成果品

1. 研修用プレゼンテーション資料
2. 研修教材、トレーナー訓練用ガイドライン
3. パイロットプロジェクトの **PIN/PDD**
4. データベース仕様

成果品 1：研修用プレゼンテーション資料

JICA Training Seminar
Session Topics

Items	Training Topics	Date	No.
CDM	1. Background and history of CDM/ current situation and issues	20/04/2010	CDM1
	2. Technical aspects of baseline determination	27/04/2010	CDM2
	3. Overview of large-scale/small-scale methodologies	25/05/2010	CDM3
	4. Technical aspects of additionality demonstration	06/07/2010	CDM4
	5. Measures to obtain CER of CDM project	07/09/2010	CDM5
	6. Validation and Verification including communication with DOE	07/09/2010	CDM6
	7. Overview of programmatic CDM (PoA)	21/09/2010	CDM7
	8. Exercise: Programmatic CDM (PoA)	21/09/2010	CDM8
	9. Development of CDM project activity	28/09/2010	CDM9
	10. AR-CDM/current situation and issues	23/11/2010	CDM10
Carbon Trading	1. Background, history and overview of carbon trading markets in the world	20/04/2010	CT1
	2. Overview of European Emission Trading System (EU-ETS) and Tokyo ETS	27/04/2010	CT2
	3. Overview of emission trading systems in the United States, and future international trading system in post 2012	22/06/2010	CT3
	4. Overview of voluntary emission trading system in Japan - J-VER	29/06/2010	CT4
	5. Overview of national registry system	06/07/2010	CT5
	6. Japan's Voluntary Emission trading Scheme (J-VETS)	10/05/2011	CT6
UNFCCC Structure and Negotiations	1. Overview of UNFCCC and international negotiations: from establishment to present	20/04/2010	UN1
	2. UNFCCC and key international negotiations after COP 3	27/04/2010	UN2
	3. Overview of international negotiations over post-2012 mechanisms	25/05/2010	UN3
	4. Overview of international negotiations by EU and the United States over post-2012 mechanisms	22/06/2010	UN4
	5. MRV/NAMA/ SCM	29/06/2010	UN5
	6. Exercise: MRV/NAMA/SCM	29/06/2010	UN6
	7. REDD/ carbon sink	06/07/2010	UN7
	8. Exercise: REDD/ carbon sink	06/07/2010	UN8
	9. UNFCCC Structure & Negotiations :Technology Transfer	11/01/2011	UN9
	10. Exercise: UNFCCC Structure & Negotiations :Technology Transfer	11/01/2011	UN10
GHG Mitigation in relevant sectors	1. International trend in GHG mitigation measures	28/09/2010	GHG1
	2. Monitoring of contribution to the sustainable development by mitigation measures, including co-benefit approach	19/10/2010	GHG2
	3. Importance of low carbon society/low carbon city	19/10/2010	GHG3
	4. Mitigation measures in commercial building and residential sectors	23/11/2010	GHG4
	5. Exercise: Quantification of GHG emission reduction with MRV (commercial building and residential sectors)	23/11/2010	GHG5
	6. Mitigation measures in waste management sector	23/11/2010	GHG6
	7. Exercise: Quantification of GHG emission reduction with MRV (waste management sector)	23/11/2010	GHG7
	8. Mitigation measures in energy and industry sectors	18/01/2011	GHG8
	9. Exercise: Quantification of GHG emission reduction with MRV (energy and industry sectors)	18/01/2011	GHG9
	10. Mitigation measures in transportation sector	15/02/2011	GHG10
	11. Exercise: Quantification of GHG emission reduction with MRV (transportation sector)	15/02/2011	GHG11
Carbon Footprint	1. Overview of carbon footprint concept and current situation of the system in the world	12/10/2010	FP1
	2. LCA related issues	12/10/2010	FP2
	3. Calculation of carbon footprint	12/10/2010	FP3
	4. Issues in implementation and dissemination of carbon footprint system	19/10/2010	FP4
	5. Issues in carbon footprint system for sevices -Example of printing servises-	22/02/2011	FP5
	6. Carbon footprint for organization	10/05/2011	FP6
GHG Inventory	1. Overview of IPCC Guideline	07/09/2010	INV1
	2. Introduction of GHG inventory of Japan and Thailand	14/09/2010	INV2
	3. Overview of energy sector	14/09/2010	INV3
	4. Overview of industrial processes and product use sector (IPPU)	14/09/2010	INV4
	5. Overview of agriculture, forestry, and other land-use sector (AFOLU)	21/09/2010	INV5
	6. Overview of waste sector	28/09/2010	INV6
	7. Overview of QA/QC of IPCC Guidelines and example of QA/QC measures taken in Japan	11/01/2011	INV7
	8. Analysis of key categories and assessment of uncertainties, example from Japanese cases	15/02/2011	INV8
	9. Review and Practice of Greenhouse Gas Inventory	22/02/2011	INV9
	10. Exercise: Review and Practice of Greenhouse Gas Inventory	22/02/2011	INV10

JICA Training Seminar
Session Schedule

1st Qtr	Training hours	**April**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	X
		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	X
	10:00-12:00																				CDM1							CDM2				
	13:00-15:00																				CT1							CT2				
	15:00-17:00																				UN1							UN2				
	Training hours	**May**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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	10:00-12:00																															
	13:00-15:00																									CDM3						
	15:00-17:00																									UN3						
	Training hours	**June**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	X
		Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	X
	10:00-12:00																						CDM4							CT4		
	13:00-15:00																						CT3							UN5		
	15:00-17:00																						UN4							UN6		
	Training hours	**July**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	10:00-12:00						CT5																									
	13:00-15:00						UN7																									
	15:00-17:00						UN8																									
2nd Qtr	Training hours	**August**																													
	Training hours	**September**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	X
		Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	X
	10:00-12:00							CDM5							INV2							INV5							GHG1			
	13:00-15:00							CDM6							INV3							CDM7							CDM9			
	15:00-17:00							INV1							INV4							CDM8							INV6			
	Training hours	**October**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
		Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	10:00-12:00												FP1							FP4												
	13:00-15:00												FP2							GHG2												
	15:00-17:00												FP3							GHG3												
	Training hours	**November**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	X
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	X
	10:00-12:00																							GHG4/5								
	13:00-15:00																							GHG6/7								
	15:00-17:00																							CDM10								
	Training hours	**December**																													
3rd Qtr	Training hours	**January 2011**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
		Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
	10:00-12:00											UN9							GHG8													
	13:00-15:00											UN10							GHG9													
	15:00-17:00											INV7																				
	Training hours	**February**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	X	X	X
		Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	X	X	X
	10:00-12:00															GHG10							INV9									
	13:00-15:00															GHG11							INV10									
	15:00-17:00															INV8							FP5									
	Training hours	**March**																													
4th Qtr	Training hours	**April**																													
	Training hours	**May**																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
		Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
	10:00-12:00										CT6																					
	13:00-15:00										FP6																					
	15:00-17:00																															

:CDM :carbon trading :GHG mitigation :UNFCCC structure and negotiation
:carbon footprint :GHG inventory

CDM 1
Background and history of CDM/ current situation and issues

20th April 2010

Chief Advisor of JICA Expert Team
Masahiko FUJIMOTO

A1-3

Contents

- Background of CDM establishment
- History of changing CDM
- Current situation of CDM
- Issues about CDM

Background

- **IPCC First Assessment Report (FAR) (1990)**
  - Intergovernmental Panel on Climate Change (IPCC)
  - Provision of **FAR** was decided in the 1st conference of IPCC held in Geneva, in November 1988
  - Climate experts around the world assessed and synthesized the most recent climate-change issues in FAR
  - FAR warned that if anthropogenic greenhouse gases will continue to be emitted to the atmosphere, climate change can occur that may impose major impacts on ecosystem and human species
- **The establishment of the United Nations Framework Convention on Climate Change (UNFCCC) (1992)**
  - The First Assessment Report (FAR) of the IPCC supported the establishment of the (UNFCCC at the United Nations Conference on Environment and Development (UNCED, commonly known as "The Earth Summit") held in Rio de Janeiro, Brazil, in 1992.

History of CDM (1)

- Berlin Mandate(COP1, 1995)
  - The Berlin Mandate establishes a process that would enable the Annex I countries to take appropriate action for the period beyond 2000
    - including a strengthening of developed country commitments, through the adoption of a protocol or other legal instruments
  - The Berlin Mandate exempted non-Annex I countries from additional binding obligations
- Kyoto Protocol and CDM establishment(COP3, 1997)
  - Most industrialized nations and some central European economies in transition (all defined as Annex B countries) agreed to legally binding reductions in greenhouse gas emissions of an average of 6 to 8% below 1990 levels between the years 2008-2012
  - **Kyoto Protocol** provides for several flexible mechanisms ("Kyoto Mechanism") which enable Annex I countries to meet their GHG emission targets by acquiring GHG emission reductions credits
    - Flexible mechanisms are emissions trading, the clean development mechanism (CDM) and joint implementation (JI)

History of CDM (2)

- Discussions on institutional design of CDM (COP4～COP 6 bis)
  - COP3 left many issues about institutional design of CDM remained unresolved.
  - → After COP3, technical analysis and political negotiations were carried out in COP and subsidiary body (SB).
  - Major points of discussion and corresponding decisions are as below:

Points of Discussion	Decision
Limitation of amounts of carbon credits acquired by Annex I Parties from all three mechanisms (ET, CDM, JI) should be set if they utilize carbon credits to comply with part of quantified emission limitation or reduction commitments. (FCCC/ SB/1999/8)	•Limitation of carbon credits acquired was not defined.
The concept of 'fungibility' among the three mechanisms (ET, CDM, JI) of the Protocol is unacceptable. (FCCC/ SB/1999/8)	•The concept of 'fungibility' among the three mechanisms (ET, CDM, JI) was accepted.
Members of the CDM executive board: Option1: 8 members from Annex I countries, and 8 members from non-Annex I countries Option2: 3 members from each of the five United Nations regional groups	•1 member from each of the five United Nations regional groups, •1 member from the small island developing States, •2 members from Annex I countries, •2 members from non-Annex I countries (plus one "alternate member" from each of the above groups)

A1-4

History of CDM (3)

Points of Discussion	Decision
If funding provided through official development assistance (ODA) is additional to the current ODA, its funding can be utilized for CDM projects.	Public funding for CDM projects from Annex I Parties is not to result in the diversion of official development assistance (ODA). [Currently, ODA can be used for CDM projects as long as host country and investing country declare such ODA is not diverted.]
Criteria for determination of whether a proposed project activity contributes to the sustainable development: • Option 1: it is made solely by non-Annex I country • Option 2: it is specified by non-Annex I country in its letter of Endorsement • Option 3: it is made by non-Annex I country using procedures developed by the United Nations Environment Programme (UNEP) and the Commission on Sustainable Development (CSD) as they become available • Option 4:It is made by non-Annex I country using international guidelines, indicators and/or standards developed by the Parties • Option 5:It is made by non-Annex I country and confirmed in a written statement	It is the host Party's prerogative to confirm whether a CDM project activity assists it in achieving sustainable development [Since SD contribution has not been evaluated, alternative approach such as co-benefit approach is drawing increasing attention.]

History of CDM (4)

Points of Discussion	Decision
Criteria of investment additionality: Option 1: Investment additionality is given if the risk-adjusted internal rate of return of the CDM project activity is below X %. The executive board determines a country-specific risk adjustment factor and the value of X %. Option 2: The threshold criterion for additionality is established. The designated operational entity determines it is properly applied.	The risk-adjusted internal rate of return and the threshold criterion for additionality were not adopted. [Currently, in demonstrating additionality of a project that generates income other than CER sales, it is essential to show in PDD the financial performance of the project using IRR.]
Baseline establishment: Option 1: Baselines shall be established on a project-specific basis Option2 :Baselines may use either project-specific or multi-project baseline methodologies	Baselines are established on a project-specific basis. [Currently, discussions are resumed in the post-2012 framework, such as in SCM.]

History of CDM (5)

Points of Discussion	Decision
Approach for selecting baseline methodology: Project participants shall select the lowest from among the following approaches. (a) Existing actual or historical emissions, as applicable; (b) Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment; or (c) Option 1: The average emissions of the top [20%] of such activities in the Annex I or host Party or an appropriate region undertaken during the previous two years. Option 2: Recently undertaken comparable activities or facilities, such as, for example, the average emissions rate of comparable projects activities that were undertaken during the previous five years in Annex I or host Party or an appropriate region.	Project participants shall select from among the following approaches the one deemed most appropriate for the project activity. (a) Existing actual or historical emissions, as applicable; or (b) Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment; or (c) The average emission or removal rates of similar projects activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 percent of their category.
A baseline chosen for a new activity or facility in sectors of heavy industry and heat and/or power supply shall at least reach a level of stringency equal to the top [20%] of all such sources constructed in the last 3 years in Parties included in Annex II.	It was not adopted.

History of CDM (6)

Points of Discussion	Decision
Positive list of safe and environmentally sound eligible projects in CDM, based on the following categories, taking into account the national priority needs of each Non-Annex I Party: (a) Renewable energy, (b) Energy efficiency, (c) Demand-side management, (d) Sustainable land-use, land-use change and forestry activities	Positive list was not provided. The categories of small scale CDM (renewable energy, energy efficiency improvement, and others) and their limitation were established. [Currently, small-scale CDM structure in the post-2012 framework is discussed]
CDM project activities shall not include the use of nuclear power and large scale hydro power plant.	Parties included in Annex I are to refrain from using certified emission reductions generated from nuclear facilities to meet their commitments. [Currently, whether to include nuclear facilities in CDM after 2012 is discussed.]

History of CDM (7)

- Marrakech Accord（COP7) 2001
  - Bonn Agreement in COP6 bis was adopted
    - Institutional design of CDM was approved
      - Shown in "Decisions" columns in previous slides
  - Specific CDM operational rules were decided
  - 1st CDM Executive Board meeting was held

Changing CDM (1)

Major decisions/ changes in CDM system (post-Marrakech Accord 2008 to present)

Oct 2004 (EB 16)	Introduction of Additionality Tool	First comprehensive guideline from CDM-EB describing how to prove additionality
Sep 2005 (EB 21)	Bundling of project activities	EB presented definition and principle of bundling. Multiple small-scale projects can be registered as a single CDM project.
Nov 2006 (COP/ MOP2)	Expansion of small-scale eligibility	Maximum ceiling for small-scale project activity was raised for energy efficiency (Type II) and other types (Type III).

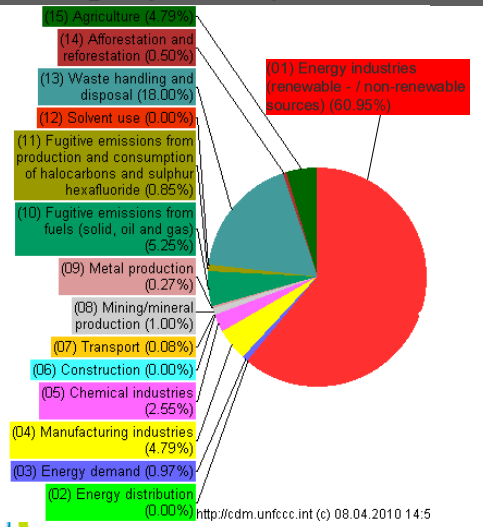
Changing CDM (2)

June 2007 (EB 32)	Introduction of programmatic CDM (PoA)	A programme of activities can be registered as a single CDM project activity.
May 2008 (EB 39)	Introduction of investment analysis guidance	First comprehensive guideline by EB showing how to perform financial analysis in order to assess and demonstrate additionality using investment analysis.
2009	Simplified A/R methodologies	Simplified consideration of pre-project activities and simplified monitoring activities are approved by CDM-EB.

Current situation of CDM: Statistics and Analysis

- Registered CDM projects
- Countries hosting CDM projects
- Countries generating CERs
- Investing counties
- Approved methodologies by sector and scale
- Frequently used methodologies
- Rejected projects and reason

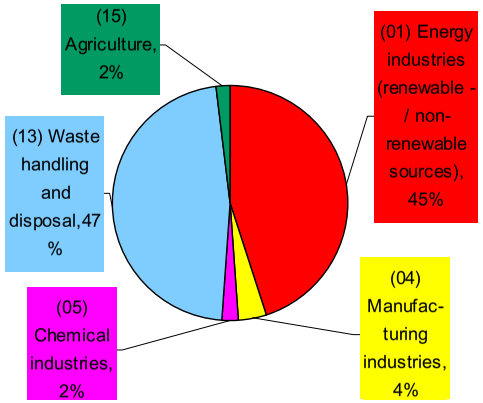
Stats (1): Number of registered CDM projects by sectoral scope (world)



Sectoral Scope	No.
(01) Energy industries (renewable - / non-renewable sources)	1578
(02) Energy distribution	0
(03) Energy demand	25
(04) Manufacturing industries	124
(05) Chemical industries	66
(06) Construction	0
(07) Transport	2
(08) Mining/mineral production	26
(09) Metal production	7
(10) Fugitive emissions from fuels (solid, oil and gas)	136
(11) Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	22
(12) Solvent use	0
(13) Waste handling and disposal	466
(14) Afforestation and reforestation	13
(15) Agriculture	124

(Source: UNFCCC)

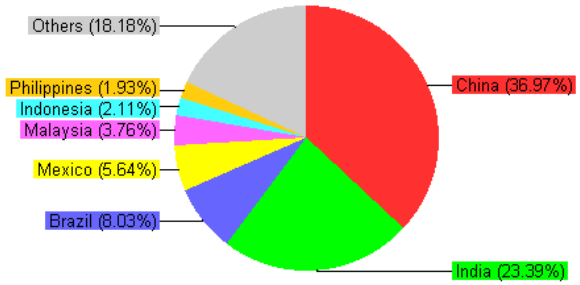
Stats (2): Number of registered CDM projects by sectoral scope (Thailand)



Sectoral Scope	No.
(01) Energy industries (renewable - / non-renewable sources)	**23**
(02) Energy distribution	-
(03) Energy demand	-
(04) Manufacturing industries	**2**
(05) Chemical industries	**1**
(06) Construction	-
(07) Transport	-
(08) Mining/mineral production	-
(09) Metal production	-
(10) Fugitive emissions from fuels (solid, oil and gas)	-
(11) Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	-
(12) Solvent use	-
(13) Waste handling and disposal	**24**
(14) Afforestation and reforestation	-
(15) Agriculture	**1**

(Source: UNFCCC)

Stats (3): Number of registered projects by host country



Country	Number Of Projects
China	787
India	498
Brazil	171
Mexico	120
Malaysia	80
Indonesia	45
Philippines	41
Thailand	**35**
Others	352

(Source: UNFCCC)

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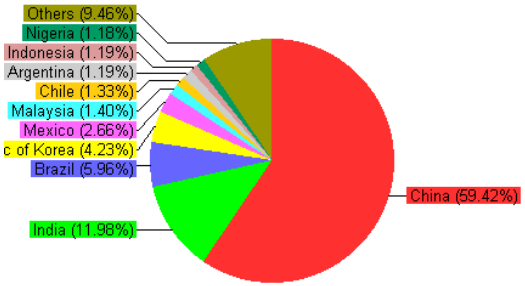
Stats (4): Amount of expected CERs by host country



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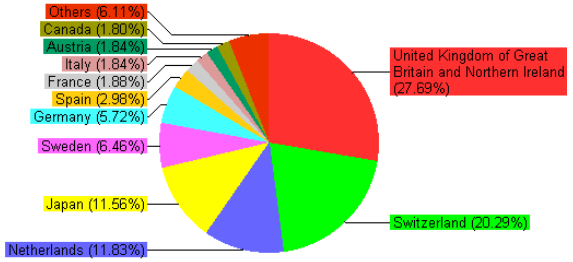
Country	Annual average reduction
China	209,403,147
India	42,208,758
Brazil	21,012,856
Korea	14,905,164
Mexico	9,385,734
Malaysia	4,929,444
Chile	4,702,400
Argentina	4,206,791
Indonesia	4,177,742
Nigeria	4,154,978
Thailand	**2,095,745**
Others	31,230,426

Unit: ton CO_2 equivalent

(Source: UNFCCC)

Stats (5): Number of registered projects by investing country



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Country	Number of projects
UK	707
Switzerland	518
Netherlands	302
Japan	295
Sweden	165
Germany	146
Spain	76
France	48
Austria	47
Italy	47
Canada	46
Others	156

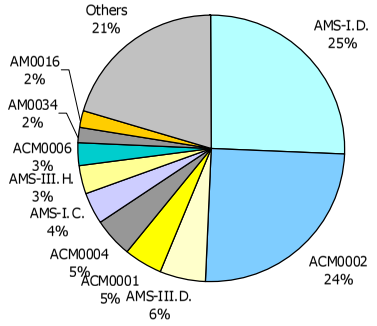
(Source: UNFCCC)

Stats (6): Number of approved methodologies

Scope No.	Sectoral Scope	Approved Methodology	Approved Consolidated Methodology	Approved Small Scale Methodology	Number of Registered Projects
1	"Energy industries (renewable - / non-renewable sources)"	32	9	9	1,578
2	Energy distribution	1	0	1	0
3	Energy demand	7	0	7	25
4	Manufacturing industries	11	5	10	124
5	Chemical industries	12	1	5	66
6	Construction	0	0	0	0
7	Transport	1	1	5	2
8	Mining/mineral production	0	1	0	26
9	Metal production	7	0	0	7
10	Fugitive emissions from fuels (solid, oil and gas)	6	1	1	136
11	Fugitive emissions from production/ consumption of halocarbons/ sulphur hexafluoride	6	0	2	22
12	Solvent use	0	0	0	0
13	Waste handling and disposal	6	3	9	466
14	Afforestation and reforestation	9	2	6	13
15	Agriculture	1	1	3	124

(Source: UNFCCC)

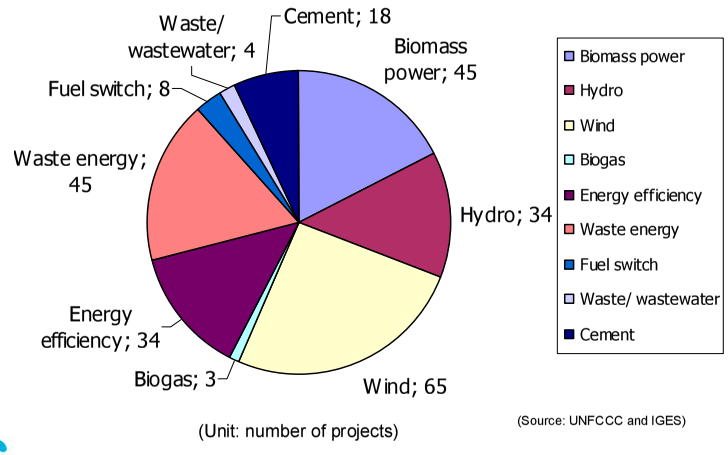
Stats (7): Registered projects by methodologies



AMS: approved methodology for small-scale
ACM- approved consolidated methodology
AM: approved methodology

Methodology Number	Technology/ Measure	Number of Reg. Projects
AMS-I.D.	Grid connected renewable electricity	615
ACM0002	Grid connected renewable electricity	592
AMS-III.D.	Methane recovery in animal manure management systems	134
ACM0001	Landfill gas project	113
ACM0004	Waste gas for power generation	111
AMS-I.C.	Thermal energy production with or without electricity	96
AMS-III.H.	Methane recovery in wastewater	80
ACM0006	Electricity generation from biomass residues	65
AM0034	Reduction of N_2O at nitric acid plants	48
AM0016	Animal manure management	40
Others	Others	494

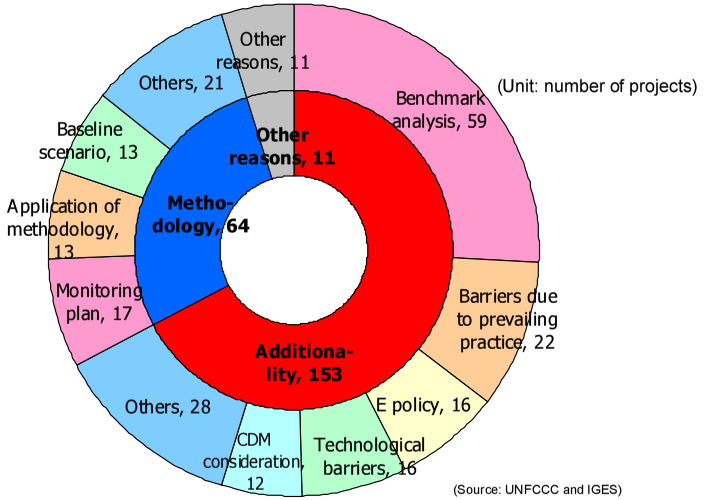
Stats (8): Number of rejected projects by sector/ measure



(Unit: number of projects)

(Source: UNFCCC and IGES)

Stats (9): Number of rejected projects by reason



(Unit: number of projects)

(Source: UNFCCC and IGES)

A1-8

Issues in CDM (1)

- Issues in additionality demonstration
  - In accordance with decision 3/CMP.1, annex, paragraph 43
    "A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity".
  - However, taken into more account was how to demonstrate that "Without CDM, the proposed project would not have been realized" by assessing barriers the project activity is facing.
  - As a result, some sectors whose additionality is easier to be demonstrated were facilitated;
    - including CH_4 recovery and utilization, N_2O destruction, and HFC23 destruction.
  - On the contrary, other sectors whose additionality is difficult to be demonstrated but safe and environmentally sound in nature were not facilitated as CDM
    - energy efficiency improvement projects
    - Project that generates financial benefit other than CER sales

Issues in CDM (2)

- Dominance by non-CO_2 CDM projects
  - Non-CO_2 CDM projects take advantage of strong commercial incentive by selling big volume of CER
    - CH_4, N_2O, and HFC23 (high global warming potential)
  - In addition, non-CO_2 CDM is easy to demonstrate its additionality and thus easy to be registered

  → Generate about 80% of total CERs from registered CDM projects
  - However, such gases (CH_4, N_2O, and HFC23) constitutes only less than 5% of overall GHG emissions on earth, and more than 60% of all GHG emissions in developing countries are CO_2
  - As a potential in such non-CO_2 projects is limited, increasing numbers of CO_2 projects have been proposed and registered in these days

Issues in CDM (3)

- Lack of authentication of SD achievement by host country
  - It is the host Party's prerogative to determine whether a CDM project activity assists it in achieving sustainable development (SD)
  - Current CDM system is not requiring project activity to check SD contribution to host country
  - Thailand evaluates SD contribution by applying Crown Standard system

- Uneven distribution of host countries
  - More than 80% of CERs that will be generated by 2012 come from 5 host countries
    - China, India, Brazil, Mexico, Korea
  - Many countries that have low foreign direct investment rate and GNP have no CDM project activity registered
  - CDM projects should be more evenly distributed geographically

CDM 2
Technical aspects of Baseline determination

27th April 2010

Chief Advisor of JICA Expert Team
Masahiko FUJIMOTO

A1-10

Contents

What is baseline?

