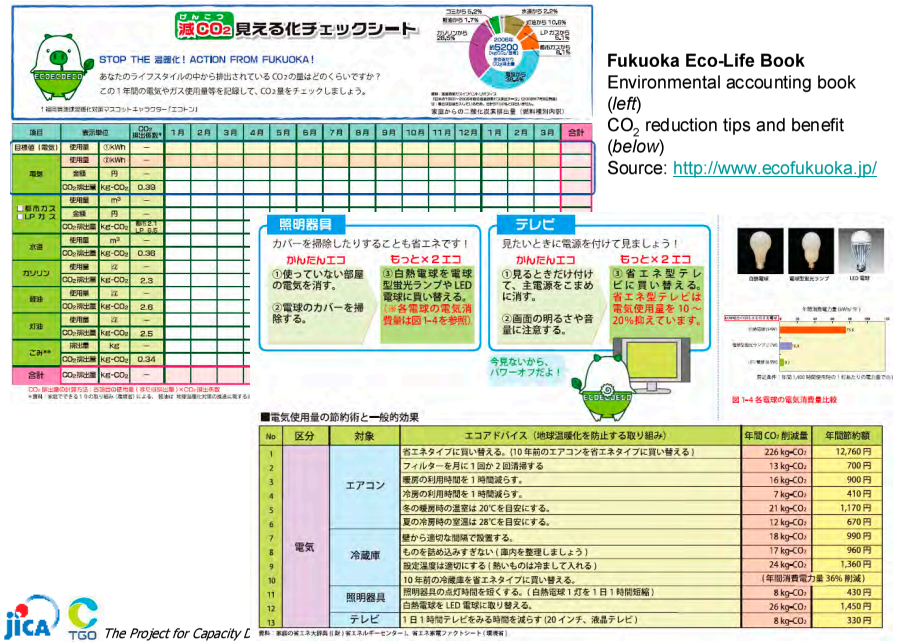
# Case of Fukuoka Prefecture

- **Target: 6% reduction by 2012**
  (Approx. 4 million tons reduction)
- **Houses**
  - Target: 10% $CO_2$ emission reduction at household
  - Preparation/ distribution of a booklet "Fukuoka Eco-Life Book"
    - Tips to reduce GHG emissions at houses
    - Simple environmental accounting book


Fukuoka Eco-Life Book
Source: http://www.ecofukuoka.jp/






**Fukuoka Eco-Life Book**
Environmental accounting book (*left*)
$CO_2$ reduction tips and benefit (*below*)
Source: http://www.ecofukuoka.jp/

# Case of Fukuoka Prefecture

- **Businesses**
  - Target: 8% $CO_2$ emission reduction per floor space at buildings
  - Preparation of a tool "Fukuoka Eco-Life Book for Businesses"
    - Tips to reduce GHG emissions at business facilities
    - Simple environmental accounting book for businesses
  - Introduction of domestic carbon credit trading system
    - Fuel switch from oil to biomass waste at boiler

Fukuoka Eco-Life Book for business
Source: http://www.ecofukuoka.jp/



# Case of Fukuoka Prefecture

## Other measures

- Enhancement of $CO_2$ absorption by sink
  - Introduction of forest environmental tax in 2004
    - Collection of 1.3 billion yen from citizens and businesses
    - Used for rehabilitation of ruined 29,000 ha forest
- Introduction of new alternative energy
  - Introduction and R&D
  - Hydrogen Strategy

Source: Fukuoka Hydrogen Town
http://www.f-suiso.jp/HyTown/index.html





# Case of Kita-Kyushu City

- **GHG Emissions from the City**
  - 15 million tons $CO_{2e}$ (2005)
  - 66% from industrial sector
  - 16 ton-$CO_{2e}$ per capita (1.5 times larger than national average)
- **Target: 30% by 2030**
  **50% by 2050**
  (about 8 million tons reduction)
  (compared with 2005 level)
- Selected as one of
  13 "Eco-Model Cities"



# Case of Kita-Kyushu City

- **Introduction of new energy**
  - Hydrogen town
  - Solar factories
  - Waste heat recovery
- **Creation of low-carbon communities**
  - Adopt long-lasting energy-efficient houses
  - Introduction of EV and FCV
  - Electric bicycle rental by community
- **Enhancement of citizen participation**
  - Carbon offsetting, Eco point system
  - Integrated low-carbon study system
- **Asia Low-Carbon Emission Center**
  - Transfer low-carbon technology to Asian countries

Source: Kita-Kyushu Eco-model City
www.city.kitakyushu.jp

# CDM 6: Validation and Verification including communication with DOE

September, 2010

Deputy chief advisor of JICA Expert Team
**Kazuhito YAMADA**

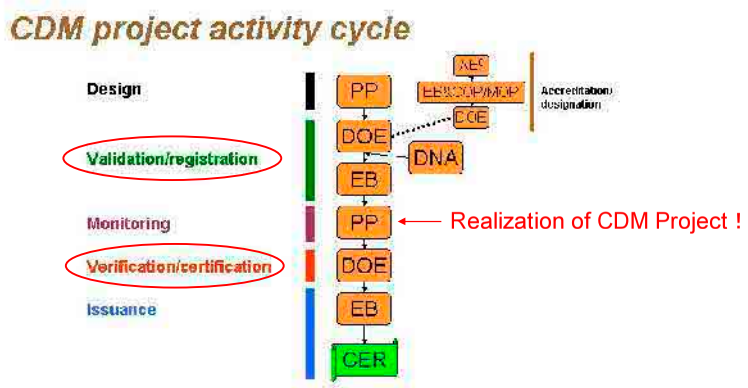


## Today's Agenda

- CDM Project Cycle - confirmation -
- Present status of DOEs
- What is "VALIDATION & VERIFICATION"?
- What is "VVM"?
- Example of current reasons of request for review and rejected
- Contents of VVM
- Important Points of VVM: Validation -Methods of Validation-
- Important Points of VVM: Validation - CAR -
- Important Points of VVM: Validation - CL and FAR -
- Important Points of VVM: Validation - Compatibility with methodologies-
- Important Points of VVM: Validation - Additionality of a project activity-
- Important Points of VVM: Validation - Monitoring plan-
- Important Points of VVM: Verification - Methods of Verification-
- Important Points of VVM: Verification -Compliance of monitoring with the monitoring plan-



## CDM Project Cycle - confirmation -






## Present status of DOEs (1)

**Numbers of DOEs (1)**