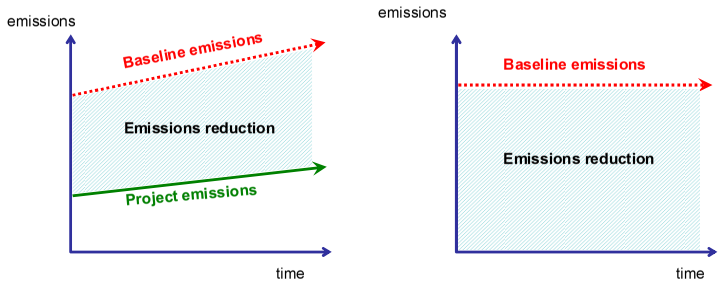
Baseline Scenario:

"the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity"

- **Project proponent should determine project-specific baseline in accordance with the methodology(ies)**
- **Taking into account national/ sectoral policies and circumstances**

What is baseline?

Baseline is different by each project, depending on technology/ measure, project type, condition, policy, etc.



Why baseline needs to be identified?

- Let's discuss the reason why we have to identify baseline in CDM.
  - Because PDD requires it ?
  - What do you think about it?

How to identify baseline (1)

- Project proponent (PP) must identify baseline using the methods and steps specified in the baseline methodology(ies) that is applied to the project activity.
- Baseline methodologies shall require narrative descriptions of project. PP must analyze all reasonable baseline scenario options, which may include:
  - Continuation of the current activity
  - Implementation of the proposed project activity
  - Other scenarios
- PP must describe how a baseline scenario is selected among possible baseline scenario options.

How to identify baseline (2)

Baseline is determined by applying one of the following 3 patterns, depending on the baseline methodologies applied;

Case 1 : Methodology presents a fixed baseline scenario.

- ✓PP demonstrates that the baseline scenario is the only relevant and plausible business-as-usual scenario.
- ✓Small-scale methodologies and some large-scale methodologies

Case 2 : Methodology presents several possible baseline options for various components of the project activity.

- ✓PP identifies the most plausible baseline scenario, which is a combination of baseline options.

How to identify baseline (3)

Case 3 : Methodology does not present any baseline option and PP must present possible baseline options using a step-wise approach resembling the additionality/ combined tool for the identification of a baseline scenario.

- ✓To apply step 1a of the "Combined tool to identify the baseline scenario and demonstrate additionality"
- ✓Only applicable if all potential alternative scenarios are available options to project participants, such as
  - Modifications to an existing installation operated by PP
  - Construction of new facilities, if all alternative scenarios are available options to PP

Method to identify baseline

When using Case 2, PP must follow methodology to identify baseline.

- For example, **ACM0014**: "Mitigation of greenhouse gas emissions from treatment of industrial wastewater"

ACM0014 requires to apply the following 4 steps;

Step 1. Identification of alternative scenarios

Step 2. Eliminate alternatives that are not complying with applicable laws and regulations

Step 3. Eliminate alternatives that face prohibitive barriers (Barrier Analysis)

Step 4. Compare economic attractiveness of remaining alternatives (Investment Analysis)

Step 1. Identification of alternative scenarios

Identify realistic and credible alternative scenarios to the project activity

- Methodology provides list of alternatives that provide outputs or services comparable to the proposed CDM project, including;
  - Continuation of current practice
  - Proposed project activity undertaken without CDM
  - All other plausible and credible alternative scenarios

Step 2. Eliminate alternatives that are not complying with applicable laws and regulations

Check whether the listed alternatives are in compliance with all legal requirements of the country/ region

- Legal requirements include those not related to GHG emission reductions (e.g. air, water, etc.)
- If only a proposed CDM project activity can comply with laws, the project will be undertaken anyway, and thus, NOT additional and will not be eligible to be registered as a CDM project

Step 3. Eliminate alternatives that face prohibitive barriers (1)

Identify barriers that would prevent the implementation of alternative scenarios (**Barrier Analysis**)

- For each of the alternative scenarios identified in Step 1, identify realistic and credible barriers that may prevent alternative scenarios to occur
- Barriers may include the following 4 barriers.

1. Investment barriers
   - Similar activities have been implemented only with grants or other non-commercial finance
   - No private capital is available from domestic or international capital markets due to real or perceived risks associated with investment in Thailand

Step 3. Eliminate alternatives that face prohibitive barriers (2)

2. Technological barriers
   - Skilled/ properly trained labor to operate and maintain the technology is not available in the country/region
   - Lack of infrastructure for implementation and logistics for maintenance of the technology
   - The particular technology used in the proposed project activity is not available in the region
   - Risk of technological failure in the local circumstances is significantly greater than for other technologies
3. Barriers due to prevailing practice
   - The project activity is the "first of its kind"
4. Other barriers

Note: PP must provide transparent and documented evidence

Step 3. Eliminate alternatives that face prohibitive barriers (3)

Eliminate alternative scenarios which are prevented by the identified barriers

- Identify which alternative scenarios are difficult to be realized due to the barriers listed, whic are preventing realization of scenarios
- Eliminate such alternative scenarios from further consideration (such scenarios will not be baseline)
- All alternative scenarios shall be compared to the same set of barriers.

Note: PP must provide transparent and documented evidence

If only one scenario is remained, it is considered as baseline scenario

IF there are still several alternative scenarios remaining,

Go to Step 3 (investment comparison analysis)

Step 4. Compare economic attractiveness of remaining alternatives

Check which alternative is most financially attractive without revenues from CERs, or have highest possibility to occur as business as usual
(Investment comparison analysis)

1. Determine financial indicator : IRR (Internal rate of return)
2. Calculate financial performance for the remaining scenarios
3. Compare results

The most economically or financially attractive alternative scenario (e.g. the scenario that has highest IRR) is considered as baseline scenario.

Group Discussion
Case of biogas project in Thailand

- Let's determine baseline by yourself using "TBEC Tha Chang Biogas Project".
  - Group Discussion and fill out blank table (30 min)
  - Presentation from each group (30 min)

1) Which is baseline scenario for the treatment of wastewater? What is the reason?

Options		W1: The use of open lagoons for the treatment of the wastewater	W2: Direct release of wastewaters to a nearby water body;	W3: Aerobic wastewater treatment facilities (e.g., activated sludge or filter bed type treatment);	W4: Anaerobic digester with methane recovery and flaring	W5: Anaerobic digester with methane recovery and utilization for electricity or heat generation
1. compliance with all legal requirements						
2. Barrier Analysis	Investment barrier					
	Technological barrier					
	Barriers due to prevailing practice					
	Other barriers					
	Result					
3. Investment Comparison analysis, if necessary						
Result of baseline selection						

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

2) Which is baseline scenario for the generation of electricity? What is the reason?

Options		E1: Power generation using fossil fuels in a captive power plant	E2: Electricity generation in the grid	E3: Electricity generation using renewable sources
1. compliance with all legal requirements				
2. Barrier Analysis	Investment barrier			
	Technological barrier			
	Barriers due to prevailing practice			
	Other barriers			
	Result			
3. Investment Comparison analysis, if necessary				
Result of baseline selection				

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CDM 3: Overview of Large-scale/ Small-scale Methodologies

25 May, 2010

Deputy Chief Advisor of JICA Expert Team
Kazuhito YAMADA

CDM 3: Large/small scale BL Methodologies:

- What are the roles of BL methodologies?
- What is the procedure to approve BL methodologies?
- Introduction of large scale BL methodologies
- Introduction of small scale BL methodologies
- Present status of registered CDM projects in Thailand
- Discussion

Objectives of this section

Objectives of this section are:

To understand large and small scale BL methodologies,

To discuss:

At the present stage, which methodology will be useful for sustainable development in Thailand?

In the future, what kind of BL methodology do we need in Thailand?

What are the roles of BL methodologies?

The roles of BL methodologies are:

to ensure that CDM project activities have:

- **real**, **measurable**, and **long-term** benefits related to the mitigation of climate change (GHG emission reductions);
- reductions in emissions that are **additional** to any that would occur in the absence of the certified project activity.

Briefly speaking, BL methodologies include appropriate formulae how to quantify BL and PJ emissions, and leakage.

What is the procedure to approve BL methodologies?

The procedure (large) is:

- PPs shall propose a new BL methodology, **through a DOE/AE**, submitting the draft CDM-PDD, CDM-NM;
- The **DOE/AE** shall determine whether the proposed project activity intends to use a new BL methodology, and **check whether the documents are complete** and forward them to EB for its consideration and approval;
- The **UNFCCC secretariat** shall forward them to **EB** and **Meth Panel** after having checked that the documentation is complete;
- **The secretariat** shall make the new BL methodology **publicly available on the UNFCCC CDM web site** and invite public inputs for a period of 15 working days. Comments shall be forwarded to Meth Panel;

What is the procedure to approve BL methodologies?

The procedure (large) is (continued):

Meth Panel shall make :

(a) A final recommendation to EB to approve the BL methodology (referred to as **A**);

(b) A final recommendation to EB not to approve the BL methodology (referred to as **C**); or

(c) A **preliminary recommendation** to PPs who may provide clarification regarding the issues raised, or Meth Panel continues the consideration of the PNM (referred to as **work-in-progress WIP**)

EB finally decide whether the BL meth. is acceptable or not.

What is the procedure to approve BL methodologies?

The procedure (small) is:

- **PPs**, **DOEs**, **DNAs** or **stakeholders** shall propose a new SSC-BL methodology, submitting the draft CDM-SSC-PDD, CDM-SSC-NM;
- After performing a completeness check, the **UNFCCC secretariat** shall forward the documentation to **EB** and **SSC-WG**;
- **The secretariat** also shall make the proposed new SSC methodology **publicly available on the UNFCCC CDM website** and invite public inputs for a period of ten (10) working days;
- **Public inputs** shall be forwarded to **SSC WG** soon after receipt and made publicly available;
- **SSC WG** shall make a **recommendation** regarding the approval of the proposed new SSC methodology to EB at its next meeting;

EB finally decide whether the BL meth. is acceptable or not.

Introduction of large scale BL methodologies

Large scale:

- Approved Methodologies (AM0001-87): 69 meth. active;
- Approved Consolidated Methodologies (ACM0001-18): 17 meth. active;
- 10 tools such as 'additionality tool' are available;
- ACM0002 is used by 647 registered projects;
- On the other hand, 46 AM and 5 ACM have no registered project;
- Non-CO_2 methodologies such as HFC23, N_2O and CH_4 have been used compare to CO_2 methodologies.

Introduction of small scale BL methodologies (1)

small scale:

- Type I (AMS-I):
  Renewable energy (capacity: <15MW)
- Type II (AMS-II):
  Energy efficiency improvement (<60GWh/year)
- Type III (AMS-III):
  Others types (<60,000 tCO_2/year)

Introduction of small scale BL methodologies (2)

small scale:

- AMS-I (I.A-I.E): 5 meth. active;
- AMS-II(II.A-II.J): 10 meth. active;
- AMS-III(III.A-III.AJ); 36 meth. active
- AMS-I.D is used by 638 registered projects;
- On the other hand, AMS-II has only 66 registered projects in total;
- Type III has many Non-CO_2 methodologies such as CH_4, HFC23, and N_2O.

Present status of registered CDM projects in Thailand

Registered CDM projects in Thailand:

- AMS-I.D. 17
- AMS-III.H. 11
- AM0022 6
- AMS-I.C. 5
- ACM0006 5
- AMS-III.D. 4
- ACM0002 3
- AM0024 2
- AM0013 2
- ACM0001 2
- AM0028 1

Discussion

- At the present stage, which methodology will be useful for sustainable development in Thailand?
- In the future, what kind of BL methodology do we need in Thailand?

CDM 4: Technical Aspects of Additionality Demonstration

22 June, 2010

Deputy Chief Advisor of JICA Expert Team
Kazuhito YAMADA

Objectives of this section

Objectives of this section are:

To understand basic concept and latest discussions of the 'additionality',

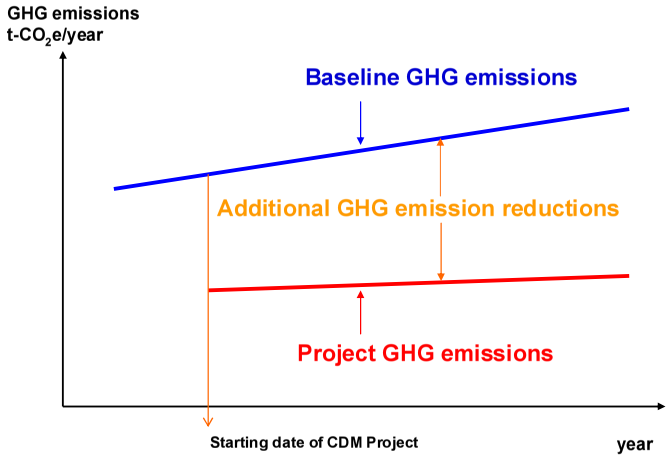
To discuss:

What is the best way to demonstrate the 'additionality' of representative CDM project in Thailand?

CDM 4: Additionality:

- What is the 'additionality'?
- Additionality in Kyoto Protocol
- Additionality in Marrakesh Accord
- History of Additionality
- Additionality tool
- Guidance on the assessment of investment analysis
- Combined additionality tool
- Additionality: TBEC Tha Chang Biogas Project
- Request for review: TBEC Tha Chang Biogas Project
- Discussion

What is the 'additionality'?



Additionality in Kyoto Protocol

Additionality is stipulated as:

5 Emission reductions resulting from each project activity shall be certified by operational entities to be designated by the Conference of the Parties serving as the meeting of the Parties to this Protocol, on the basis of:

(a) Voluntary participation approved by each Party involved;

(b) Real, measurable, and long-term benefits related to the mitigation of climate change; and

(c) Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.

Additionality in Marrakesh Accord

Additionality is stipulated as:

43. **A CDM project activity is additional** if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

There is no concrete definition of 'additionality'

44. The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A within the project boundary. A baseline shall be deemed to reasonably represent the anthropogenic emissions by sources that would occur in the absence of the proposed project activity if it is derived using a baseline methodology referred to in paragraphs 37 and 38 above.

History of Additionality

December 1997:	Kyoto Protocol (article 12)
November 2001:	Marrakesh Accord (Modalities & Procedures for CDM)
August 2002:	EB5 decided that

para5. Paragraph 43 of the CDM modalities and procedures stipulate that **a CDM project activity is additional if its emissions are below those of its baseline.** The definition of a baseline is contained in paragraph 44 of the CDM modalities and procedures. The executive board agreed that no further work is required regarding this issue.

October 2004:	Additionality tool
December 2005:	CMP1 (Montreal)
November 2006:	Combined additionality tool
July 2008:	Addition of the 'Guidance on the assessment of investment analysis' as annex to the additionality tool

Additionality tool (see Annex 1)

- "Tool for the demonstration and assessment of additionality" was approved at CDM-EB16 (October 2004).
- This tool provides for a step-wise approach to demonstrate and assess additionality. These Steps include:

  - Identification of alternatives to the project activity;

  - Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible;

  - Barriers analysis; and

  - Common practice analysis.

- Based on the information about activities similar to the proposed project activity, the common practice analysis is to complement and reinforce the investment and/or barriers analysis.

Guidance on the assessment of investment analysis

- This guidance was added by CDM-EB as an annex to the Additionality tool (July 2008).
- Background: In consideration of issues identified through request for reviews and reviews of requests for registration the EB considers it necessary to provide project participants and DOEs with guidance on the preparation, presentation and validation of investment analysis.

  This general guidance is to be considered a as complement to existing materials in this area including, the additionality tool, the combined tool.
- The guidance includes 1) general issues in calculation and presentation of IRR/NPV, 2) investment comparison analysis and benchmark analysis, 3) selection and validation of appropriate benchmarks, 4) sensitivity analysis, etc.

Combined additionality tool (Annex 2)

- "Combined tool to identify the baseline scenario and demonstrate additionality" was approved at CDM-EB27 (November 2006).
- Methodologies using this tool are only applicable if all potential alternative scenarios to the proposed project activity are available options to project participants. This applies, for example, to project activities that make modifications to an existing installation that is operated by project participants, such as, for example:

  - Energy efficiency improvements at existing installations operated by project participants;

  - Fuel switch at existing installations operated by project participants;

  - Changes in waste management practices at existing solid waste disposal sites operated by project participants;

  - Reduction of N_2O, HFC-23 or PFC emissions at existing installations operated by project participants.

Additionality: TBEC Tha Chang Biogas Project (see Annex 3)

TBEC Tha Chang Biogas Project (1)

- The Tha Chang Biogas Project involves the construction of an anaerobic wastewater treatment facility at the Tha Chang Palm Oil and Rubber Factory in Surat Thani. The project will install a covered in-ground anaerobic reactor (CIGAR), designed to capture the gases produced from the digestion of organic matter in the combined wastewater streams of the palm oil mill and the rubber factory. This biogas will be used to initially fuel a 1.4MW biogas engine to produce electricity to be sold to the Provincial Electricity Authority (PEA). A second 1.4MW engine will most likely be installed in 2010. Any excess biogas will be consumed in an open flare.

Additionality: TBEC Tha Chang Biogas Project (see Annex 3)

TBEC Tha Chang Biogas Project (2)

- The purpose of the project is to:

  - Capture the waste gases and reduce odour currently produced from the factory's deep treatment lagoons by installing a CIGAR biogas system

  - Use the captured biogas to produce renewable electricity for sale to the national grid to support the Thai Government's policy to reduce dependency on fossil fuels

  - Improve the treatment of the factory wastewater

  - Reduce greenhouse gas emissions and create Certified Emission Reductions (CERs)

Additionality: TBEC Tha Chang Biogas Project (see Annex 3)

TBEC Tha Chang Biogas Project (3)

- The baseline scenario is the scenario existing prior to the start of implementation of the project activity

  - continued treatment of the wastewater in deep anaerobic lagoons, which currently emit CH_4 to the atmosphere.

  - continued CO_2emissions from the Thai electricity grid which currently uses electricity generated from a combination of natural gas, coal, oil, hydro and other sources

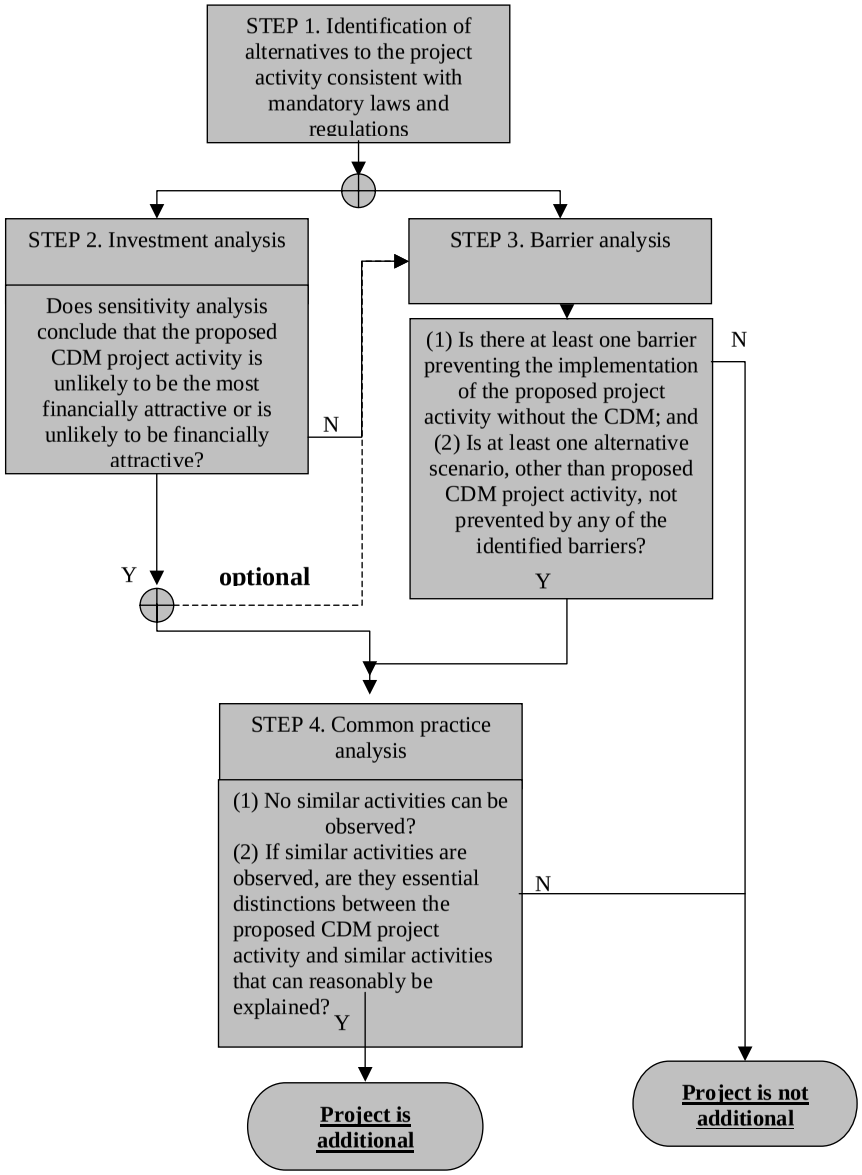
Request for review: TBEC Tha Chang Biogas Project (see Annex 4)

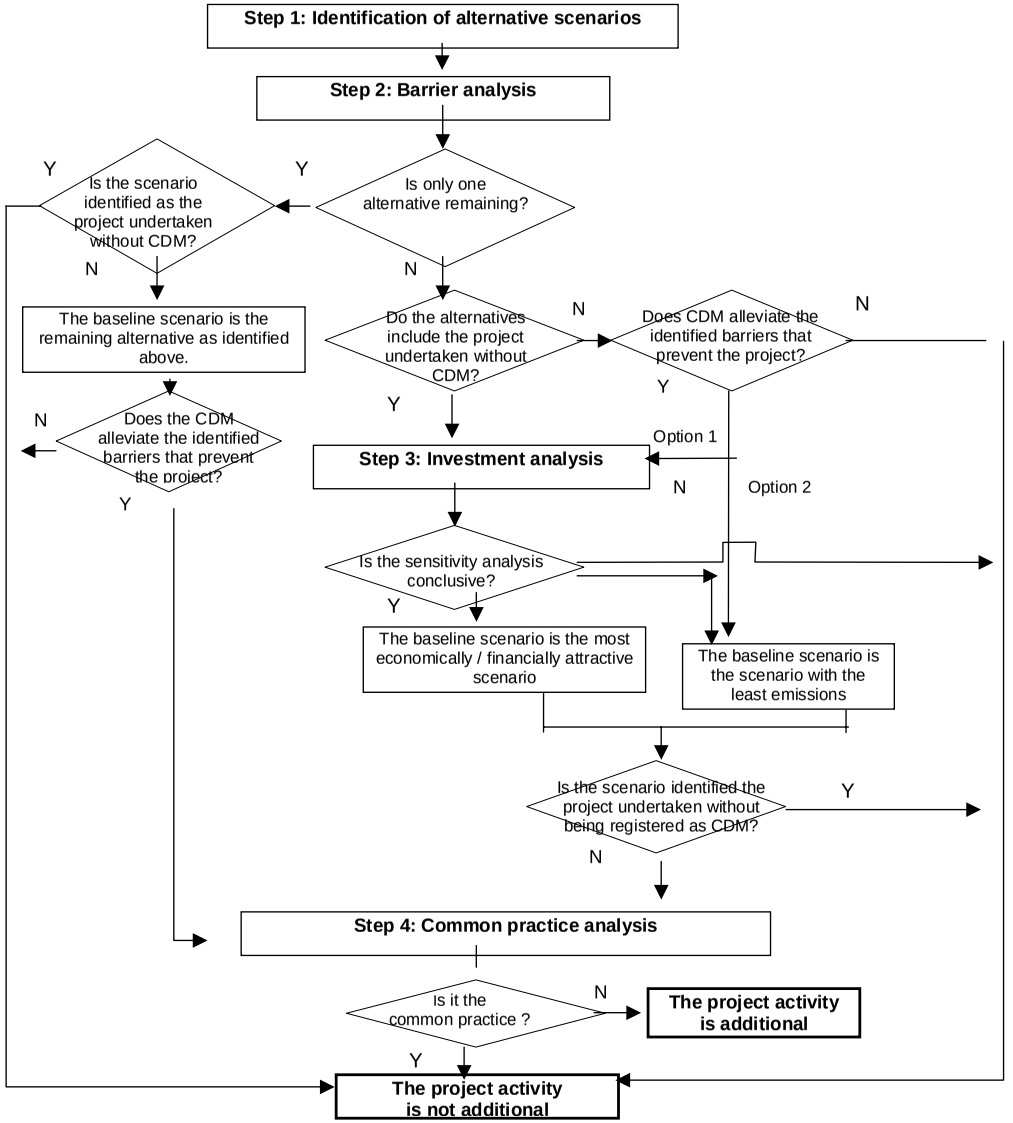
CDM-EB decided:

- The DOE should further substantiate the technological, investment and business culture barriers presented in the PDD, in line with the VVM paragraphs 113, 114, 115 and 116. The PP/DOE are reminded that if the barriers cannot be sufficiently substantiated, they have an option to **establish additionality through investment analysis**.

Discussion

- What is the best way to demonstrate the 'additionality' of representative CDM project in Thailand?


STEP 1. Identification of alternatives to the project activity consistent with mandatory laws and regulations
STEP 2. Investment analysis
Does sensitivity analysis conclude that the proposed CDM project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive?
N
Y
optional
STEP 3. Barrier analysis
(1) Is there at least one barrier preventing the implementation of the proposed project activity without the CDM; and (2) Is at least one alternative scenario, other than proposed CDM project activity, not prevented by any of the identified barriers?
Y
N
STEP 4. Common practice analysis
(1) No similar activities can be observed? (2) If similar activities are observed, are they essential distinctions between the proposed CDM project activity and similar activities that can reasonably be explained?
Y
N
Project is additional
Project is not additional


Step 1: Identification of alternative scenarios
Step 2: Barrier analysis
Is only one alternative remaining?
Y
N
Is the scenario identified as the project undertaken without CDM?
Y
N
The baseline scenario is the remaining alternative as identified above.
Do the alternatives include the project undertaken without CDM?
N
Y
Does CDM alleviate the identified barriers that prevent the project?
N
Y
Does the CDM alleviate the identified barriers that prevent the project?
N
Y
Step 3: Investment analysis
Option 1
Option 2
N
Is the sensitivity analysis conclusive?
Y
The baseline scenario is the most economically / financially attractive scenario
The baseline scenario is the scenario with the least emissions
Is the scenario identified the project undertaken without being registered as CDM?
Y
N
Step 4: Common practice analysis
Is it the common practice ?
N
Y
The project activity is additional
The project activity is not additional

prohibitive barrier in the form of legal regulation prohibiting the practice. The key barrier faced by scenario W3, aerobic wastewater treatment, is the financial barrier due to high operating costs and the absence of incentives through regulation or direct revenue. Scenario W4 & W5 face prohibitive technological and investment barriers due to the performance risk translating to commercial risk . The key barriers faced by Scenario E1 and E3 are the technical and financial barriers associated with high cost of installing and operating a fossil fuel or renewable power plant at the factory.

In summary, all alternative scenarios are eliminated through the barrier analysis except W1, the use of open lagoons for the treatment of wastewater and E2, electricity generation in the grid.

Step 4: Compare economic attractiveness of remaining alternative
Only one alternative remains after elimination of alternatives that face prohibitive barriers, therefore Step 4 is not applicable.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

The project reduces anthropogenic emissions of GHG through the destruction of methane which is produced through the anaerobic decay of wastewater from the Palm Oil Mill and Rubber Factory at Tha Chang. By combusting methane that would otherwise have been released to the atmosphere, the project results in the reduction of 362,760 tCO2e of emissions in the first crediting period. The equipment used to capture and combust methane would not have been installed in the absence of the registered CDM project, as demonstrated below.

Start Date and Implementation Timeline
The start date of the project was prior to the date of validation. Evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity has been supplied to the DoE.

Project Timeline	**Dates**	
Investment Decision made	01/04/07	Contract signed between TBEC and factory owner for BOOT investment, including a sharing of carbon credit revenue between factory owner and TBEC.
Date construction works	01/07/07	Date Civil works planned to begin (26/06/07 contract signed)
Construction	Completed	Project construction delays due to significant wet season in Southern Thailand in 2007
Date of commissioning	27/11/08	Commissioning of genset and gas system
Start up	06/01/09	Commercial Operation Date

CDM Timeline	**Dates**	
Investment Decision made	01/04/07	Contract signed between TBEC and factory owner for BOOT investment. Contract clearly shows the intention and CDM incentive seriously considered, as it discusses share of revenue from carbon credits.
CDM Consultancy	06/05/07 31/07/07	CDM Contract Consultancy negotiations begin Date of signature of Consultancy contract
CDM Consultation	29/10/07	Gold Standard initial consultation meeting
PDD submitted to TBEC for	11/04/08	PDD delayed due to cancellation of AM0022 and

review		delays in collecting data
PDD submitted to DoE	04/09/08	Validation commenced

ACM0014v2.1 requires that the additionality of the project be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" v05.2 (EB39) The tool defines a step-wise approach as follows:

1. Identification of alternatives to the project activity;
2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive;
3. Barriers analysis; and
4. Common practice analysis.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations
The realistic and credible alternatives to the project activity are identified through the following two steps:

Sub-step 1a. Define alternatives to the project activity:

The project activity involves the provision of two outputs/services; wastewater treatment and electricity generation. Realistic and credible alternative scenarios that deliver similar outputs and services to the project activity were identified in section B4 as per the "procedure for the identification of the most plausible baseline scenario" described in ACM0014 v2.1. Plausible alternative scenarios were identified as follows:

Wastewater Treatment
W1. The use of open lagoons for the treatment of the wastewater;
W2. Direct release of wastewaters to a nearby water body;
W3. Aerobic wastewater treatment facilities (e.g., activated sludge or filter bed type treatment);
W4. Anaerobic digester with methane recovery and flaring;
W5. Anaerobic digester with methane recovery and utilization for electricity or heat generation (the proposed project activity without CDM)

Generation of Electricity
E1. Power generation using fossil fuels in a captive power plant;
E2. Electricity generation in the grid;
E3. Electricity generation using renewable sources

Sub-step 1b. Consistency with mandatory laws and regulation:
As determined in section B4, all alternative scenarios are in compliance with applicable legal and regulatory requirements except for the direct release of wastewater into nearby water bodies (W2) which is eliminated from further analysis.

Step 2. Investment analysis
In the step-wise approach described in the "Tool for the demonstration and assessment of additionality", project participants may chose to perform either an investment analysis or a barrier analysis. The Barrier Analysis method has been chosen for this project and an investment analysis is not applied.

Step 3. Barrier analysis
The barrier analysis method has been chosen as a means to demonstrate additionally because the project activity faces barriers that prevent its implementation and these barriers do not prevent the implementation of the current practice (Scenarios W1 and E2). CDM registration of the project activity will help the proponents overcome these barriers. The barrier analysis was performed through the following two steps:

Sub-step 3a. Identify barriers that would prevent the implementation of the proposed CDM project Activity:
There are realistic and credible barriers that would prevent the implementation of the project if it were not registered as a CDM activity. These barriers identified for this project are classified as follows:

- *Investment barriers*
- *Technological barriers*
- *Other Barriers (as specified in original methodology AM22 Business Culture barriers)*

According to the 'Guidelines for Completing CDM PDDs V7.0 (EB41) Section B.4 and B.5 are complimentary and the same information need not be replicated in both sections. Therefore these barriers will not be elaborated again, except to elaborate in Sub-step 3b how the CDM helps to overcome these barriers to show that the project, without the CDM, would not go ahead.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

In section B4 it has been established that the scenario W1, the use of open lagoons, and scenario E2, electricity generation in the grid, face no barriers to their implementation/continued use. These two scenarios represent the existing standard practice for the industry and are not affected by the barriers which the proposed CDM project faces and demonstrated by the fact that they are common practice in Thailand. In addition, the following pages outlines how the CDM helps alleviate the barriers identified in Section B.4

Technological barriers alleviated by CDM
CDM alleviates the technical barriers previously described by ensuring that the necessary expertise, technical skills and technology are delivered to the project. Thai Biogas Energy Company (TBEC) was formed in 2004 to finance, build and operate biogas projects. CDM has been central to the business plan of TBEC and a crucial aspect in the decision making processes of all biogas projects they have implemented. To date TBEC have commissioned three biogas plants in Thailand, all of which have been applying under the CDM procedure as shown in table B.5.a.

Name	Plant Type	Start of Construction	Developed under CDM?
Kitroongruang	Tapioca	July 2004	Yes
Jiratpattanna	Tapioca	March 2005	Yes
Chao Khun Agro	Tapioca	June 2005	Yes

Table B.5.a: TBEC biogas Projects in Thailand

Without CDM the Tha Chang factory would not have access to the technical knowledge and skills available through TBEC. TBEC have hired Waste Solutions Ltd (WSL), who is the project designer. WSL have 15 years of international experience in CIGAR technology which they are transferring to Thailand. Whilst WSL have been involved in CIGAR biogas plants in other agriculture industries in Thailand, all of these projects have been implemented with CDM.

The incentives from the CDM have created an environment which is attractive for TBEC to pursue biogas energy projects in Thailand. TBEC approached the Tha Chang factory with an offer to design, build and operate a biogas plant which will be transferred to Tha Chang factory after 10 years of operation. Without the offer from TBEC to build and operate the plant, Tha Chang factory would not be capable of sourcing the technical expertise necessary for completion of the project. The factory owners 'did not want to take on the headache of operating a biogas plant … and believed TBEC would be more efficient as they have the expertise and staff who already know how to operate other biogas plants'. A description of how each technical barrier is removed through registration as a CDM project is as follows:

<u>Anaerobic Digester Performance Risk</u>
Through the technology from WSL, TBEC will have access to international experts with detailed understanding of the biological system of the CIGAR. TBEC will assume the risk due to uncertainty in digestor performance associated of the CIGAR. The alternative revenue streams provided by CDM through the destruction of methane reduce the risk of the project defaulting through decreased electricity revenues. Developing the biogas plant as a CDM project allows TBEC to offset the risk of decreased electricity production from poor performance of the digestor. Furthermore, the contract with WSL ensures access to experiences technology providers capable of successfully managing the performance characteristics of the CIGAR.

<u>Access to Technology and Expertise</u>
TBEC will draw on the expertise of its partner WSL to bring the necessary knowledge and skills to the project. This international technology provider has been involved in the transfer of its CIGAR technology to Thailand through the successful introduction of CDM.

<u>Access to Skilled Labour and Technical Services</u>
TBEC will own and operate the plant for the first ten years of operation. During this time TBEC will use the knowledge and skills it has acquired through its portfolio of CDM projects to ensure that the biogas plant operates effectively. Prior to handing over the plant, TBEC will train factory personnel in the correct operation and maintenance procedures for the biogas plant.

<u>Energy Production barriers</u>
TBEC will access industry best technology in the form of a GE Jenbacher dedicated gas engine to ensure the efficient and reliable production of energy from the biogas produced from the anaerobic digester. To ensure the continued operation of this complicated machinery, TBEC will attract, train and retain appropriately skilled staff and draw on the previous experience it has gained through its portfolio of CDM projects. As previously discussed, it is only through the incentives provided by CDM that TBEC have been able to access the necessary technology and skills required to successfully develop similar biogas projects in Thailand.

Investment barriers alleviated by CDM

The investment barriers alleviated by the CDM are demonstrated by the fact that biogas plants at palm oil plants and most agriculture plants were very rare in Thailand prior to the introduction of the CDM, despite the fact that these projects could earn revenue or make savings from electricity production. It is clear that the CDM has alleviated this commercial risk and tipped the balance to proceed and break from the prevailing practice of open anaerobic lagoons.

Only through the participation of TBEC, a biogas energy developer with interest in CDM certified emission reductions, was the factory willing to accept the concept of installing a biogas plant. TBEC approached the Tha Chang factory and offered to finance and build a biogas plant through the provisions of a build own operate and transfer contract. TBEC assume the risk associated with application of a technology which is relatively new to Thailand and new to the application to POME streams.

Other Barriers - Business Culture barriers
Due to the significant technical and financial risks, combined with a general lack of understanding of newer technologies, shareholders are more reluctant to invest in anaerobic digesters and aerobic waste water treatment systems. Furthermore, there are no legal incentives to move away from the existing practice of anaerobic local lagoons.

For TBEC at the time of their decision to proceed with the Tha Chang project, there was no experience in applying CIGAR POME technology in Thailand, and only 6 CIGAR systems are in other industries, such as cassava (built with CDM). This made it difficult for TBEC to have confidence in the starch CIGAR technology in its performance with POME and combined rubber wastewater. TBEC Shareholders were only convinced about the viability of the proposed project through the combined estimate of electricity and CDM revenues. The estimate of combined revenue streams helped to mitigate the risk perceived in investing high upfront capital in otherwise unproven and unfamiliar technology and at a 3rd party factory site where they did not control the project inputs.

Summary: The project faces significant barriers that would prevent the project from being completed in the absence of CDM registration. The prevailing practice of Scenario W1 and E2, would continue in the absence of the project.

Step 4 – Common Practice Analysis
Sub-step 4a. Analyse other activities similar to the proposed project activity:

As mentioned in Section B.4 The prevailing practice for palm oil mills in Thailand is to dispose and treat the POME in open lagoons[15]. As indicated by a letter from the Chairman of the Palm Oil Crushing Mill Association[16], there are around 33 large palm oil crushing mills in Thailand, and prior to the effective implementation of CDM, it was not common practice for biogas plants to be installed. This is also confirmed from interviews with experts[17] on the Thai palm oil industry, which indicates that palm oil

[15] As outlined in Section A.4 the project is a predominately POME biogas system, with a tiny fraction of organic load from the rubber wastewater (less than 4%). Nevertheless, the prevailing practice for disposal of rubber wastewater is in open lagoons, according to Dr Saroach (Footnote 2), a Thai rubber wastewater expert, 50-60% of rubber factories treat their wastewater in open lagoons. The remaining rubber wastewater is treated with other systems, mainly a combination of activated sludge and UASB systems (see Footnote 4). Dr Saroach explained that more recently other treatment systems have been used mainly when there are issues in accessing enough land or to improve the treatment of the wastewater for compliance.

[16] As cited previously in Footnote 1

[17] As cited previously in Footnote 2

mills in Thailand used open pond systems. There were only 2 small pilot biogas plants in operation[18], one of which was installed with a government research grant, the other was built because that factory was reported to have a pollution problem with the existing treatment ponds, and this project has applied for CDM. Since the implementation of CDM a number of biogas plants have been built with support of the CDM. In accordance with Page 9 of the "Tool for the demonstration and assessment of additionality", CDM project activities are not to be included in this analysis.

Tha Chang Palm Oil and Rubber factory complies with all environmental regulations and has sufficient space within the compound to treat the wastewater from the rubber factory. In fact, not all of the open lagoons at Tha Chang are being used. Therefore there is no compliance or land access reason why they would install a covered lagoon or other treatment system in the baseline case.

Sub-step 4b. Discuss any similar options that are occurring

Both the biogas projects previously developed at Palm Oil Mills were based on tank reactors and used modified reconditioned truck engines as generators. One of these projects has applied under the CDM. These technologies are considerably less complex and less efficient than the covered in-ground anaerobic digestor and dedicated gas engine used in the project activity. The tank reactor and reconditioned truck engine represent a cheaper alternative and one that is more likely to be subject to technical problems during operation.

There are significant differences between the biogas plant and the project activity which ensure that these projects do not contradict the arguments made in the barrier analysis. One of these plants was installed with the aid of a government research grant. This grant helped to remove the technical and financial barriers which are encountered by the project activity. Therefore, this project differs significantly from the proposed project activity, and do not contradict the claim that the project is additional. The 2nd project is a CDM project and therefore excluded from the common practice analysis.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The applicable methodology, ACM0014, is suitable for project activities aimed at reducing methane emissions from industrial wastewater treatment. Two scenarios are applicable to the methodology as described in the following table from ACM0014. Scenario 1 is applicable to the project activity as established in section B.2.

Scenario	Description of the baseline situation	Description of the project activity
1	The wastewater is not treated, but directed to open lagoons that have clearly anaerobic	The residence time of the wastewater treated in the open lagoons is over 552 days (please refer to Section B.2). The wastewater is treated in a new anaerobic digester. The biogas extracted from the anaerobic digester is

[18] As cited previously in Footnote 14

Annex 26

Registration

Scope of the review on
"TBEC Tha Chang Biogas Project" (2970)

1. The Board agreed to undertake a review of the project activity "TBEC Tha Chang Biogas Project" (2970).

2. The Board agreed that the scope of the review relating to issues associated with validation requirements shall cover a review to assess the additionality of the project activity, through an assessment of:

(a) The barrier analysis, in particular how the DOE has validated the technological, investment and business culture barriers presented in the PDD, in line with the VVM paragraphs 113, 114, 115 and 116; and

(b) The investment analysis, in particular, how the DOE has validated the:

(i) Suitability of the benchmark, as the ROE has not been fully substantiated;

(ii) Suitability of the input values, regarding: how the electricity generation (8,680 MWh/y) from the WSL Report has been considered more conservative than the value calculated by the CDM consultants (9,164 MWh/y); the O&M costs, including the 2% annual escalation; and the exclusion of the variation in the electricity generation in the sensitivity analysis; and to present and validate the investment analysis considering the input values in line with the total capacity after the second electricity generator is installed (i.e., 2.8MW).

- - - - -

Project 2970	EB 53, Annex 26, 26 March 2010	**Decision Class**: Ruling **Document Type**: Scope of Review **Business Function**: Registration

CDM 5: Measures to obtain CERs from CDM projects

7 September, 2010

JICA Expert Team
Mariko FUJIMORI

A1-27

Objectives of this section

Objectives of this section are:

- To understand basic procedures to obtain CERs from CDM projects, from the view point of project participants (PPs),
- To understand difficulties and barriers which the PPs encounter frequently, and
- To consider options how to avoid these difficulties.

Critical points to obtain CERs

From our experiences:

From very beginning stage of the project!

- Selection of a project type,
- Selection of a DOE (and person(s) in charge), for validation,

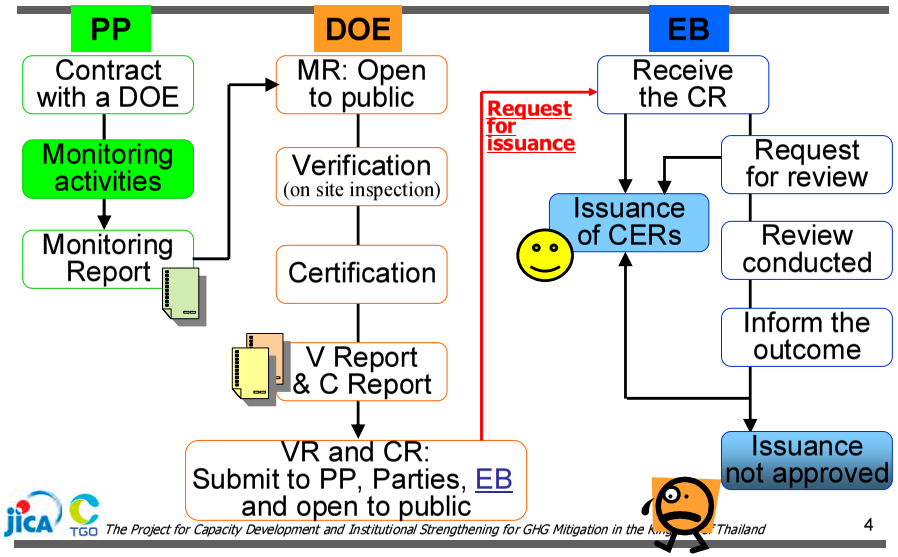
Registration

- Implementation of the project (including ERPA),
- Monitoring,
- Selection of a DOE for verification/certification (In case of SSC: same DOE is OK.),
- Request for issuance --> obtain CERs.

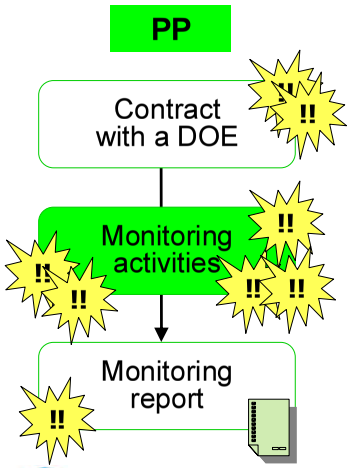
Until middle and final stage of the project!

Procedures for issuance of CER

Steps and necessary documents



Where are the "pitfalls" for the PPs?



- Which DOE (and who) do you select?
- Systems are lack/not in place (most common: calibration),
- Emission calculation is different from the registered PDD,
- Higher claim of CERs than estimated in the PDD without justification,
- The DOE failed to request for deviation or revision of the monitoring plan,
- Detailed excel sheet is not available.

Reasons of issuance rejection

Latest examples 1

EE project in India:

- PDD requires to calculate the emission reductions using total operating hours in the project x the difference between the pre- and post-project hourly power consumption for each project measure,
- Whereas the PP/DOE calculated the baseline emissions based on annualized electricity consumption.

Reasons of issuance rejection

Latest examples 2

Wind power project in the Philippines:

- The formulae to calculate the electricity supplied to the grid by the project was applied correctly: not sufficiently demonstrated,
- The calculation of electricity supplied takes into account all sources of electricity imports from the grid to the project: not sufficiently demonstrated,
- The DOE failed to request for deviation or revision of the monitoring plan: additional meters were installed but original plan was direct measurement.

Reasons of rejection - examples

- PP and DOE did not provide adequate evidence of the existence and significance of a barrier,
- DOE has accepted a modification of the approved monitoring methodology without requesting a deviation,
- DOE has not sufficiently verified that the monitoring plan is in accordance with the approved methodology,
- PP and the DOE could not demonstrate that independent assessment has been conducted to confirm that the claimed emission reductions result solely from the project activity,
- There is no reference on what time the daily sample was taken,

Difference of emission reduction in PDD and monitored results

Registered CDM projects in Thailand (last three years) using ACM0006 - Consolidated methodology for electricity generation from biomass residues

Ref. No.	Project Name	Reduction in PDD	Reduction in MR	Reduction in PDD / monitored		Monitored months
1519	Surat Thani Biomass Power Generation Project in Thailand	106,592	42,993	106,592	40.3%	12
1024	Phu Khieo Bio-Energy Cogeneration project (PKBC)	102,493	395,010	307,479	128.5%	36
1020	Dan Chang Bio-Energy Cogeneration project (DCBC)	93,129	328,954	279,387	117.7%	36
1036	Khon Kaen Sugar Power Plant	61,449	50,811	46,087	110.3%	9
1026	A.T. Biopower Rice Husk Power Project in Pichit, Thailand	70,772	104,689	106,158	98.6%	18

Source: UNFCCC (as of June 2010)

Difference of emission reduction in PDD and monitored results

10 registered CDM projects (last three years, except for Thailand) using ACM0006

Reduction in PDD	Reduction in MR	Reduction in PDD / monitored		Monitored months
183,692	47,527	229,615	20.7%	8
46,680	14,923	50,570	29.5%	6
113,433	77,995	160,697	48.5%	12
41,284	10,479	13,761	76.1%	13
54,502	6,982	9,084	76.9%	2
45,750	303,686	305,000	99.6%	15
130,638	87,621	87,092	100.6%	17
19,937	105,647	94,701	111.6%	57
140,695	178,263	140,695	126.7%	80
39,636	59,152	19,818	298.5%	4

Source: UNFCCC (as of June 2010)

Why such differences occur?

Project design itself;

- Applicability/ability of the utilized technology,
- Inappropriate operation of the project,
- Delay of project implementation (construction, operation, ERPA, etc.),

Monitoring;

- Monitoring plan was not realistic,
- Correct calibration was not carried out,
- Monitoring methodology was not suitable to the project.

Technical issues - LFG

Problem of methodology itself

- LFG collection and destruction/utilization projects,
- Average emission reduction achievement: less than 40%,
- Problem of approved methodology (methodological tool): Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site
- The calculation is based on a first order decay (FOD) model. --> caused overestimation.

Technical issues - HFC

Information Note (EB55): Request for the Meth panel to continue work on HFC projects

(1) Developments of supply and demand in the global HCFC22 market, clarifying whether CDM HFC facilities are increasing their production and whether more HFC23 had or could have been generated than would have happened without the CDM.

Request for review:

- 10 HFC projects requested for issuance are under request for review, and the total CER amount from them are 13,560,073.

How to avoid these problems

Monitoring is most important!!

- Establish correct, practical and realistic monitoring plan,
- Carry out the monitoring accurately,
- In some methodologies, monitoring parameter tables are attached, indicating relevant parameters which shall be monitored.

Table III.AK.2

No	Parameter	Description	Unit	Monitoring/ recording Frequency	Measurement Methods and Procedures
1	$A_{k,y}$	Total area in which oil seed type *k* is cultivated for use in the project plant in year *y*	ha	Annually	Measured or calculated (e.g. using maps). Measurements results shall be consistent with yield of the cultivation
2	$P_{BD,y}$	Production of biodiesel in the project plant in year *y*	tonnes	Continuously or in batches	Measurements are undertaken using calibrated meters. Measurement results shall be cross checked with records for consumption and sales (e.g. invoices/receipts)
3	$P_{BD,no\text{-}site,y}$	Quantity of biodiesel that is either produced with other alcohols than methanol from	tonnes	Continuously or in batches	Measurements are undertaken using calibrated meters at production site

GHG Mitigation Measures in Commercial Building and Residential Sector

23, November, 2010

Deputy chief advisor of JICA Expert Team
Kazuhito YAMADA

Today's Agenda

1. Characteristics of GHG emissions in Commercial building and household Sector
2. Overview of Energy Efficiency Principle
3. GHG mitigation options in buildings and equipment
4. Barriers to adopting building technologies and practices that reduce GHG emissions
5. Energy consumption in Thailand
6. Energy Intensity in Thailand and Japan
7. Japanese experience
8. GHG mitigation measures in buildings/households sector: case studies (Hotel, Commercial building, underground shopping mall)
9. Comparison between CFL and LED
10. New Technology: CCFL
11. Exercises

Characteristics of GHG emissions in Commercial building and household Sector (WG.3, IPCC-AR4)

- Substantial reductions in CO_2 emissions from energy use in buildings can be achieved over the coming years using mature technologies for energy efficiency that already exist widely and that have been successfully used (high agreement, much evidence).
- In spite of the availability of these high-efficiency technologies and practices, energy use in buildings continues to be much higher than necessary. There are many reasons for this energy waste in buildings.
- Measures to reduce GHG emissions from buildings fall into one of three categories: reducing energy consumption and embodied energy in buildings, switching to low-carbon fuels including a higher share of renewable energy, or controlling the emissions of non-CO_2 GHG gases.

Overview of Energy Efficiency Principle (WG.3, IPCC-AR4)

- Reduce heating, cooling and lighting loads
- Utilize active solar energy and other environmental heat sources and sinks
- Increase efficiency of appliances, heating and cooling equipment and ventilation
- Implement commissioning and improve operations and maintenance
- Change behavior
- Utilize system approaches to building design
- Consider building form, orientation and related attributes
- Minimize halocarbon emissions

GHG mitigation options in buildings and equipment (WG.3, IPCC-AR4)

- Thermal envelope (insulation, windows, air leakage)
- Heating systems (passive solar heating, space heating systems)
- Cooling and cooling loads (reducing the cooling load, passive and low-energy cooling techniques
- Heating, ventilation and air conditioning (HVAC) systems
- Building energy management systems (BEMS)
- Active collection and transformation of solar energy (Building-integrated PV, solar thermal energy for heating and hot water

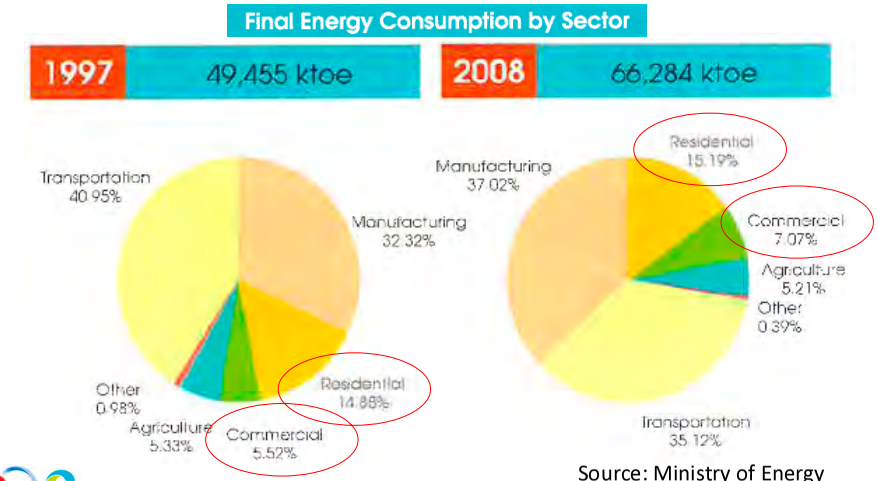
GHG mitigation options in buildings and equipment (WG.3, IPCC-AR4) continued

- Domestic hot water
- Lighting systems (high efficiency electric lighting)
- Daylighting
- Household appliances, consumer electronics and office equipment
- Supermarket refrigeration systems
- Energy savings through retrofits
- Trade-offs between embodied energy and operating energy
- Trade-offs involving energy-related emissions and halocarbon emissions

Barriers to adopting building technologies and practices that reduce GHG emissions (WG.III, AR4)

- Limitations of the traditional building design process and fragmented market structure
- Misplaced incentives
- Energy subsidies, non-payment and theft
- Regulatory barriers
- Small project size, transaction costs and perceived risk
- Imperfect information
- Culture, behavior, lifestyle and the rebound effect

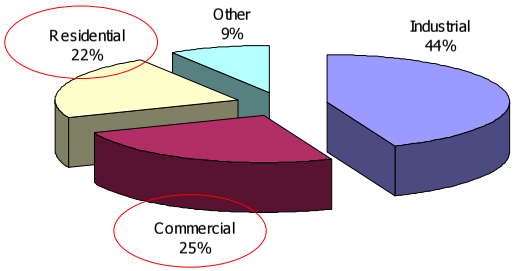
Energy consumption in Thailand



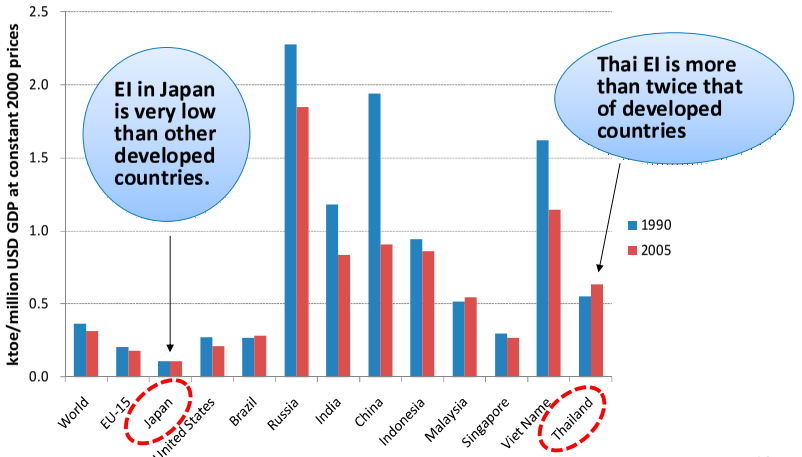
Source: Ministry of Energy

Energy consumption in Thailand

Share of electricity use:
Electricity consumption in buildings



Energy Intensity in Thailand and Japan



Source: Presentation of LCS Seminar, 2010

A1-33

Japanese experience: Amendment of Rationalization in Energy Use Law

- The "Act on the Rational Use of Energy" was established on 1979.
- The main objectives are to assure the effective use of fuel resources and rationalize the energy use
- In order to further rationalize the energy use in industry and household, the Act was revised in 2008 and came into force in 2009.
  - Factories,
  - Transportation,
  - Residences and buildings, and
  - Machinery and appliances.

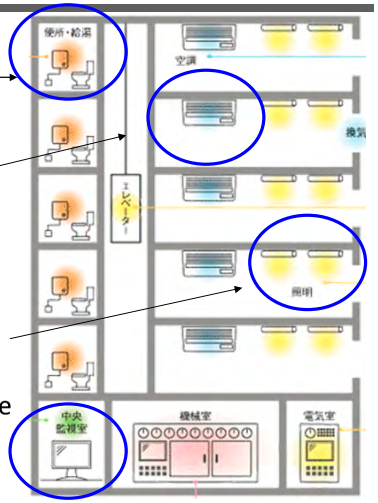
Japanese experience: Main revised points related to Building

- **Stepped-up security for large*1 residences and buildings** (introduction of orders in addition to instructions and notices) in case of only significantly insufficient energy-saving measures have been carried out,
- Report on energy-saving methods by owners of **small- to medium-sized residences and buildings** above a certain size*2 ,
- Adoption of energy-saving measures by **businesses engaged in the construction and sales of residences** (security through recommendations and orders for those who are engaged in the construction and sales of a large number of residences),
- Indication of the **energy saving performance of residences and buildings**. (specify effort of housing businesses engaged in the sales and lease of buildings)

Large scale: over 2,000m² total floor area, Small to medium: over 300m² total floor area

Japanese experience: Example of energy efficiency of the building

- Hot-water supply facility, Feed-water and drainage facility
  - temperature control, reclamation water
- Air conditioning, ventilating facilities
  - temperature control, install high efficiency facility
- Lighting facility, elevator, electric equipment
  - install high efficiency facility, voltage adjustment
- Management etc.



Source: http://www.eccj.or.jp/law/pamph/outline_revision/08-5.html

Japanese experience: Energy efficiency diagnosis

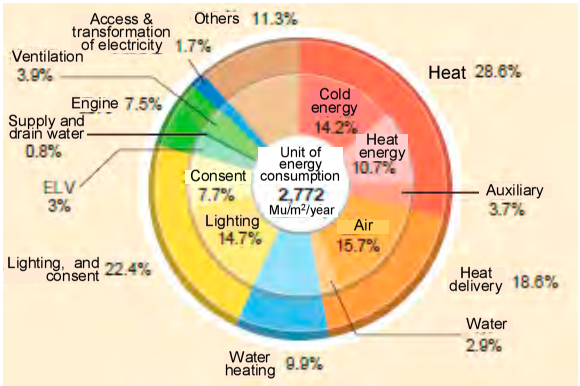
- Non-charge energy efficiency diagnosis submitted by ECCJ (The Energy Conservation Center, Japan)
- Advices by external expert
  - Hearing investigation
  - On-site review
  - Analysis of current situation and submit the proposal for improvement

Source: http://http://www.eccj.or.jp/audit/build_guide10/index.html

GHG mitigation measures in buildings/households sector: Buildings -1-

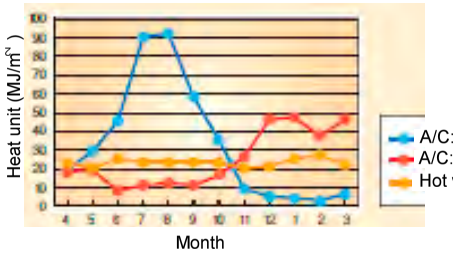
Hotels - Important resource for tourism in Thailand

Basic structure of energy consumption in hotels

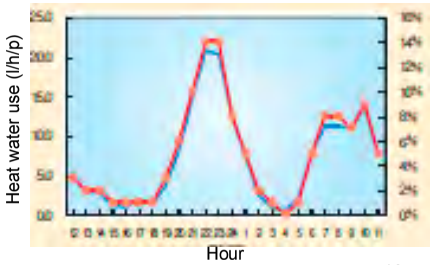


GHG mitigation measures in buildings/households sector: Buildings -1-

Heat load trend in hotels



Daily hot water supply trend in hotels



Hotels - Important resource for tourism in Thailand

GHG mitigation measures in buildings/households sector: Buildings -1-

Example of ESCO for a hotel: Gifu Grand Hotel, Japan

- Completion of construction: 1973
- Gloss floor area: 34,037 m^2
- Scale: 10 stories above the ground and 2 underground stories, including main, east and west buildings
- Hotel type: Resort hotel
- Duration of ESCO: 2003 - 2013 (continuing)

GHG mitigation measures in buildings/households sector: Buildings -1-

Items introduced to the Gifu Grand Hotel by ESCO:

	Facilities/equipments for energy efficiency improvement	Estimated effect of EE
1	Introduction of high efficiency freezing machines	1.8 %
2	Introduction of high efficiency boilers	**3.7 %**
3	Introduction of inverter control to water heat pumps	0.6 %
4	Introduction of BEMS (buildings energy management system)	**3.1 %**
5	Control of appropriate external air introduction	1.0 %
6	Introduction of inverter control to air conditioning machines	0.6 %
7	Heat insulation of steam bulbs and back-flow water pipes	0.5 %
8	Renewal of air conditioning system in the West building	**2.5 %**
9	Control of air blower thermostat	0.1 %
10	Revision of cooling water plumbing (pump-and-pipe system)	0.3 %
	Total	14.2 %

GHG mitigation measures in buildings/households sector: Buildings -1-

Results - total:

	Planned value	Actual performance (2004)	Actual performance (2005)
Energy consumption before ESCO	116,058.5 GJ	-	-
Energy consumption after ESCO	99,558.1 GJ	103,629.8 GJ	101,743.7 GJ
Energy reduction	16,470.1 GJ	12,429.8 GJ	14,314.9 GJ
Ratio of energy efficiency (%)	14.2 %	10.7 %	12.3 %
Achievement ratio (%)	-	75.4 %	86.6 %

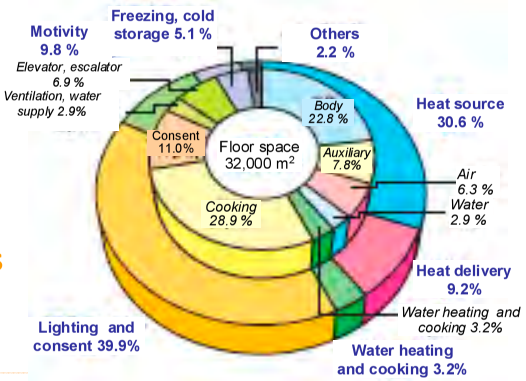
GHG mitigation measures in buildings/households sector: Buildings -1-

Results - details: Adjustment of freezing machine operation is one of the most important issues to improve the performance of EE.

	Facilities/equipments for energy efficiency improvement	Estimated effect	Actual (2005)
1	Introduction of high efficiency freezing machines	1.8 %	1.5 %
2	Introduction of high efficiency boilers	3.7 %	3.7 %
3	Introduction of inverter control to water heat pumps	0.6 %	0.2 %
4	Introduction of BEMS (buildings energy management system)	3.1 %	2.3 %
5	Control of appropriate external air introduction	1.0 %	1.0 %
6	Introduction of inverter control to air conditioning machines	0.6 %	0.5 %
7	Heat insulation of steam bulbs and back-flow water pipes	0.5 %	0.5 %
8	Renewal of air conditioning system in the West building	2.5 %	2.2 %
9	Control of air blower thermostat	0.1 %	0.1 %
10	Revision of cooling water plumbing (pump-and-pipe system)	0.3 %	0.3 %
	Total	14.2 %	12.3 %

GHG mitigation measures in buildings/households sector: Buildings -2-

Basic structure of energy consumption in department stores



Commercial buildings

Another important resource for tourists

GHG mitigation measures in buildings/households sector: Buildings -2-

Example of ESCO for a department store: Takashimaya, Tachikawa, Japan

- Completion of construction: 1994
- Gloss floor area: 66,911 m²
- Scale: 10 stories above the ground and 4 underground stories
- Store type: sale of goods (mainly clothing)

GHG mitigation measures in buildings/households sector: Buildings -2-

Items introduced to the Takashimaya, Tachikawa

1	Temperature control of air conditioning system by introducing PMV (Predicted Mean Vote) index
2	Introduction of inverter control to air ventilation fans
3	Control of air conditioning system by intermittent operation control
4	Energy management by BEMS equipment

PMV: Index for thermal (warm/cool) comfort condition to individuals
BEMS = buildings energy management system

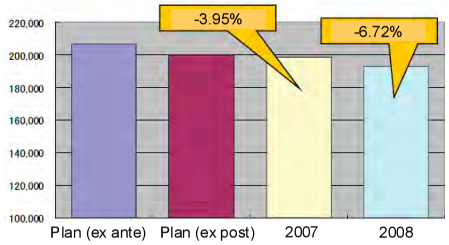
GHG mitigation measures in buildings/households sector: Buildings -2-

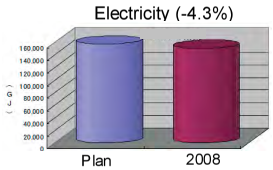
Results

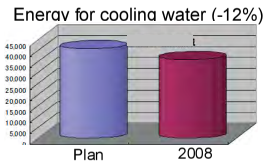
	Planned value	Actual performance (2007)	Actual performance (2008)
Energy consumption before ESCO	206,555 GJ	-	-
Energy consumption after ESCO	200,147 GJ	198,394 GJ	192,680 GJ
Energy reduction	6,407 GJ	8,160 GJ	13,874 GJ
Ratio of energy efficiency (%)	3.10 %	3.95 %	6.72 %
Energy consumption unit	2,991 MJ/m²/y	2,965 MJ/m²/y	2,880 MJ/m²/y

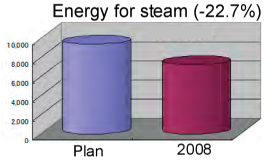
GHG mitigation measures in buildings/households sector: Buildings -2-

Results









GHG mitigation measures in buildings/households sector: Buildings -3-

Example of ESCO for a underground shopping mall "Azalea", Kawasaki, Japan

- Completion of construction: 2008 (upgraded)
- Gloss floor area: 56,000 m²
- Scale: 2 stories above the ground and 2 underground stories
- Store type: shops, restaurants and pathways to major train stations (24 hours accessible)

GHG mitigation measures in buildings/households sector: Buildings -3-

Map of Azalea's main floor - *shopper's paradise!*

GHG mitigation measures in buildings/households sector: Buildings -3-

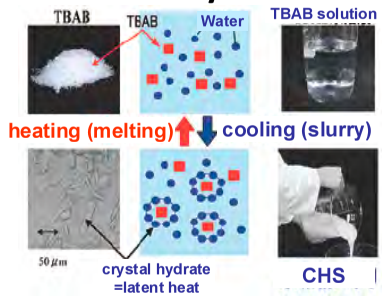
Items introduced to the Azalea, Kawasaki

*CHP: next page

1	Air conditioning system using clathrate hydrate slurry (CHS)*
2	Introduction of inverter control to secondary pumps for water
3	Introduction of inverter control to air conditioning fans
4	Introduction of inverter control to ventilation fans for basement car park
5	Revision to high efficiency cool/hot water generators
6	Introduction of free cooling system for air conditioning
7	Energy management by BEMS equipment

GHG mitigation measures in buildings/households sector: Buildings -3-

Clathrate Hydrate Slurry (CHS) system



Slurry generator

- Developed by a Japanese company and NEDO
- A kind of liquid clathrate hydrate with tetra-n-butylammonium bromide (TBAB)
- Latent heat in the range of 5-12 deg C,
- Cooling storage capacity is 2-3 times larger than conventional chilled water,
- Suitable for both cooling storage and pumping,
- Introduced to buildings in Japan, Singapore, and the USA.

GHG mitigation measures in buildings/households sector: Buildings -3-

Results: Total CO_2 emission reduction = 1,188 tCO_2/y

	Energy efficiency improvement equipments	Energy reduction	CO_2 reduction
1	Air conditioning system using clathrate hydrate slurry (CHS)*	382 MWh	212 tCO_2/y
2	Introduction of inverter control to secondary pumps for water	144 MWh	80 tCO_2/y
3	Introduction of inverter control to air conditioning fans	94 MWh	52 tCO_2/y
4	Introduction of inverter control to ventilation fans for basement car park	357 MWh	198 tCO_2/y
5	Revision to high efficiency cool/hot water generators	294529 m^3 of gas	613 tCO_2/y
6	Introduction of free cooling system for air conditioning	38 MWh	21 tCO_2/y
7	Energy management by BEMS equipment	-	12 tCO_2/y

Comparison between CFL and LED

	CFL	LED
Power Consumption (W)	13	8
Life time (h)	6,000-7,000	40,000-50,000
Unit Price (USD) *1	10-13	40
CO_2 emissions (tCO_2/year) *2	22,667	12,205

Note: compare as 60W light bulb type corresponding

Emission reduction;
10,462 tCO_2/year

*1: 1USD= 80Yen

*2: Calculation condition;
Lightning period = 3,000 h/year, EF=0.5812tCO2/MWh,
replace number = 1,000,000

New Technology: CCFL (Cold Cathode Fluorescent Lamp)

- Fluorescent tube that has been used as backlight of monitor of LCD TV and personal computer
- Long life (as well as LED) , and energy saving compared with a fluorescent lamp
- Low heat, and high light emission compared with LED

Commercial building and household Sector

Exercise:

How to implement the GHG mitigation measures in hotels and shopping buildings?

- **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?**

CDM7: Overview of Programme of Activities (PoA)

21, September, 2010

Deputy chief advisor of JICA Expert Team
Kazuhito YAMADA

Today's Agenda

- What is PoA ?
- History of PoA
- Registered PoAs:
  Mexico, Brazil, Uganda, India, Honduras
- Procedures of PoA
- Issues of PoA
- Possible PoAs in Thailand

What is PoA ? -1

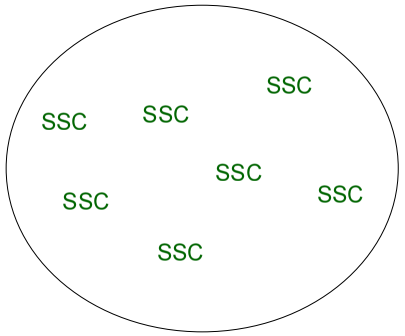
- A **programme of activities** (**PoA**) is a voluntary coordinated action by a private/public entity which coordinates and implements any policy/measure or stated goal (i.e. **incentive schemes and voluntary programmes**), which leads to anthropogenic GHG emission reductions or net anthropogenic GHG removals by sinks that are additional to any that would occur in the absence of the PoA, via an unlimited number of **CDM programme activities** (**CPAs**).

What is PoA ? -2

- **A CPA is a project activity under a PoA.**
- A **CPA** is a single, or a set of interrelated measure(s), to reduce GHG emissions or result in net anthropogenic GHG removals by sinks, applied within a designated area defined in the baseline methodology/ies.

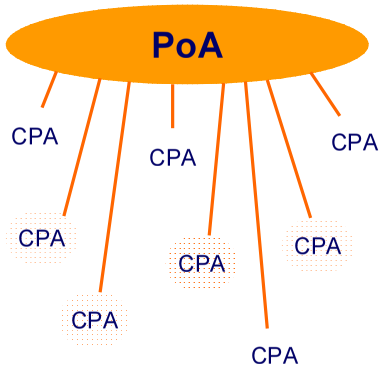
What is PoA ? -3

Small Scale CDM - bundling



Type I: <15MW
Type II: <60GWh/y
Type III: <60kt-CO_2/y

PoA



no limit of CPAs

History of PoA

- COP/MOP2 (**2006**) decided that a local/regional/national policy or standard cannot be considered as a CDM project activity, but that project activities under a programme of activities can be registered as a single CDM project activity.
- EB28 (**2006**) submitted the 'Guidance on the registration of project activities under a PoA'.
- The first PoA (Brazil) was started to validate in **2008**.
- The first PoA (Mexico) was registered in **2009**.
- Registered PoAs are only five (Mexico, Brazil, Uganda, India, Honduras).
- Under validation; China(6), Brazil(2), India(8), Mexico(1), Indonesia(3), Viet Nam(5)
- ***Thailand has one PoA under validation.***

Registered PoAs: Mexico -1

Goal of the PoA:

- The goal is to transform the energy efficiency of Mexico's residential lighting stock by distributing up to **30 million compact fluorescent lamps (CFLs) to households**.

Coordinating/managing entity:

- Cool nrg Carbon Investments Pty Ltd

Project participants:

- Cool nrg Mexico SRL de CV (Mexico)/
  Cool nrg Carbon Investments Pty Ltd (UK/Australia)

Estimated GHG emission reductions:

- **520,365 t-CO_2/y**

Registered PoAs: Mexico -2

Figure 1: Geographic boundary of PoA - Mexico

- Residents will come to distribution points with their old incandescent bulbs and exchange them for CFLs with equivalent or greater lumen output. Incandescent bulbs collected during the exchange will be destroyed to prevent leakage.
- Each SSC-CPA will involve the distribution and installation of CFLs for use by Mexican households.
- CFLs will be made available at a large number of distribution points within the area covered by the SSC-CPA.
- These distribution points will typically be those provided by Cool nrg's retail partners, who have a network of approximately 3,550 outlets across Mexico available to participate in the PoA.

Registered PoAs: Brazil -1

Goal of the PoA:

- The PoA consists of **installing a biodigester** system to capture CH_4 and an enclosed flare system to combust it in 5 states of Brazil with **market farms and breeding Farms**.

Coordinating/managing entity:

- Instituto Sadia de Sustentabilidade (ISS)

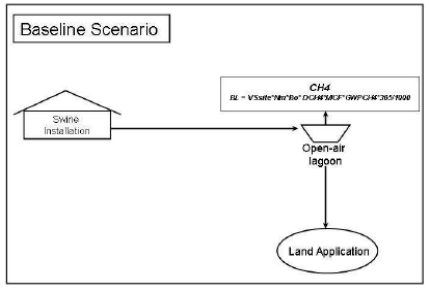
Project participants:

- ISS (Brazil)/European Carbon Fund (ECF) (UK)

Estimated GHG emission reductions:

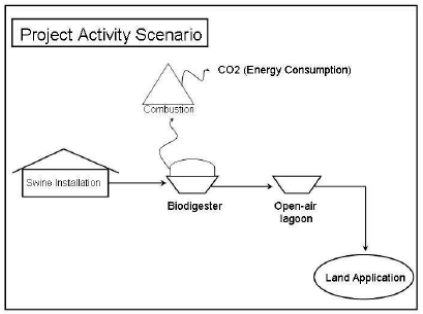
- **591,418 t-CO_2/y**

Registered PoAs: Brazil -2



- The estimated amount of installed biodigester and enclosed flare systems in the PoA of the ISS is of 1,103 in 1,074 farmers.

- The sampling random method to be applied in verification by the DOE's is estimated as 25% in each round for each verification. These samplings estimate that every 4 rounds or every 4 verifications the amount to be verified is 100% of the farms.



Registered PoAs: Uganda -1

Goal of the PoA:

- The goal is to avoid CH_4 emissions from municipal waste landfills by undertaking composting of the wastes and using the organic matter in wastes as humus for soil conditioning and plant growth.

Coordinating/managing entity:

- National Environmental Management Authority (NEMA)

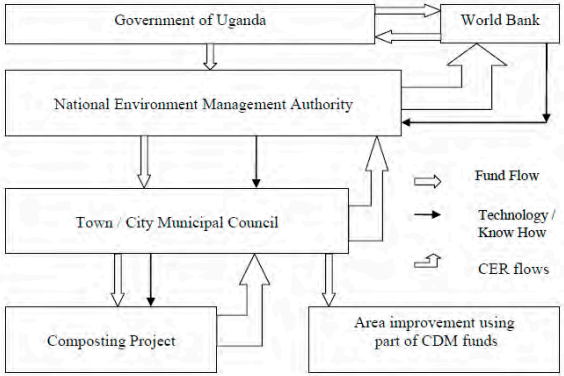
Project participants:

- NEMA (Uganda)/IBRD-CDCF (Netherlands)

Estimated GHG emission reductions:

- **83,700 t-CO_2/y**

Registered PoAs: Uganda -2



- The Government of Uganda has taken a Loan from the World Bank under the "Environment Management and Capacity Building Project-II" and intends to use part of this loan to improve municipal solid waste management in cities and municipalities through the proposed municipal waste compost program.

- The program aims to promote composting as an alternative means of solid waste processing and disposal in Uganda.

Registered PoAs: India -1

Goal of the PoA:

- **CFLs** will be distributed by SSC-CPA implementer(s) to grid-connected residential households in exchange of an incandescent lamp (ICL). Approximately **600,000 CFLs** can be distributed within a single SSC-CPA.

Coordinating/managing entity:

- Bureau of Energy Efficiency (BEE)

Project participants:

- BEE (unilateral)

Estimated GHG emission reductions:

- **34,892 t-CO_2/y**

Registered PoAs: India -2

a.) Three Tube CFL b.) Two Tube CFL c.) Spiral Tube CFL

Figure 1: Examples of self-ballasted CFLs with plug in Type base

- It is estimated that there are over 400 million light points in India lighted using ICLs. ICLs are extremely energy in-efficient, with just 5% of the electricity input converted to light. The remaining is lost as heat. In recent years the CFL has emerged as an energy efficient alternative, as a CFL uses only one-fifth as much electricity as an ICL to provide the same amount of illumination.

Registered PoAs: Honduras -1

Goal of the PoA:

- The Masca Small Hydro Programme aims at developing a series of **small hydroelectric projects** in Honduras.

Coordinating/managing entity:

- Hidroeléctrica de Masca S.A. de C.V. (Hidromasca)

Project participants:

- Hidromasca (Honduras) / OneCarbon International BV (Netherlands)

Estimated GHG emission reductions:

- **4,395 t-CO_2/y**

Registered PoAs: Honduras -2

Table 7. Activities similar to the proposed project activity. Source CDM Pipeline October 2008

Recent hydro power projects in Honduras	Start of operation year	Capacity MW	CDM status
Peña Blanca	2008	0.7	Seeking registration, supported by board minutes. Also see PoA DD, A.4.3, Sub-step 4a
Cortecito	2007	3.2	Registered, No. 51
Cuyamapa	2007	12.2	Registered, No. 45
Cuyamel	2007	7.8	Registered, No. 83
La Gloria	2007	5.8	Registered, No. 154
San Carlos	2007	2.3	Registered, No. 51
La Esperanza	2006	12.7	Registered, No. 9
Cececapa	2005	2.9	Registered, No. 156
Yojoa	2005	0.6	Registered, No. 157
Zacapa	2005 rehabilitation	0.5	Registered, No.235

Honduras already has many SSC-hydropower projects.

Procedures of PoA -1

Preparation of a PoA

- Preparation of a CDM-POA-DD

-Identification of the coordinating/managing entity;
-Host Party(ies) and PoA participants;
-Definition of the boundary for the PoA in terms of a geographical area (e.g., municipality, region within a country, country or **several countries**);
-Description of the policy/measure or stated goal that the PoA seeks to promote;
-Demonstration that in the absence of the CDM either:
(i) the proposed voluntary measure would not be implemented, or
(ii) the mandatory policy/regulation would be systematically not enforced and that non-compliance with those requirements is widespread in the country/region, or
(iii) that the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation. This shall constitute the demonstration of additionality of the PoA as a whole;

Procedures of PoA -1

Preparation of a PoA

- Preparation of a CDM-POA-DD (continued)

-Definition of eligibility criteria for inclusion of a project activity as a CPA under the PoA;
-Starting date and length of the PoA not exceeding **28 years** (**60 years for A/R**);
-Description of the operational and management arrangements;
-Description of a monitoring plan for a CPA;
etc...

- Preparation of the CDM-CPA-DD

Procedures of PoA -2

Validation of a PoA

- The coordinating/managing entity shall submit to a DOE the following documentation:

(a) A completed CDM-POA-DD;
(b) A PoA generic CDM-CPA-DD, which specifies the generic information relevant to all CPAs that may be included in the PoA;
(c) A completed CDM-CPA-DD which is to be based on the application of the PoA to one real case.

- The validation by the DOE shall address the following issues:

Additionality; eligibility criteria for inclusion of a proposed CPA; operational and management arrangements; consistency between CDM-POA-DD and the PoA generic CDM-CPA-DD; etc.

Procedures of PoA -3

Inclusion of CPAs

- A CPA can be included in a registered PoA at any time during the duration of the PoA.
- To include an additional CPA in a registered PoA, the coordinating/ managing entity shall forward the completed specific CDM-CPA-DD form to any DOE, after having ensured that the CPA and the specific CDM-CPA-DD meets the requirements determined in the POA and its generic CDM-CPA-DD. The coordinating/managing entity may forward more than one specific CDM-CPA-DD at one time.

Procedures of PoA -4

Inclusion (continued)

- The DOE shall scrutinize the CPA and the specific CDM-CPA-DD against the latest version the POA. If the DOE confirms that the CPA meets the requirements of the POA, it shall include the CPA in the registered PoA by forwarding the specific CDM-CPA-DD to the Board via uploading it through a dedicated interface on the UNFCCC CDM website.
- The CPA identified in the specific CDM-CPA-DD uploaded by the DOE will be automatically included in the registered PoA and displayed on the view page of that PoA. The DOE, the coordinating/managing entity and the DNA shall be automatically notified of the change in the status of the PoA.

Issues of PoA

- Who will be the best 'coordinating/ managing entity'?
- What is the best methodology to verify GHG emissions from a large number of CPAs?
- Should we simplify the procedure of the present PoA to speed up realization of them?

Possible PoAs in Thailand

- Renewable energy including waste to energy
- Energy efficiency improvement in industry and in household
- Transport
- A/R

CDM08:
Exercise: programmatic CDM (PoA)

- Introduction of Thailand PoA under validation and discussion for possible PoAs in Thailand -

21, September, 2010

JICA Expert Team
Mariko FUJIMORI

PoA in Thailand

Project title:

- Thailand Small Scale Livestock Waste Management Program

Current condition:

- Under validation

PDD submission date:

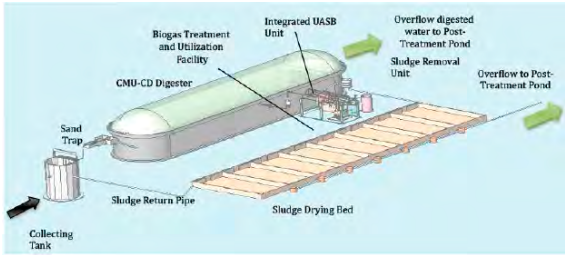
- 27 October 2009

Starting date:

- June 2009

Length of the PoA:

- 28 years



PoA in Thailand

Coordinating/managing entity:

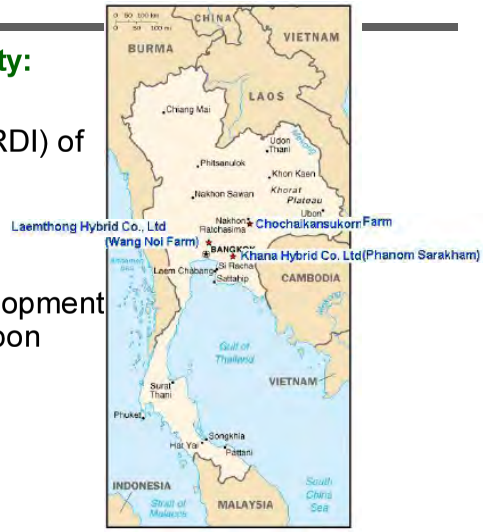
- Energy Research and Development Institute (ERDI) of Chiang Mai University

Project participants:

- International Bank for Reconstruction and Development as the Trustee of the Carbon Fund for Europe

Estimated GHG emission reductions:

- 55,774 t-CO_2/y



PoA in Thailand

Applied methodology:

- AMS-III.D: Methane recovery in animal manure management systems, ver. 15

Technology to be employed:

- Anaerobic digestion technology designed by ERDI
- Targeted system size: 300 - 19,000 m^3/farm or 2,000 - 150,000 pig heads/farm
- Not only pig farms but also cattle and chicken farms can be included

Baseline scenario:

- Anaerobic lagoon treatment systems, causing odor and water pollution

PoA in Thailand

Structure of CPA:

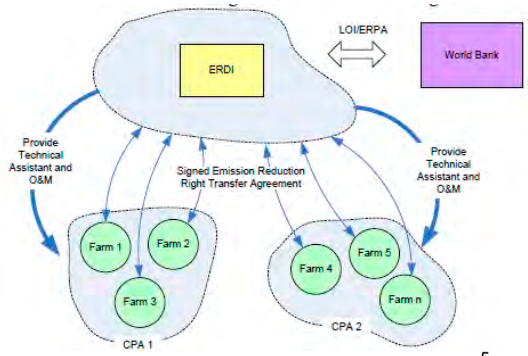
- Group of farms or individual farm will implement the project activity.

Project management:

- ERDI will manage the whole PoA, transfer technology to each CPA farmers and control monitoring.

Estimated GHG emission reductions by the specific CPA (=three farms):

55,774 t-CO_2/y



Possible PoAs in Thailand

- What is the **rationale**? - Why this particular PoA should be promoted/prioritized?
- What kind of **benefits** can be expected by the possible PoA?
- What kind of **issues** will we face to develop the possible PoA?

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

- Biogas generation using food waste in Bangkok -

JICA Expert Team

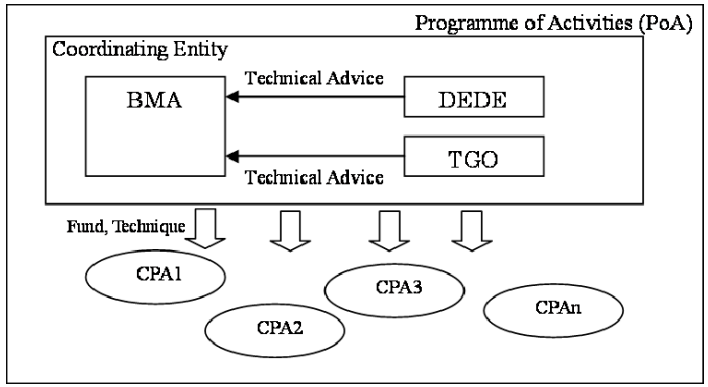
Yoshihiro MIZUNO

Description of the PoA project

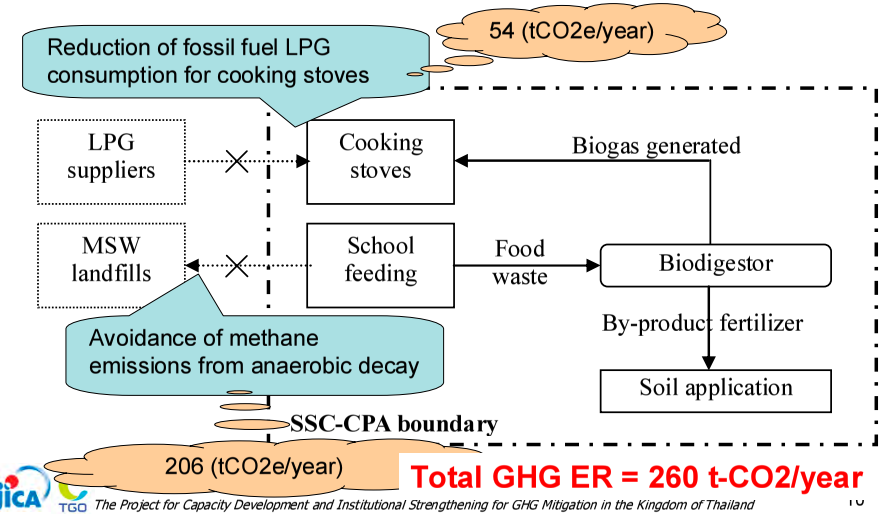
- Install bio digesters at elementary schools in Bangkok
- Organic waste from human feeding will be used as material input to generate biogas
- Generated biogas will be used for cooking fuel at schools

the parties involved in the PoA

・Number of candidates (elementary school) in the programme activities: 84 (school)



Benefit of the Project (GHG Emission Reductions)



CDM 09: Development of CDM Project Activity

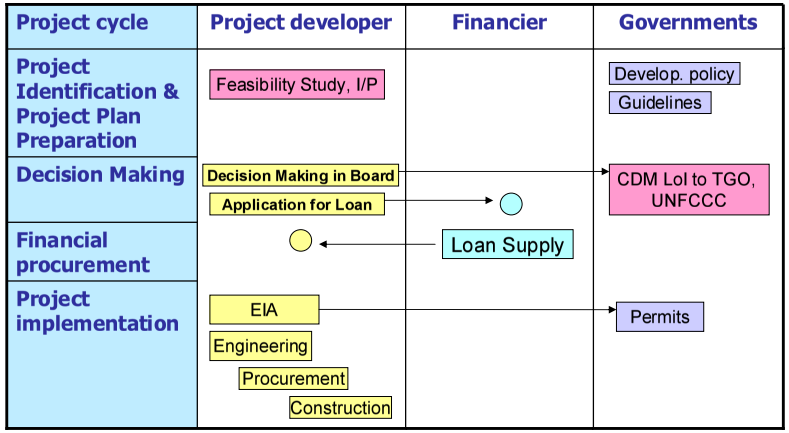
28th September 2010

Chief Advisor of JICA Expert Team
Masahiko FUJIMOTO

Agenda

- Project implementation flow
- What is feasibility study?
- Steps of Feasibility Study
- Project implementation structure
- For example: Small Hydro Power Generation
- For example: Biomass Power Generation
- Present value and internal rate of return
- Starting Date of Project Activity
- Prior consideration of the CDM
- Conclusion
- Practice

Project Implementation Flow



EIA: Environmental Impact Assessment, LoI: Letter of Interest

What is feasibility study?

- Feasibility study
  - is **valuable tool** for developing a winning business plan.
  - can **answer the essential question** of "Should we proceed with the proposed project idea?",
    - identifying what potential problems are
    - identifying how, where the business should be operated, and to whom to sell a service or product
    - figuring out how much money you need

Necessity of feasibility study

- Feasibility study
  - **outlines some business alternatives** and **clarifies strengths and limitations** of them.
  - **enhances the possibility of success** by addressing and mitigating factors early on that could affect the project.
  - **provides quality information for decision making**, including reasons not to proceed.
  - **helps in securing funding** from lending institutions and other financial sources.
  - helps to attract equity investment.

Steps of Feasibility Study

Review of available data and information and of major policy issues

↓

Analysis of the need for the Project, including supply-and-demand analysis and determination of the relative priority of the Project in the country's national/regional economic development or sector program

↓

Design of the project concept (**purpose, scope, site**, etc.)

↓

Preliminary facility design and related engineering of potentially viable alternatives (including **preliminary layout**, **selection of plant capacity**, logistics study, and CDM), taking into account **natural and site conditions**, **availability of materials and labor, possible construction methods**

↓

Cost estimate of potentially viable alternatives

↓

Source: Operational guidance on the preparation for Japan's ODA loan projects

Steps of Feasibility Study

Evaluation of technical soundness, economic and financial viability of potentially viable alternatives

↓

Selection of most viable alternative

↓

Implementation schedule

↓

Project implementation and **operation and maintenance** scheme

↓

Financial plan

↓

Evaluation of environmental and social impacts, possible project risks

↓

Project Implementation Plan: **Recommendations and procedures**

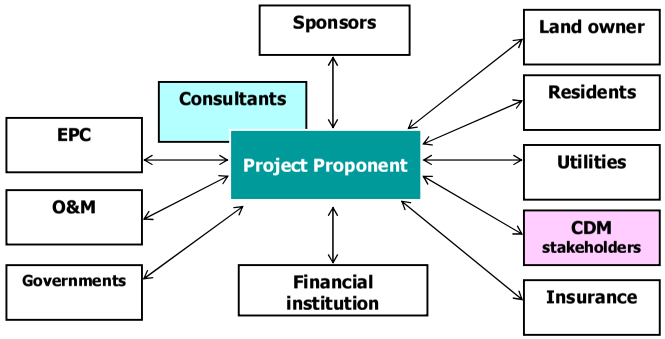
Source: Operational guidance on the preparation for Japan's ODA loan projects

Project Implementation Plan

- **Priority and necessity** of the project
- **Investment and financing plans** consistent with the project cost, including the cost of operation, maintenance and staff training program
- Details of the **items and components of the project**
- **Clear statement of the intention** of the project developer to undertake the project
- **Steps and procedures** necessary to undertake the project (e.g. government approval for the project or EIA, acceptance by the project affected people)

Source: Operational guidance on the preparation for Japan's ODA loan projects

Project Implementation Structure

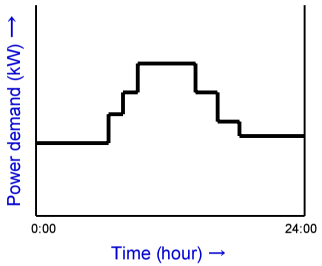


EPC: Engineering, Procurement and Construction
O&M: Operation and Maintenance

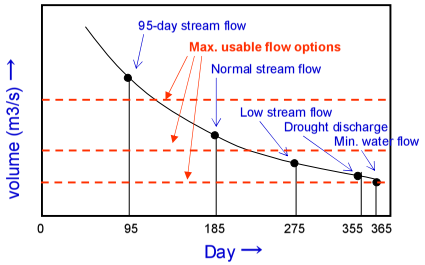
Example 1: Small Hydro Power Generation Project Planning Steps

- Power demand study
  - Selection of demands
  - Survey of demand variation patterns and scale
- Power generation planning
  - Power generation plant layout
  - Study on effective head
  - Study on water flow volume
  - Setting of max. available water flow volume
- Optimum power generation capacity
  - Power demand and supply balance
  - Review of optimum capacity
- Preliminary design of power plant
- Preliminary cost estimate
- Feasibility study

Demand Variation and Water Flow - Duration



Daily demand variation pattern



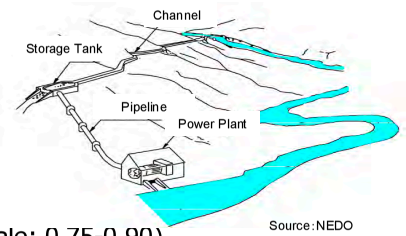
Flow-duration curve and selection of max. usable flow

Power Output Capacity and Generated Energy

- Power output capacity (kW)

  $Pe = 9.8\ Q\ He\ \eta_t\ \eta_g$

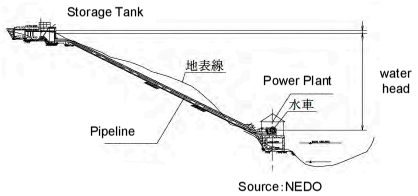
  Where,
  Pe: power output (kW)
  Q: flow (m^3/s)
  He: water head (m)
  η_t: efficiency of turbine (small-scale: 0.75-0.90)
  η_g: efficiency of generator (small-scale: 0.82-0.93)



- Generated energy (kWh/yr)

  $Ee = Pe\ T$

  Where,
  Ee: generated energy (kWh/yr)
  T: time (h/yr)



Example 2: Biomass
Power Generation Project Planning Steps

- Project site survey
  - Preliminary selection of potential sites
  - Collection of biomass potential data, natural and social conditions
- Preliminary sizing of biomass plant/facilities
- Preliminary selection of collection/transport methods for biomass resources
- Preliminary study on the amount and utilization of heat and power generated by biomass plants/facilities (including matching of demand and supply)
- Preliminary study on disposal of by-products (ex. ashes)
- Preliminary cost estimate
- Feasibility study

Energy Generation – Direct Combustion

Heat	[Heat generated (GJ/year)] = [Possible **biomass quantity** (t/year)] x [**Heating value** (GJ/t] x [**Heat efficiency**]
Power	[Power generated (kWh/year)] = [Possible **biomass quantity** (t/year)] x [**Heating value** (GJ/t)] x [**Power efficiency**] / **0.0036** (GJ/kWh)

Biomass	Major items	Heating value (GJ/ton,Dry base)	Heat efficiency	Power efficiency
Sugar cane mill residues	Bagasse	14.40	0.85	0.10 (Wet base) ～ 0.22 (Dry base)
	Top &Trashier	17.39		
Rice mill residues	Rice husks	14.27		
	Rice straws	10.24		
Palm oil mill residues	EFB	17.86		
	Fiber	17.62		
	Shell	18.46		
	Frond	9.83		

Source: Biomass energy, Department of alternative Energy Development and Efficiency

Energy Generation – Direct Combustion

Biomass	Major items	Heating value (GJ/ton)	Heat efficiency	Power efficiency
Coconut industry residues	Husk	16.23	0.85	0.10 (Wet base) ～ 0.22 (Dry base)
	Shell	17.93		
	EFB	15.40		
	Frond	16.00		
Cassava starch industry residues	Stalk	18.42		
Maize	corncob	18.04		
Woody biomass[2]	Disposed trees (coniferous trees)	19.78		
	Disposed trees (broad leaf trees)	18.8		
	Sawmill chips	15.6		

Source: Biomass energy, Department of alternative Energy Development and Efficiency
[2] : NEDO

Energy Generation – Methane Fermentation

Heat	[Heat generated (GJ/year)] = [Possible **biomass quantity** (t/year)] x **1,000** x [**Gas generation factor** (m^3/kg)] x [**Methane content** (60%)] x [**Methane heating value** (kJ/m^3)] x [**Heat efficiency**] x 10^{-3}
Power	[Power generated (kWh/year)] = [Possible **biomass quantity** (t/year)] x **1,000** x [**Gas generation factor** (m^3/kg)] x [**Methane content** (60%)] x [**Methane heating value** (kJ/m^3)] x [**Power efficiency**] / **3,600** (kJ/kWh)

Biomass	Major items	Gas generation factor (m^3/kg)	Methane content (%)	Methane heating value (kJ/m^3)	Heat efficiency	Power efficiency
Cattle manure	Dairy cattle	0.025	60	37,180	0.90	0.25
	Beef cattle	0.030	60			
Swine manure	-	0.024	60			
Food biomass	Kitchen wastes	0.740	62			
Sewage	Sewage (sludge)	0.550	62			

Source: NEDO

Indicator for financial analysis : NPV & IRR

✓ Present value analysis: value evaluation of various cash flow

Net present value : NPV = $\sum_{i=1}^{n}$ (value$_i$)/(1 + rate)^i - investment cost

value: future cash flow, rate: discount rate, i: year (1 ~ n)

✓ **Internal rate of return (IRR):** the discount rate where NPV equals to ZERO.

-a reference indicator for the profitability of the project to pay interest;

✓ **General criteria for investment : NPV > 0**

IRR > Bank interest rate

NPV & IRR Calculation

Year (i)	Investment Cost	Income	Benefit (B)	(1+rate)^i	Present Value (PV)	Net Present Value (NPV)
0	300		-300	0	-300	-300
1		100	100	1.13	88	-212
2		100	100	1.28	78	-133
3		100	100	1.44	69	-64
4		100	100	1.63	61	-3
5		100	100	1.84	54	52

Investment cost	300
Total income	100 x 5 = 500
Discount Rate (rate)	13%
Internal rate of Return IRR in 5 year	19.9%, =IRR(B0:B5) using benefit value
Net present value (NPV) in 5 year	52

"Starting Date" of CDM Project Activity

- Starting Date : "the earliest date at which either the implementation or construction or real action of a project activity begins"
  - "the date on which the PP has committed to expenditures related to the implementation or related to the construction of the project activity"
- If starting date is before the date of publication of the PDD for global stakeholder consultation
  - Need to show how the benefits of the CDM were seriously considered prior to the starting date

Guidance on the demonstration and assessment of prior consideration of the CDM

- New Project (starting date, on or after 2 August 2008)
  - Inform the start of the project activity and their intention to seek CDM status to a Host party DNA and the UNFCCC secretariat in writing within 6 months of starting date
- Existing Project (starting date, before 2 August 2008 and before the date of validation)
  - Indicate awareness of the CDM prior to starting date
  - Indicate that the benefits of the CDM were a decisive factor in the decision to proceed with the project
    - (e.g. minutes or notes of the decision by the Board of Directors)

Conclusions

- Feasibility study serves as an decision-making tool for the management whether to go ahead with the proposed project
- It is essential to understand feasibility and potential risks of the proposed project objectively and quantitatively.
- When decision-making was done, if you intend to implement your Project as CDM, you need to send LOI to TGO and UNFCCC for CDM.

Practice 1

1) Please calculate maximum capacity of Small Hydro Power Generation and annual expected electricity generation.

Assumption)

- ✓ Water volume : 11 (m^3/s)
- ✓ Water head : 74 (m)
- ✓ Efficiency of turbine : 0.9
- ✓ Efficiency of generator : 0.9
- ✓ Annual working time : 3600 (h) = 24 hours * 150 days
- ✓ Source: Suoi Sap 3 Hydro Power Project in Son La Province in Vietnam

Answer) _____ kW _____ kWh/year

Practice 2

2) Please calculate expected amount of electricity generated from Biomass Electricity Generation Plant.

Assumption)

- ✓ Rice Husk volume : 14,307 (tons/ 6 months), dry base
- ✓ source: Monitoring report of A.T Biopower Rice Husk Power Project in Pichit, Thailand

Answer) _____ kWh/ 6months

Practice 3 (a)

3a) Please calculate IRR of 10 years without CDM

Assumption)

- ✓ Investment cost: 1,500 million TBH
  - For Year 1
- ✓ O/M cost : 5% of investment cost
  - Operation starts from Year 2
- ✓ Annual electricity generation:210,000 MWh/year
- ✓ Electricity Tariff: 2.1 TBH/ kWh
- ✓ Biomass cost: 142,500,500 TBH/ year
- ✓ source: Phu Khieo Bio-Energy Cogeneration project (PKBC)

Answer) _____ % (IRR) without CER

Practice 3 (b)

3b) Please calculate IRR of 10 years with CDM.

Assumption)

- ✓ Cost and revenue items are same as in the previous slide
- ✓ Annual emission reduction is 100,000 t-CO_2/ year
- ✓ CER price: $10/ ton, or 300 Baht/ ton
- ✓ Source: Phu Khieo Bio-Energy Cogeneration project (PKBC)
  - Figures and contents are modified from the original PDD for simplification

Answer) _____ % (IRR) wit CER

CDM 10:
AR - CDM/ current situation and issues

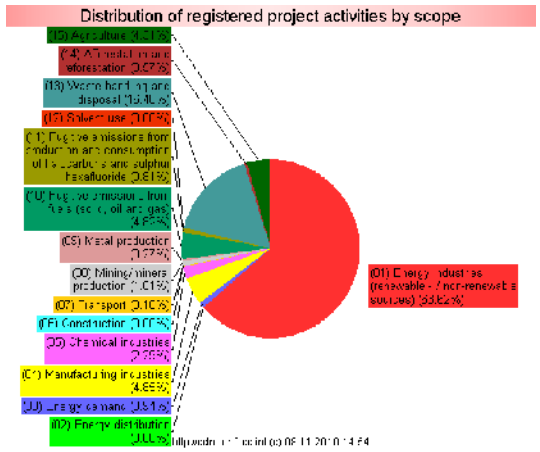
23rd November 2010
JICA Expert Team
Osamu ISODA

Contents สารบัญ

1. Current status of A/R CDM
1.1 Current status of CDM

1. สถานะปัจจุบันของ CDM ภาคป่าไม้
1.1 สถานะปัจจุบันของ CDM

- No. of registered projects (as of 8 Nov. 2010) : Total: 2,969, A/R: 17 (0.57%)
- Differences from emission reduction project include "non-permanence": Risk that removals by sinks are reversed because of death etc.
- จำนวนโครงการที่ได้มีการขึ้นทะเบียนแล้ว (ณ วันที่ 8 พฤศจิกายน 2553) : รวม : 2,969 โครงการ, ภาคป่าไม้: 17 โครงการ (0.57%)
- ความแตกต่างจากโครงการการลดการปลดปล่อยก๊าซเรือนกระจกจากโครงการอื่น คือความไม่ถาวร: มีความเสี่ยงที่ว่าการดูดซับก๊าซของต้นไม้ก๊าซอาจปลดปล่อยออกมาได้หากต้นไม้ตาย



Source: UNFCCC

1.2 Registered A/R CDM projects

1.2 โครงการ CDM ภาคป่าไม้ ที่ได้ทำการขึ้นทะเบียนแล้ว

- Projects (17):
  In 2006; 1
  In 2009; 10
  In 2010; 6
- Methodology (18):
  AM0001; 3
  AM0003; 4
  AMS0001; 7
- โครงการ (17):
  ปี พ.ศ. 2549; 1
  ปี พ.ศ. 2552; 10
  ปี พ.ศ. 2553; 6
- หลักการ (18):
  AM0001; 3
  AM0003; 4
  AMS0001; 7

No.	Registered	Host Parties	Other Parties	Methodology	Removals (tCO2-e/yr)
1	06/11/10	China	Italy, Spain	AR-AM0001 ver. 2	25,795
2	09/1/30	Moldova	Canada etc.	AR-AM0002 ver. 1	179,242
3	09/3/23	India		AR-AMS0001 ver. 4	11,596
4	09/4/28	Viet Nam		AR-AMS0001 ver. 4	2,665
5	09/6/5	India		AR-AM0001 ver. 2	57,792
6	09/6/11	Bolivia	Belgium	AR-AMS0001 ver. 4	4,341
7	09/8/21	Uganda	Italy	AR-AMS0001 ver. 5	5,564
8	09/9/6	Paraguay	Japan	AR-AMS0001 ver. 4	1,523
9	09/11/16	China		AR-AM0003 ver. 3	23,030
10	09/11/16	Peru		AR-AM0003 ver. 4	48,689
11	09/12/7	Ethiopia	Canada	AR-AM0003 ver. 4	29,343
12	10/1/2	Albania	Italy	AR-AM0003 ver. 4	22,964
13	10/1/15	India	UK	AR-AMS0001 ver. 5	3,594
14	10/4/16	Colombia		AR-AM0004 ver. 3	37,783
15	10/5/27	Chile	UK	AR-AMS0001 ver. 5	9,292
16	10/7/21	Brazil	Netherlands	AR-AM0005 ver. 2	75,783
17	10/9/15	China	Spain	AR-ACM0001 ver. 3	87,308
				Av. (large- scale)	58,773
				Av. (Small- scale)	5,511
				Av. (Total)	36,841

Source: UNFCCC

2. Basic Rules for A/R CDM
2.1 Advantage of A/R CDM Project Activity

2. กฎพื้นฐานสำหรับ CDM ภาคป่าไม้
2.1 ประโยชน์จากกิจกรรมโครงการ CDM ภาคป่าไม้

- A/R CDM project activity can:
  - be possible to absorb large volume of CO2 by low cost in case of large-scale of planting; and
  - contribute not only CO2 absorption but also environmental improvement/ regional development.

- กิจกรรมในโครงการ CDM ภาคป่าไม้สามารถ:
  - มีความเป็นไปได้ที่จะดูดซับก๊าซคาร์บอนไดออกไซด์ได้มากโดยมีค่าใช้จ่ายต่ำในกรณีการปลูกป่าในโครงการ CDM ขนาดใหญ่
  - ไม่เพียงแต่ดูดซับก๊าซคาร์บอนไดออกไซด์แต่ยังปรับปรุงสภาพแวดล้อมให้ดีขึ้น และการพัฒนาส่วนท้องถิ่น

2.2 Issues on A/R CDM & their solutions

2.2 ปัญหาเกี่ยวกับ CDM ภาคป่าไม้ และ การแก้ไข

- Issues:
  - Non-permanence (Forest will be vanishing someday.)
  - Uncertainty (Impossible to predict accurate amount of removals)
  - Long-term (necessary for forest growth)
- Solution:
  - Non-permanence -> CER (long-term/ short-term)
  - Uncertainty -> prediction by adequate sampling/ statistical methods
  - Long-term -> long-term crediting period

- ปัญหา:
  - ความไม่ถาวร (สักวันป่าจะหมดไป)
  - ความไม่แน่นอน (ไม่สามารถที่จะคาดการณ์ปริมาณก๊าซที่ถูกกักเก็บได้อย่างถูกต้อง
  - ระยะยาว (จำเป็นสำหรับความเติบโตของป่าไม้)
- การแก้ไข:
  - ไม่ถาวร -> CER (ระยะยาว/ ระยะสั้น)
  - ความไม่แน่นอน -> การทำนายโดยการสุ่มตัวอย่างอย่างเพียงพอ / วิธีการทางสถิติ
  - ระยะยาว -> ระยะเวลาในการคิดเครดิตระยะยาว

2.3 What is A/R CDM Project Activity?

2.3 อะไรคือกิจกรรมโครงการ CDM ภาคป่าไม้

- Definition of FOREST
  (a) A single minimum tree crown cover value between 10 and 30 %;
  (b) A single minimum land area value between 0.05 and 1 hectare;
  (c) A single minimum tree height value between 2 and 5 meters

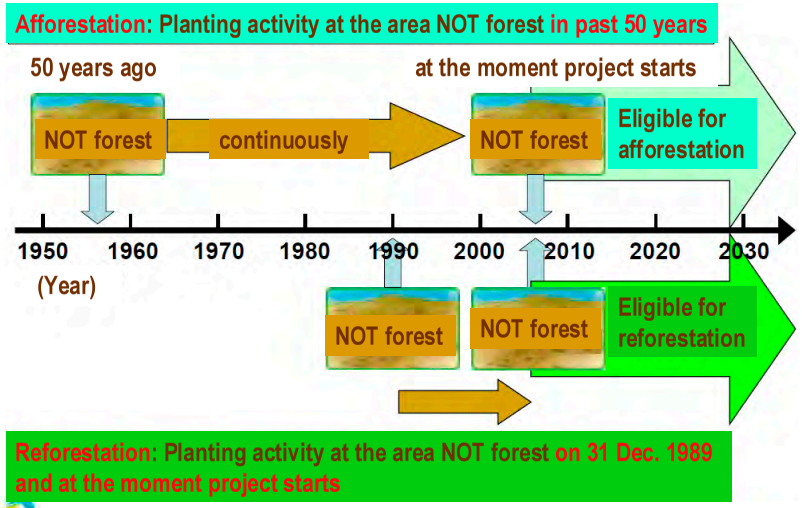
- คำนิยามของป่าไม้
  (a) มีค่าการปกคลุมของเรือนยอดระหว่าง 10 - 30%;
  (b) มีพื้นที่ระหว่าง 0.05 - 1 เฮคแตร์;
  (c) ต้นไม้มีความสูงระหว่าง 2 - 5 เมตร

At not forest area　　By planting activities　　Project activity to create forested area

Source: JIFPRO

2.4 Eligibility of lands

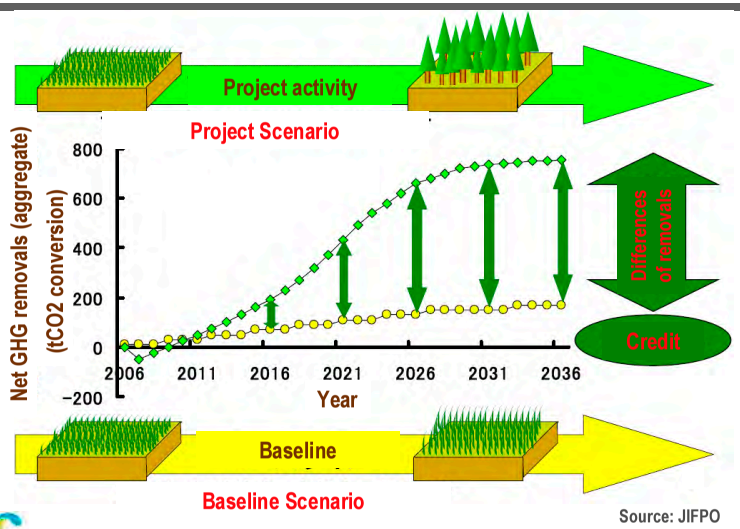
2.4 คุณสมบัติของพื้นที่



Source: JIFPRO

2.5 Credit to be able to achieve by A/R CDM

2.5 เครดิตเพื่อให้บรรลุตามโครงการ CDM ภาคป่าไม้



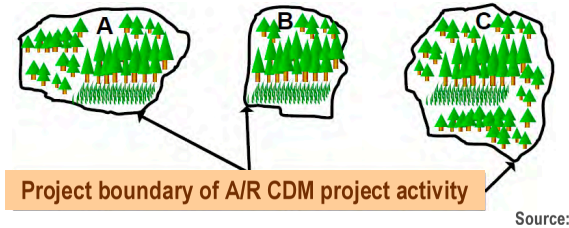
Source: JIFPO

2.6 Project boundary

2.6 ขอบเขตโครงการ

- Geographically delineates project activity under the control of the PPs.
- More than one discrete areas of land
  - Each: a unique geographical identification;
  - Not include the areas in between these discrete areas of land.

- อธิบายลักษณะภูมิศาสตร์ของพื้นที่อย่างชัดเจนภายใต้การควบคุมของผู้ร่วมโครงการ
- มากกว่าหนึ่งพื้นที่ที่ไม่ต่อเนื่อง
  - แต่ละพื้นที่: มีการบ่งชี้ลักษณะทางภูมิศาสตร์
  - ไม่รวมพื้นที่ที่อยู่ระหว่างพื้นที่ที่ไม่ต่อเนื่อง



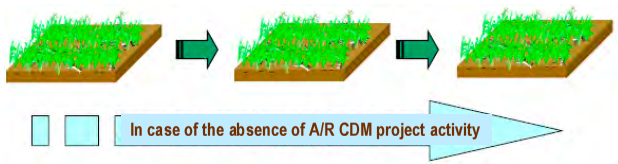
Source: JIFPO

2.7 Baseline Scenario

2.7 กรณีฐาน

- The baseline scenario for an A/R CDM project activity is the scenario that reasonably represents the sum of the changes in carbon stocks in the carbon pools within the project boundary that would occur in the absence of the A/R CDM project activity.

- กรณีฐานของ CDM ภาคป่าไม้ คือ กรณีที่แสดงถึงการเปลี่ยนแปลงของปริมาณการเก็บกักคาร์บอนในแหล่งสะสมคาร์บอนภายในขอบเขตโครงการที่เกิดขึ้นในขณะที่ไม่มีโครงการ



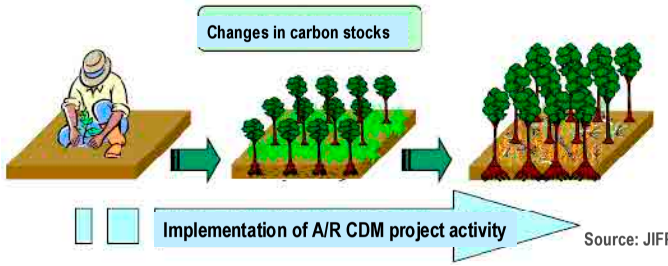
Source: JIFPO

2.8 Project Activity

2.8 กิจกรรมโครงการ

- An A/R CDM project activity is an afforestation or reforestation measure, operation or action that aims at achieving net anthropogenic GHG removals by sinks.

- กิจกรรมโครงการ CDM ภาคป่าไม้ คือ การปลูกป่าหรือ การฟื้นฟูป่า, การดำเนินการหรือกระทำเพื่อบรรลุวัตถุประสงค์ในการดูดซับก๊าซเรือนกระจกจากกิจกรรมของมนุษย์



Source: JIFPO

2.9 Calculation of net anthropogenic GHG removal by sink

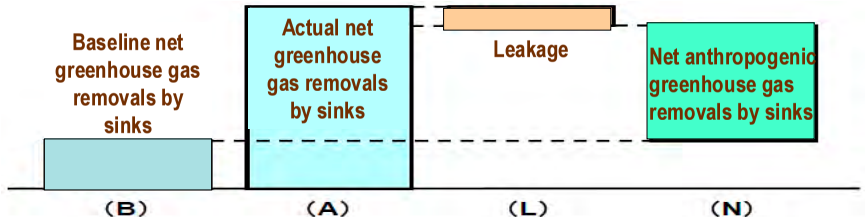
2.9 การคำนวณปริมาณการดูดซับก๊าซเรือนกระจกที่เกิดจากกิจกรรมของมนุษย์

$N = A - B - L$

- N: Net anthropogenic greenhouse gas removals by sinks
- A: Actual net greenhouse gas removals by sinks
- B: Baseline net greenhouse gas removals by sinks
- L: Leakage

$N = A - B - L$

- N: ปริมาณก๊าซเรือนกระจกสุทธิที่ดูดซับได้จาก กิจกรรมของมนุษย์
- A: ปริมาณก๊าซเรือนกระจกสุทธิที่ดูดซับได้จริง
- B: ข้อมูลฐานของปริมาณก๊าซเรือนกระจกที่ดูด ซับได้
- L: การรั่วไหล



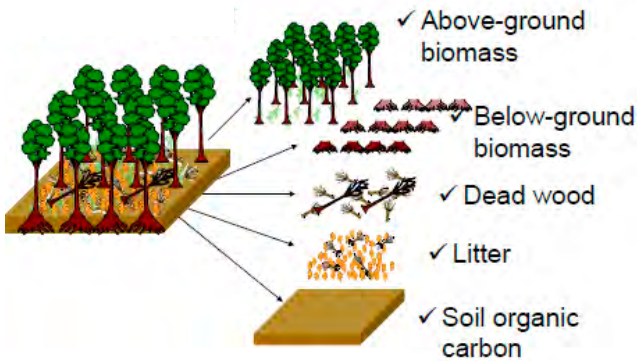
Source: JIFPO

2.10 Carbon Pools

2.10 แหล่งสะสมคาร์บอน

PPs should evaluate 5 carbon pools for calculation on change of carbon removals.

ผู้เข้าร่วมโครงการควรพิจารณา 5 แหล่งสะสมคาร์บอน สำหรับคำนวณความเปลี่ยนแปลงของการดูดซับคาร์บอน



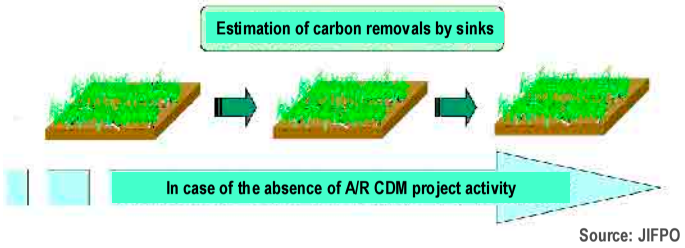
Source: JIFPO

2.11 Calculation of Baseline net GHG removals by sinks

2.11 การคำนวณข้อมูลฐานของปริมาณก๊าซเรือนกระจกที่ดูดซับได้

- Total amount on change of carbon removals of carbon pools in project boundary
- = Living biomass

- ผลรวมการเปลี่ยนแปลงทั้งหมดของปริมาณการดูดซับคาร์บอนจากแหล่งสะสมคาร์บอนในเขตโครงการ
- = ชีวมวล



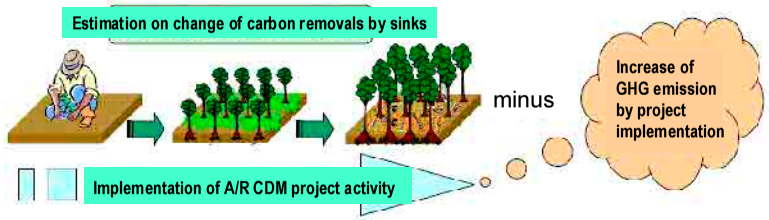
Source: JIFPO

2.12 Calculation of Actual net GHG removals by sinks:

2.12 การคำนวณปริมาณก๊าซเรือนกระจกสุทธิที่ดูดซับได้จริง

- Total amount on change of carbon removals of carbon pools in project boundary
- = Living biomass
- – Emission by project (increase of emission in project boundary)

- ผลรวมของการเปลี่ยนแปลงทั้งหมดของปริมาณการดูดซับคาร์บอน จากแหล่งสะสมคาร์บอนในเขตโครงการ
- = ชีวมวล
- ลบก๊าซที่ถูกปล่อยจากการดำเนินโครงการ (การเพิ่มขึ้นของการปล่อยก๊าซในขอบเขตโครงการ)



Source: JIFPO

2.13 Non-permanence of A/R CDM (tCER and lCER)

- Temporary CERs (tCER) and long-term CERs (lCERs):
  - The PPs shall select one of the following approaches to addressing non-permanence of an A/R CDM project activity
    (a) issuance of tCERs for the net GHG removals by sinks achieved by the project activity since the project starting date;
    or
    (b) issuance of lCERs for the net GHG removals by sinks achieved by the project activity during each verification period

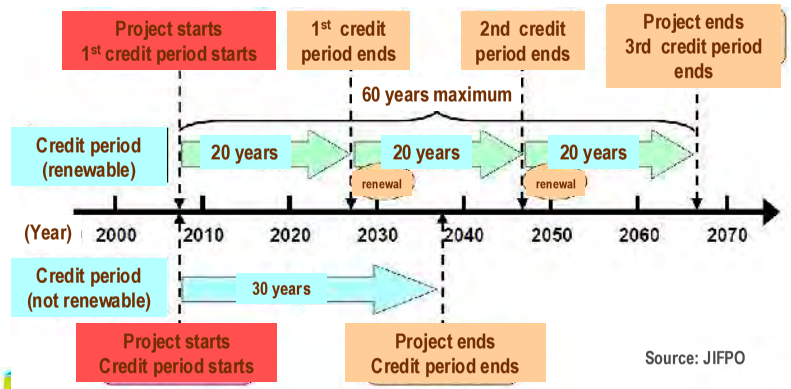
2.13 ความไม่ถาวรของ CDM ภาคป่าไม้ (tCER and lCER)

- ใบรับรองการการปล่อยก๊าซเรือนกระจกแบบชั่วคราว (tCER) และใบรับรองการปล่อยก๊าซเรือนกระจกแบบระยะยาว (lCERs):
  - ผู้เข้าร่วมโครงการจะต้องเลือกหนึ่งในวิธีการดังต่อไปนี้เพื่อเข้าถึงความไม่ถาวรของกิจกรรมโครงการของ CDM ในภาคป่าไม้
    (a) การออก tCERs จะทำได้เมื่อมีการดูดซับก๊าซเรือนกระจกจากการดำเนินโครงการโดยเริ่มตั้งแต่วันที่ที่เริ่มโครงการ
    หรือ
    (b) การออก lCERs จะทำได้เมื่อมีการดูดซับก๊าซเรือนกระจกจากการดำเนินโครงการโดยอยู่ในช่วงระยะเวลาการตรวจสอบ

2.14 Crediting Period

2.14 ระยะเวลาในการคิดเครดิต

- It begins at the start of the A/R CDM project activity and can be either:
  - A maximum of 20 years, may be renewed twice (total 60 years maximum)
  - A maximum of 30 years
- เริ่มตั้งแต่วันที่เริ่มดำเนินโครงการ และสามารถเลือกได้สองแบบดังนี้:
  - ระยะเวลาสูงสุด 20 ปี และอาจต่อได้อีก 2 ครั้ง (รวมสูงสุด 60 ปี)
  - ระยะเวลาสูงสุด 30 ปี



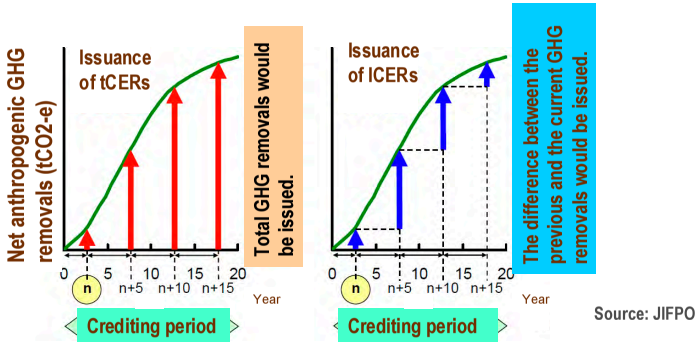
Source: JIFPO

2.15 Issuance of tCER/ lCER

- The initial verification and certification of an A/R CDM project activity may be undertaken at a time selected by the PPs. Thereafter, verification and certification shall be carried out every 5 years until the end of the crediting period.

2.15 การออก tCER/ lCER

- การตรวจสอบและรับรองคาร์บอนเครดิตของโครงการจะถูกกำหนดโดยผู้พัฒนาโครงการ และจะกระทำต่อเนื่องทุกๆ 5 ปี



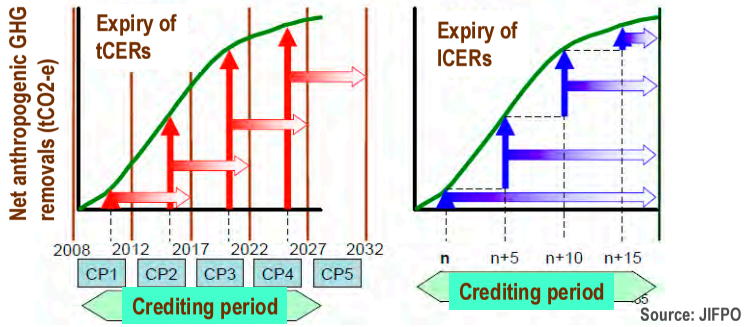
Source: JIFPO

2.16 Expiry of tCER/ lCER

2.16 วันหมดอายุของ tCER/ lCER

Each tCER shall expire at the end of the commitment period subsequent to the commitment period for which it was issued.
Each lCER shall expire at the end of the crediting period.

tCER จะหมดอายุเมื่อสิ้นสุดพันธกรณี ภายหลังจากพันธกรณีที่ออกใบรับรอง
lCER จะหมดอายุเมื่อสิ้นสุดระยะเวลาในการคิดเครดิต



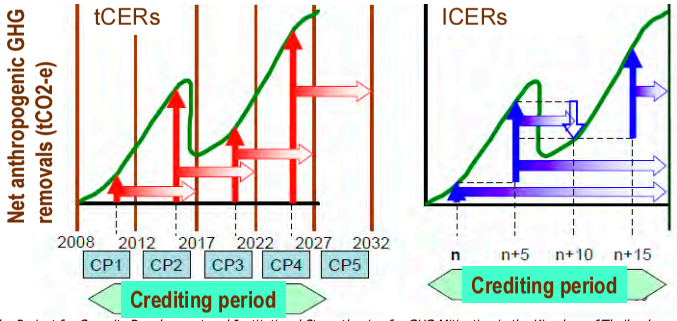
Source: JIFPO

2.17 Replacement of CERs

2.17 การทดแทน CERs

tCERs: Even when trees are cut right after tCERs are issued, the tCERs are still valid during the CP which they are issued.
ICERs: Where the certification report indicates a reversal of GHG removals since the previous certification, an equivalent quantity of CERs shall be replaced.

tCERs: แม้ว่าต้นไม้ถูกตัดแล้วหลังจากการออกใบรับรอง tCERs จะยังคงมีอายุในระหว่างช่วงพันธกรณีซึ่งได้รับการรับรองแล้ว
ICERs: รายงานการรับรองที่แสดงให้เห็นถึงปริมาณการปลดปล่อยก๊าซเรือนกระจกที่ลดลงจากที่ได้รับการรับรองก่อนหน้า ฉนั้นปริมาณเทียบเท่าของ CERs จะต้องถูกชดใช้คืน



Source: JIFPO

Source: DMCR

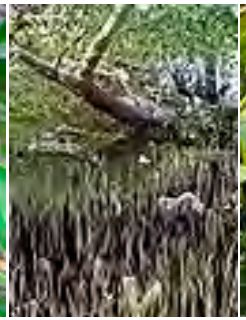
Typical mangrove species:

ตัวอย่างพันธ์ไม้ป่าชายเลน:

Genera in several families, in particular *Rhizophora* and related genera (family Rhizophoraceae), and *Avicenia* (family Verbenaceae or Avicenniaceae).

แบ่งออกเป็นหลายสายพันธ์ โกงกาง และ ตระกูลที่เกี่ยวข้อง (วงศ์ Rhizophoraceae) และแสม (วงศ์ Verbenaceae or Avicenniaceae)

Rhizophaora mucronata
Prop-root & Propagules



Avicenia marina
Aerial-root & Seeds

Source: Wikipedia

2.18 Demonstration of Additionality 1

2.18 การแสดงส่วนเพิ่มเติม 1

- PPs shall demonstrate the additionalities:
  - Net anthropogenic removals will increase those that would have occurred in the absence of the A/R CDM.
  - Project activity can be implemented, if the project is approved as A/R CDM. It will be demonstrated by financial analysis/ barrier analysis.

- ผู้เข้าร่วมโครงการจะต้องพิสูจน์ว่าโครงการมี additionality ดังต่อไปนี้:
  - โครงการมีปริมาณการดูดซับก๊าซเรือนกระจกเพิ่มมากขึ้นเมื่อเทียบกับการไม่มีโครงการ
  - กิจกรรมโครงการจะสามารถดำเนินการต่อเมื่อโครงการได้รับการอนุมัติให้เป็นโครงการ CDM ซึ่งจะถูกพิจารณาจากการวิเคราะห์ทางด้านการเงินและการวิเคราะห์อุปสรรคในการดำเนินงาน

2.19 Demonstration of Additionality 2

2.19 การแสดงส่วนเพิ่มเติม 2

- Financial Analysis:
  The evidence that IRR (internal rate of return) will NOT exceed bench mark without financial profit of CER selling.
- Barrier Analysis:
  PPs shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:
  - Investment barrier
  - Technological barrier
  - Barrier due to prevailing practice
  - Other barriers

- การวิเคราะห์ด้านการเงิน:
  หลักฐานที่ IRR (อัตราผลตอบแทนภายใน) จะเกินเกณฑ์มาตรฐานมีสาเหตุจากผลกำไรทางด้านการเงินจากการขาย CER
- การวิเคราะห์อุปสรรค:
  ผู้ร่วมโครงการสามารถอธิบายเพื่อแสดงให้เห็นว่าโครงการไม่สามารถเกิดขึ้นได้ถ้าเกิดอุปสรรคอย่างใดอย่างหนึ่ง ดังต่อไปนี้:
  - อุปสรรคด้านการลงทุน
  - อุปสรรคด้านเทคนิค
  - อุปสรรคเนื่องจากขาดแนวปฏิบัติที่ได้ผล
  - อุปสรรคอื่นๆ

2.20 Careful Attention to be paid

2.20 ข้อควรระวัง

- A/R CDM project activity should contribute sustainable development in host country.
- Environmental/ socio-economical impact assessment should be implemented. If any impacts are predicted, the mitigating measures should be prepared.
- Countermeasures to response to stakeholder's comments should be provided.
- Public funding from Annex I Parties does not result in a diversion of ODA (official development assistance).

- กิจกรรมโครงการ CDM ควรมีส่วนร่วมในการพัฒนาอย่างยั่งยืนให้แก่ประเทศเจ้าบ้าน
- ควรทำการประเมินผลกระทบสิ่งแวดล้อม/เศรษฐกิจและสังคม หากมีผลกระทบใดที่คาดการณ์ไว้ ควรเตรียมมาตรการเพื่อการป้องกัน
- ควรเตรียมข้อชี้แจงเพื่อตอบข้อคิดเห็นของผู้มีส่วนได้เสีย
- เงินทุนสาธารณะจากประเทศในภาคผนวกที่ 1 ไม่มีผลในการเบี่ยงเบนความช่วยเหลือในการพัฒนาอย่างเป็นทางการ

3. Small-scale A/R CDM
3.1 Small-scale A/R CDM 1

3. CDM ภาคป่าไม้ขนาดเล็ก
3.1 CDM ภาคป่าไม้ขนาดเล็ก 1

- Definition of small-scale A/R CDM project activity
  - Net GHG removals by sinks of less than 16,000 t-CO_2/year (each verification period)
    - If greater than 16,000 t-CO_2/year, the excess removals will not be eligible for the issuance of tCERs or lCERs.
  - Developed or implemented by low-income communities and individuals as determined by the host Party.
    - Prior to the submission of the validation report to the EB, the DOE have received from the PPs a written declaration of that.

- คำนิยามของโครงการปลูกป่าขนาดเล็ก
  - ปริมาณการดูดซับก๊าซเรือนกระจกน้อยกว่า 16,000 ตันคาร์บอนไดออกไซด์เทียบเท่าต่อปี (ตามแต่ละระยะเวลาการตรวจสอบ)
    - ถ้าปริมาณการดูดซับก๊าซเรือนกระจกมากกว่า 16,000 ตันคาร์บอนไดออกไซด์เทียบเท่าต่อปีส่วนที่เกินจะไม่สามารถออก tCERs หรือ lCERs ได้
  - เป็นการพัฒนาหรือดำเนินงานโดยที่ชุมชนมีรายได้ต่ำและโดยล้ำพัง กำหนดโดยประเทศเจ้าบ้าน
    - ก่อนที่จะยื่นรายงานการตรวจสอบให้กับ EB, DOE จะได้รับจดหมายแถลงการณ์จากผู้เข้าร่วมโครงการ

3.2 Small-scale A/R CDM 2

3.2 CDM ภาคป่าไม้ขนาดเล็ก 2

- Simplified modalities and procedures for small-scale A/R CDM project activity:
  In order to reduce transaction costs, modalities and procedures are simplified as follows:
  - The requirements for the PDD (project design document) are reduced;
  - Baseline methodologies by the project type are simplified;
  - Monitoring plans are simplified; and
  - The same operational entity may undertake validation, and verification and certification.

- รูปแบบและขั้นตอนการจัดทำโครงการที่ง่ายสำหรับโครงการปลูกป่าขนาดเล็ก:
  เพื่อลดค่าใช้จ่ายในการดำเนินการทำให้รูปแบบและขั้นตอนมีความง่ายดังนี้:
  - ความต้องการเอกสารประกอบโครงการน้อยลง (PDD);
  - ใช้วิธีการกำหนดกรณีฐานแบบง่าย;
  - ใช้วิธีติดตามผลแบบง่าย; และ
  - ใช้หน่วยงานตรวจสอบเดียวกันในการตรวจสอบ ทวนสอบ และการให้การรับรอง

4. Mangrove reforestation small-scale A/R CDM project in Chantaburi province
4.1 Background

4. โครงการฟื้นฟูการปลูกป่าชายเลนขนาดเล็ก ณ จังหวัดจันทบุรี
4.1 ความเป็นมา

Assistance of JICA

- PPs request to TGO & JICA Expert Team to assist to prepare A/R CDM
- Mangrove reforestation project was selected.
- JICA Expert Team assists to prepare PDD.

Project site

- Located in Welu wetland (19,000 ha) in Chantaburi province
- Designated as “Reserved Forest” in 1962
- Drastically encroached in this 30 years
- Natural forest has been changing to shrimp pond.

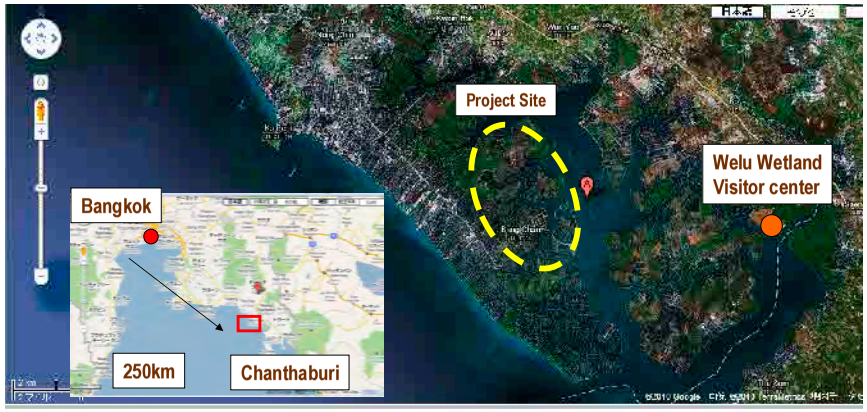
ความร่วมมือจากหน่วยงาน JICA

- ผู้เข้าร่วมโครงการได้ทำการร้องขอมายังองค์การบริหารจัดการก๊าซเรือนกระจก และทีมผู้เชี่ยวชาญจากใจก้า ให้ช่วยเหลือในเรื่องของการจัดเตรียมโครงการ CDM ภาคป่าไม้
- โครงการปลูกป่าชายเลนได้รับการคัดเลือก
- ทีมผู้เชี่ยวชาญใจก้าตกลงให้ความช่วยเหลือในเรื่องการจัดทำเอกสารออกแบบโครงการ

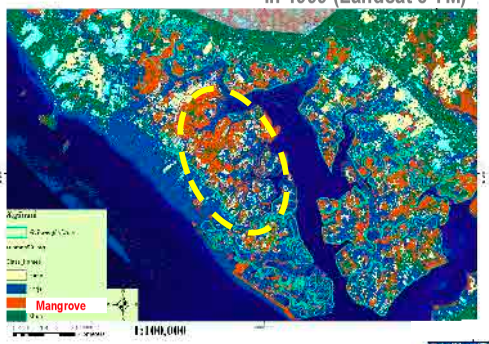
ที่ตั้งโครงการ

- ตั้งอยู่ที่ลุ่มน้ำเวฬุ (19,000 เฮกแตร์) ณ จังหวัดจันทบุรี
- กำหนดให้เป็น “ป่าสงวน” ในปี พ.ศ.2505
- ถูกบุกรุกอย่างรุนแรงในช่วง 30 ปีที่ผ่านมานี้
- ธรรมชาติของป่าถูกเปลี่ยนเป็นฟาร์มเลี้ยงกุ้ง

4.2 Project Site 4.2 ที่ตั้งโครงการ

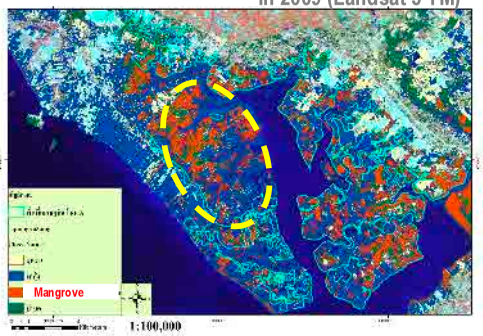


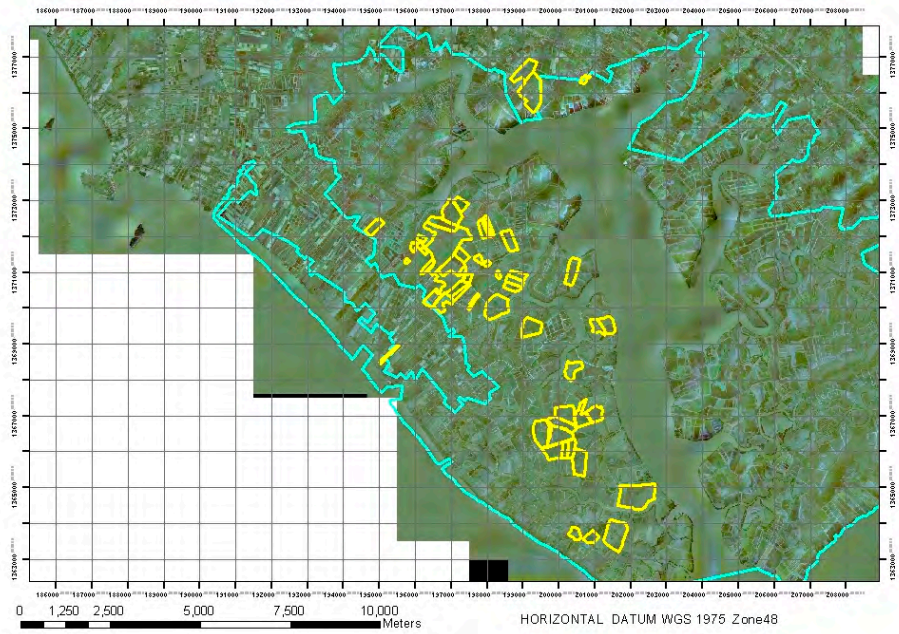
In 1999 (Landsat 5 TM)



Satellite images (1999 and 2009) (Encroachment of mangrove is in progress.)

In 2009 (Landsat 5 TM)





Mangrove forest has been destroying by development of shrimp ponds.

4.3 Conservation Activities

- Chantaburi province has been trying conservation of mangrove forest
- Royal Forest Department (RFD), Department of Marine and Coastal Resources (DMCR), and Chantaburi province has been implementing reforestation activities in several years.
- Encroachment is still going.

4.3 กิจกรรมการอนุรักษ์

- จังหวัดจันทบุรีได้พยายามที่จะอนุรักษ์ป่าชายเลน
- กรมป่าไม้, กรมทรัพยากรทางทะเลและชายฝั่ง และจังหวัดจันทบุรี ได้ดำเนินกิจกรรมการฟื้นฟูป่ามาอย่างต่อเนื่องในหลายปีที่ผ่านมา
- การบุกรุกพื้นที่ป่าสงวนยังคงมี

Nursery

Planting at shrimp pond in August 2010

A1-64

4.4 Preparation of AR-CDM PDD

- PPs: Chantaburi province, DMCR, RFD
- Selected species: *Rhizophora* sp., *Avicenia* sp. etc.
- Technical transfer of planting method: DMCR, KUFF
- Rights of land: RFD
- Land use rights: residents
- CER: ICER
- Project period/ crediting period: 30 years
- Methodology: AR-AMS0003

4.4 การเตรียมเอกสารออกแบบโครงการสำหรับโครงการ CDM ภาคป่าไม้

- ผู้เข้าร่วมโครงการ: จังหวัดจันทบุรี, กรมทรัพยากรทางทะเลและชายฝั่ง และ กรมป่าไม้
- พันธ์ไม้ป่าชายเลนที่คัดเลือก: โกงกาง และ แสม เป็นต้น
- การถ่ายทอดวิธีการปลูกต้นไม้: กรมทรัพยากรทางทะเลและชายฝั่ง และคณะวนศาสตร์ มหาวิทยาลัยเกษตรศาสตร์
- เจ้าของที่ดิน: กรมป่าไม้
- สิทธิการใช้ที่ดิน: ประชาชนผู้อยู่อาศัย
- ใบรับรองการปล่อยก๊าซเรือนกระจก (CER): ใบรับรองการปล่อยก๊าซเรือนกระจกระยะยาว (ICER)
- ระยะเวลาโครงการ/ระยะเวลาในการคิดเครดิต: 30 ปี
- หลักการ: AR-AMS0003

Carbon Trading 1: Background, history and overview of carbon trading markets in the world

April, 2010

Deputy Chief Advisor of JICA Expert Team
Kazuhito YAMADA

Carbon Trading 1:
Background, history and overview of carbon trading markets in the world

- What is 'Carbon Trading'?
- Who are the main players?
- Summary of Carbon Emission Trading in the world
- From my personal experience:
- - Who develop CDM/JI projects?
- - How to evaluate those projects
- - How to contract ERPA

Objectives of this section

Objectives of this section are:

To understand history of 'emissions trading',

To confirm the importance and anticipated roles of 'carbon trading', and

To consider and discuss the following issues:

- Why do we trade carbon in Thailand?
- When will we start to trade carbon in Thailand?
- Who will organize 'carbon trading' in Thailand?
- What is the most important thing for 'carbon trading' in Thailand?

What is 'Emissions Trading'?

Definition of 'emission trading'

- 'Emissions trading' is one of the economic approaches to mitigate environmental pollutants such as SO_2,
- The role of this approach is to control total emissions of environmental pollutants by trading 'emission credit' between the entities who go over their assigned amount of the pollutants and the entities who underrun their assigned amount of the pollutants.
- In order to operate emissions trading system effectively, organizer of the system has to allocate 'emission credit' to entities by rational way in advance.

What is 'Emissions Trading'?

History of emissions trading of the pollutants

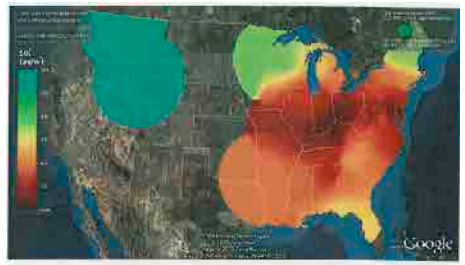
- We have experienced the emissions trading of air pollutants before 'carbon trading'.
- Canadian scientist proposed 'tradable or marketable discharge permits' in 1968.
- In general, the ownership right of 'environment' is difficult to set because 'environment' is considered as 'global common'.
- Emissions trading system can be considered to trade the 'right to use' in order to mitigate environmental pollution.

What is 'Emissions Trading'?

History of emissions trading: SO_2 Trading in the USA

- The main air pollutants in the USA were SO_2 and NO_x in early 1980s.
- More than 2/3 of annual emission of SO_2 were from coal-fired or oil-fired power plants.

SO_2 concentration in 1989 →



What is 'Emissions Trading'?

Governing law of SO_2 trading

- Revision of the Clean Air Act in 1990.
- EPA's Acid Rain Program based on the Act in 1995.

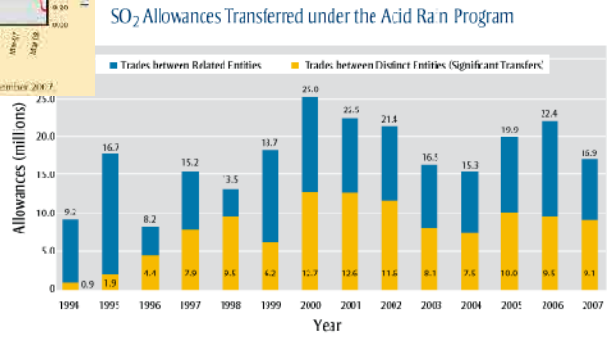
Main characteristics of SO_2 trading

- Participants: Thermal power plants (easy to monitor)
- Purpose: to mitigate the impact of acid rain
- Present SO_2 trading (2007)

  Total value of the SO_2 allowance market: 5.1 bil. US$

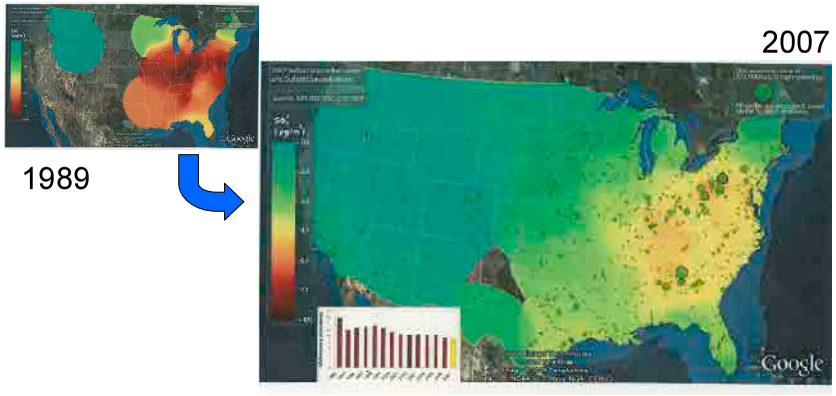
  Average price: 325 US $/t-$SO_2$, Allowable emission: 15.8 mil. t-SO_2

What is 'Emissions Trading'?



What is 'Emissions Trading'?

Result of SO_2 trading: Mitigation effect



What is 'Emissions Trading'?

Reasons of effectiveness of SO_2 trading

- Direct relation between SO_2 and human health damage
- Environmental impacts of acid rain mainly induced by SO_2
- Ease to control emission sources (power plants) because of 'point sources'

We should consider the difference between SO_2 and CO_2!

Who are the main players of carbon trading?

- Private entities
- Government/municipal governments
- Carbon brokers
- Citizens

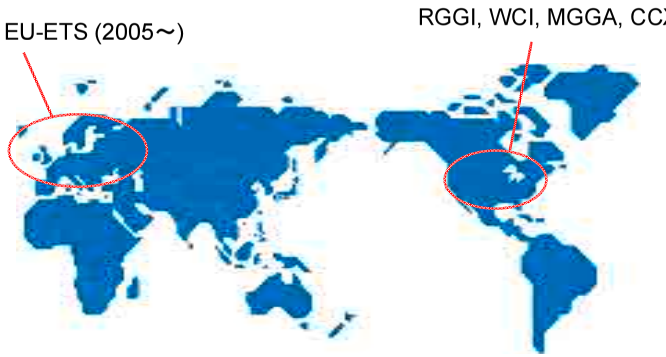
Who are participants?
Who are organizers or controllers?

Who will be winner?
Who will be loser?

Summary of Carbon Emission Trading in the World

- ICAP
- EU-ETS
- RGGI
- WCI
- MGGA
- CCX

ICAP = participants of EU-ETS, RGGI, WCI, and Australia, NZ, Norway, Tokyo (observers: Japan, Ukraine)



Summary of Carbon Emission Trading in the World

EU-ETS -1-

29 Participants:

Austria, Belgium, Bulgaria, Cyprus, Czech, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italia, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portuguese, Romania, Slovakia, Slovenia, Spain, Sweden, UK

About 80% of transaction volumes and values in 2007-08 was occupied by that of EU-ETS.

Summary of Carbon Emission Trading in the World

EU-ETS -2-

Transaction Volumes and Values, Global Carbon Market, 2007 and 2008

Markets	Volume ($MtCO_2e$)		Value (US$ million)	
	2007	2008	2007	2008
Voluntary OTC	43.1	54.0	262.9	396.7
CCX	22.9	69.2	72.4	306.7
Other exchanges	0	0.2	0	1.3
Total Voluntary Markets	**66.0**	**123.4**	**335.3**	**704.8**
EU ETS	2,061.0	2,982.0	50,097.0	94,971.7
Primary CDM	551.0	400.3	7,426.0	6,118.2
Secondary CDM	240.0	622.4	5,451.0	15,584.5
Joint Implementation	41.0	8.0	499.0	2,339.8
Kyoto [AAU]	0.0	16.0	0.0	177.1
New South Wales	25.0	30.6	224.0	151.9
RGGI	-	27.4	-	108.9
Alberta's SGER[a]	1.5	3.3	13.7	31.3
Total Regulated Markets	**2,919.5**	**4,090.0**	**63,710.7**	**119,483.4**
Total Global Markets	**2,985.5**	**4,213.5**	**64,046.0**	**120,188.2**

Source: Ecosystem Marketplace, New Carbon Finance.

Notes: (a) Assume a CA$10 price for Alberta offsets and Emission Performance Credits based on interviews with market participants.

Summary of Carbon Emission Trading in the World

RGGI : Regional Greenhouse Gas Initiative -1-

- RGGI is a cooperative effort by ten Northeast and Mid-Atlantic states to limit greenhouse gas emissions. RGGI is the first mandatory, market-based CO_2 emissions reduction program in the USA.
- The states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont are signatory states to the RGGI agreement. These ten states have capped CO_2 emissions from the power sector, and will require a 10 percent reduction in these emissions by 2018.
- RGGI is composed of individual CO_2 Budget Trading Programs in each of the ten participating states. These ten programs are implemented through state regulations, based on a RGGI Model Rule, and are linked through CO_2 allowance reciprocity. Regulated power plants can use a CO_2 allowance issued by any of the ten participating states to demonstrate compliance with the state program governing their facility. Taken together, the ten individual state programs function as a single regional compliance market for carbon emissions.

Summary of Carbon Emission Trading in the World

RGGI : Regional Greenhouse Gas Initiative -2-

To reduce emissions of greenhouse gases, the RGGI participating states are using a market-based cap-and-trade approach that includes:

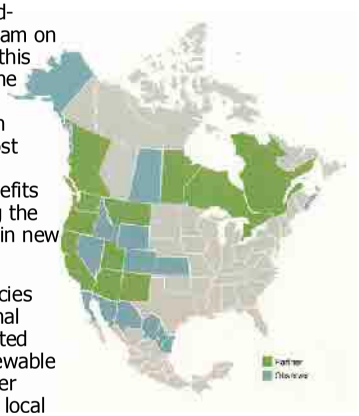
- Establishing a multi-state CO_2 emissions budget (cap) that will decrease gradually until it is 10 percent lower than at the start
- Requiring electric power generator to hold allowances equal to their CO_2 emissions over a three-year control period
- Providing a market-based emissions auction and trading system where electric power generators can buy, sell and trade CO_2 emissions allowances
- Using the proceeds of allowance auctions to support low-carbon-intensity solutions, including energy efficiency and clean renewable energy, such as solar and wind power
- Employing offsets (greenhouse gas emissions reduction or sequestration projects outside the electricity sector) to help companies meet their compliance obligations

RGGI's phased approach means that reductions in the CO_2 cap will initially be modest, providing predictable market signals and regulatory certainty. Electricity generators will be able to plan for and invest in lower-carbon alternatives and avoid dramatic electricity price impacts.

Summary of Carbon Emission Trading in the World

WCI : Western Climate Initiative

The centerpiece of the WCI strategy is a regional cap-and-trade program. The WCI released the design of its program on September 23, 2008. When fully implemented in 2015, this comprehensive program will cover nearly 90 percent of the GHG emissions in WCI states and provinces. Analyses conducted on the WCI design indicate that the region can mitigate the costs of reduction emissions and realize a cost savings through increased efficiencies and reduced fuel consumption. These savings come in addition to the benefits for the region from a cleaner environment and promoting the kinds of investment and innovation that will spur growth in new green technologies and build a strong green economy.



The WCI is also working together on complementary policies that support the cap-and-trade program, provide additional opportunities to address climate change and achieve related co-benefits of increased energy efficiency, increased renewable energy generation, improved air quality and reduced water pollution, job growth, and increased provincial, state and local revenue.

Summary of Carbon Emission Trading in the World

MGGA : Midwestern Greenhouse Gas Reduction Accord -1-

- Nine Midwestern governors and two Canadian premiers have signed on to participate or observe in the Midwestern Greenhouse Gas Reduction Accord (Accord), as first agreed to in November 2007 in Milwaukee, Wisconsin. Realizing the unique and major impact that the Midwestern states play in the emissions of carbon, these governors wanted to institute Midwestern practicality in the debate on global warming.
- While the Midwest has intensive manufacturing and agriculture sectors, making it the most coal-dependent region in North America, it also has world-class renewable energy resources and opportunities to allow it to take a lead role in solving the effects of climate change. The geographic location and ideologically centrist beliefs of the Midwestern region provide its leaders with an ability to push the federal policy debate in a productive direction. Through the Accord, these governors agreed to establish a Midwestern greenhouse gas reduction program to reduce greenhouse gas emissions in their states, as well as a working group to provide recommendations regarding the implementation of the Accord.

Summary of Carbon Emission Trading in the World

MGGA : Midwestern Greenhouse Gas Reduction Accord -2-

Members

- Iowa
- Illinois
- Kansas
- Manitoba
- Michigan
- Minnesota
- Wisconsin

Observers

- Indiana
- Ohio
- Ontario
- South Dakota

Summary of Carbon Emission Trading in the World

CCX : Chicago Climate Exchange -1-

- Chicago Climate Exchange (CCX) operates North America's only cap and trade system for all six greenhouse gases, with global affiliates and projects worldwide.
- CCX Members are leaders in greenhouse gas (GHG) management and represent all sectors of the global economy, as well as public sector innovators. Reductions achieved through CCX are the only reductions made in North America through a legally binding compliance regime, providing independent, third party verification by the Financial Industry Regulatory Authority (FINRA, formerly NASD). The founder and chairman of CCX is economist and financial innovator Dr. Richard L. Sandor, who was named a Hero of the Planet by Time Magazine in 2002 for founding CCX, and in 2007 as the "father of carbon trading."
- CCX emitting Members make a voluntary but legally binding commitment to meet annual GHG emission reduction targets. Those who reduce below the targets have surplus allowances to sell or bank; those who emit above the targets comply by purchasing CCX Carbon Financial Instrument® (CFI®) contracts.

Summary of Carbon Emission Trading in the World

CCX：Chicago Climate Exchange -2-

Goals of CCX:

- To facilitate the transaction of GHG allowance trading with price transparency, design excellence and environmental integrity
- To build the skills and institutions needed to cost-effectively manage GHGs
- To facilitate capacity-building in both public and private sectors to facilitate GHG mitigation
- To strengthen the intellectual framework required for cost effective and valid GHG reduction
- To help inform the public debate on managing the risk of global climate change

Benefits of Membership:

- Be prepared: mitigate financial, operational and reputational risks
- Reduce emissions using the highest compliance standards with third party verification
- Prove concrete action on climate change to shareholders, rating agencies, customers and citizens
- Establish a cost-effective, turnkey emissions management system
- Drive policy developments based on practical, hands-on experience
- Gain leadership recognition for taking early, credible and binding action to address climate change
- Establish early track record in reductions and experience with growing carbon and GHG market

From my personal experience: Who develop CDM/JI projects?

- CDM developers
- Carbon funds (governments and private entities)
- Private companies in host countries
- Private companies in investment countries
- International/regional banks (WB, ADB, etc.)
- Governmental organizations in investment countries (JICA, NEDO)

From my personal experience: How to evaluate those projects?

From the viewpoint of CDM project:

- Ability of DNA in host country
- Feasibility of CDM project type
- Applicability of the technology used by CDM project

From the viewpoint of business development:

- Country risk of host country
- C/B of the project (w or w/o CER)
- Stability of business itself

From my personal experience: How to contract ERPA?

What is the ERPA ?

ERPA = Emission Reduction Purchase Agreement

- ERPA type 1：
  Agreement between Investor in investment country and Project participant in host country
- ERPA type 2：
  Agreement between Project participant in investment country and Project participant in host country

→ Finally, the most important issue is:
'Who will take the risk of CDM projects?'

Confirmation of the importance and anticipated roles of 'carbon trading'

- Carbon trading may be effective GHG mitigation measures if all GHG emitters in the world can be participated.
- 'Cap and trade' is the fundamental approach of carbon trading.
- 'Cost-effectiveness' will be the most important point from the experience of SO_2 trading.
- But, carbon trading is not versatile, one and only system to mitigate GHG emissions in the world.
- We should consider appropriate institutional design of carbon trading in order to have no particular bit of 'losers' and 'winners' by it.

Discussion points of 'carbon trading'

- Why do we trade carbon in Thailand?
- When will we start to trade carbon in Thailand?
- Who will organize 'carbon trading' in Thailand?
- What is the most important thing for 'carbon trading' in Thailand?

Carbon Trading 2: Overview of EU-ETS and Tokyo Cap-and-Trade

27, April, 2010

Deputy Chief Advisor of JICA Expert Team
Kazuhito YAMADA

Objectives of presentation

Objectives of this presentation are:

To understand history and success of 'EU-ETS',

To understand the plan of 'Tokyo Cap-and-Trade', and

To discuss:

- Why do we trade carbon in Thailand?
- When will we start to trade carbon in Thailand?
- Who will organize 'carbon trading' in Thailand?
- What is the most important thing for 'carbon trading' in Thailand?

Carbon Trading 2: Overview of EU-ETS

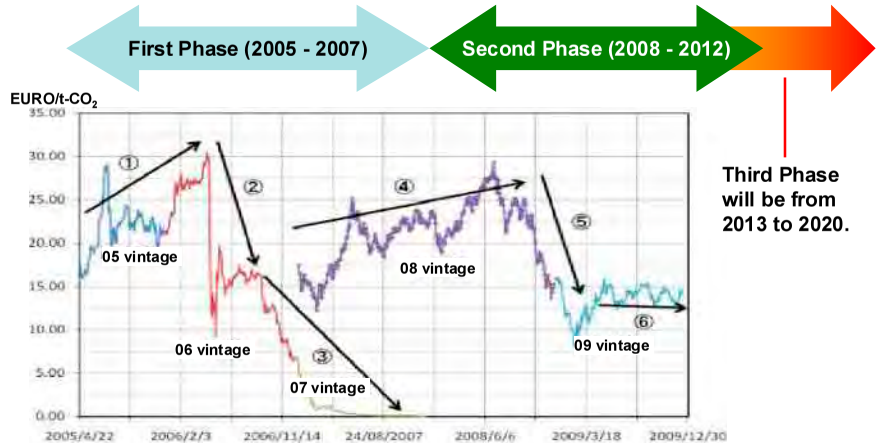
- Has EU-ETS succeeded?
- Do you know the history of EU-ETS?
- What is the design of EU-ETS?
- Who are the targeted entities of EU-ETS?
- How to allocate 'allowance' of EU-ETS?
- Where are main exchanges of EU-ETS?
- Important characteristics of EU-ETS (1) GHG emissions
- Important characteristics of EU-ETS (2) Challenging Phase III
- Discussion

Has EU-ETS succeeded?

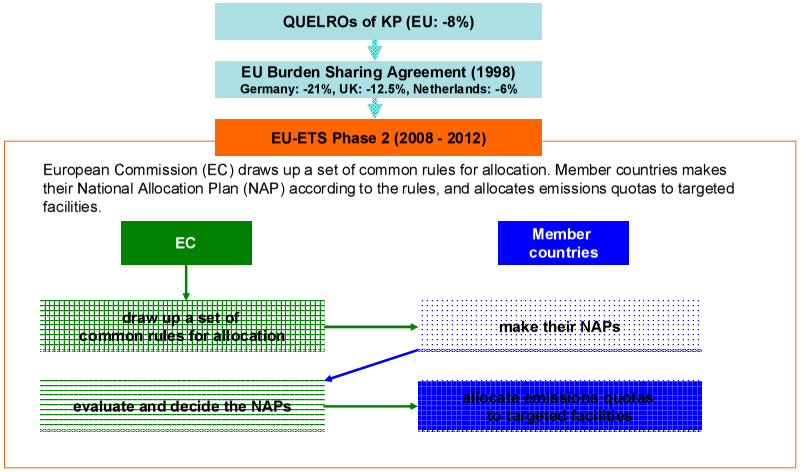
Yes, EU-ETS has succeeded:

- Everyone knows that EU-ETS is the first system in the world to trade carbon for the mitigation of climate change,
- EU-ETS has been playing a role of trigger for other developed countries such as USA and Japan to facilitate developing 'domestic carbon cap-and-trade scheme', and
- EU-ETS has found problems to be solved by 'learning by doing'.

Do you know the history of EU-ETS?



What is the design of EU-ETS?



Who are the targeted entities of EU-ETS?

Phase I (2005-2007): +8.3% (2005)

- Power sector, and Industrial sector (about 11,500 facilities)
- Penalty: 40 EURO/t-CO_2

Phase II (2008-2012): -5.6% (2005)

- Power sector, and Industrial sector
- Penalty: 100 EURO/t-CO_2

Phase III (2013-2020): -21% (2005)

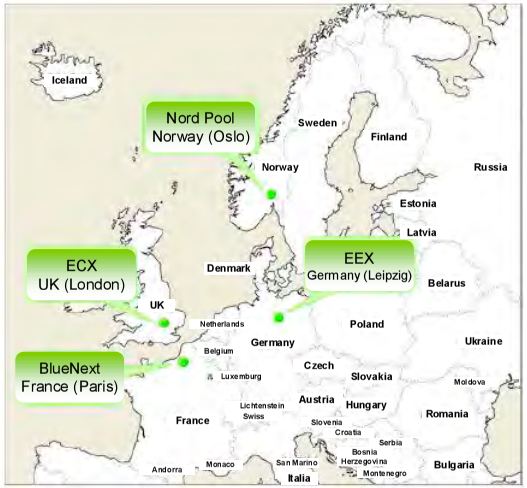
- Power sector, and Industrial sector (include aluminum, ammonia), Aviation
- Penalty: Index to Consumer Price (dynamic pricing)

How to allocate 'allowance' of EU-ETS?

- Targeted facilities of EU-ETS (Phase II) are plants for production of power sector and industrial sector.
- Targets of industrial sector are set by moderate policy, considering their competitive power in the international market, and limited data availability of past activities of targeted facilities,
- On the other hand, targets of power sector are set by strict rule because cost increases by the allocation is easy to shift to consumers by power companies.
- Basic concept of the allocation to targeted facilities 'emissions in base year' * 'allocation factor'

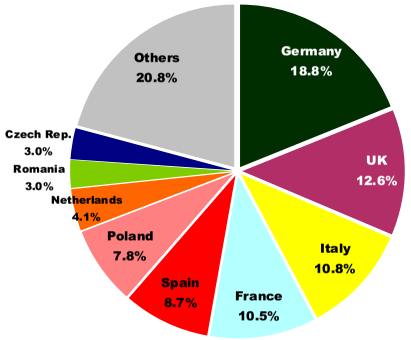
Where are main exchanges of EU-ETS?

- ECX: EUA/CER
  (mainly futures deal)
- Bluenext: EUA
  (mainly spot deal)

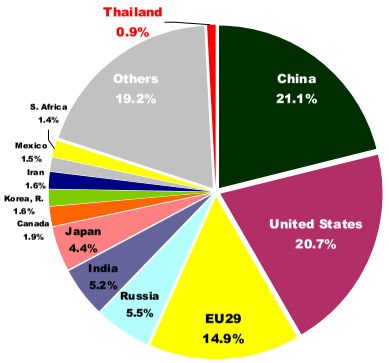


Important characteristics of EU-ETS (1)
GHG emissions

EU-ETS (29) GHG (2007)



World (212) CO_2 (2006)



Important characteristics of EU-ETS (2)
Challenging Phase III

- Phase III target is challenging: -21%

year	Cap in total (million t-CO_2)
2013	1,974
2014	1,937
2015	1,901
2016	1,865
2017	1,829
2018	1,792
2019	1,756
2020	1,720

Discussion

- Has EU-ETS succeeded?
- What is the reason of success?
- Why and how do we trade carbon in Thailand?

Carbon Trading 2:
Overview of Tokyo Cap-and-Trade (T-CAT)

- What is the background of T-CAT?
- What is the design of T-CAT? (1)
- What is the design of T-CAT? (2)
- Who are the targeted entities of T-CAT?
- How to allocate 'allowance' of T-CAT?
- Discussion

What is the background of T-CAT?

Tokyo:

- Population: 13 million, GDP (2006): 815 billion US$
- Rapid increase of CO_2 emission from Commercial sector

	1990 ($Mt\text{-}CO_2$)	2000 ($Mt\text{-}CO_2$)	2006 ($Mt\text{-}CO_2$)	2006/1990
Industry	9.8	6.8	5.2	-47.0%
Commercial	15.7	18.9	20.6	+31.1%
Household	13.0	14.3	14.4	+11.0%
Transport	14.8	17.6	14.7	-1.1%
Others	1.0	1.2	1.0	-0.5%
Total	54.4	58.8	55.9	+2.8%

What is the design of T-CAT? (1)

- Target Gas: energy-related CO_2
- Cap coverage：1,400 installations（including 1,100 business facilities and 300 industrial facilities）
- Targeted facilities: consumption of fuels, heat and electricity is >1,500 kl/year (crude oil equivalent)
- Compliance period: 5 years (Start: 1st April 2010)

  1st: 2010 to 2014, 2nd: 2015 to 2019
- Allowance allocation:

  Base year emission* × Compliance factor × Compliance period (5 years)

  *Base year emission: Average emission of past 3 years

What is the design of T-CAT? (2)

- Compliance factor:

  1st Compliance Period: 6% or 8%

  * 6% for factories (and buildings receiving energy from district heating and cooling plants)

  * 8% for rest of the buildings

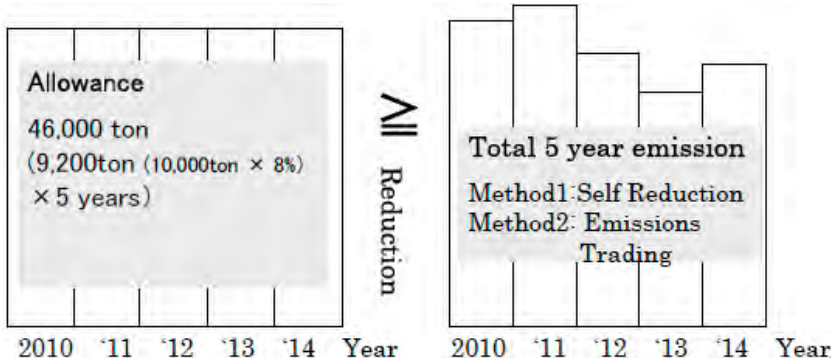
  2nd Compliance Period: 17% (planned)
- Monitoring and Reporting: every year
- Penalty:

  Non-compliance is required to reduce 1.3 times in the next period

How to allocate 'allowance' of T-CAT?

Example:

- Base year emission: 10,000 t-CO_2/y, -8% reduction



Discussion

- Can you establishe 'Bangkok Cap-and-Trade (B-CAT)'?
- Who are targeted entities in B-CAT?
- Who are supporters and detractors about B-CAT?

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 4:
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

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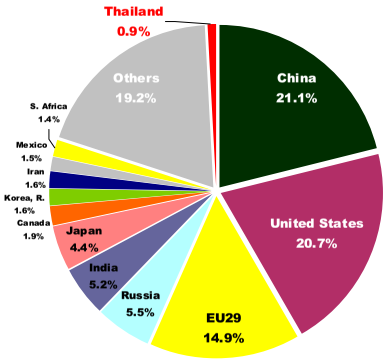
Contents

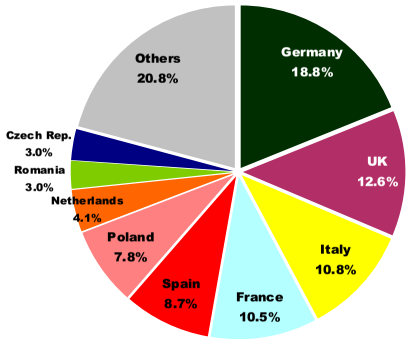
Important characteristics of EU-ETS
GHG emissions

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

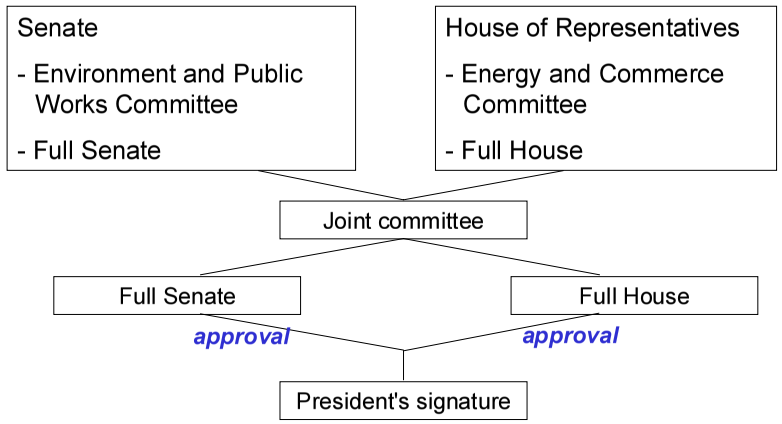
- -17 % until 2020 compared to 2005

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:**

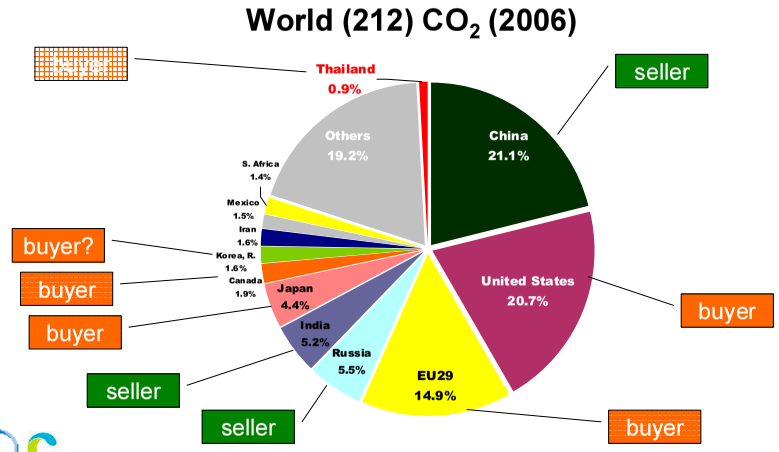
  Targets: Developing countries who agree to the system
  - not each company/factory but specified sector
  - competitive sectors with USA's industries

  MRV: Targeted DC has to develop MRV capacity

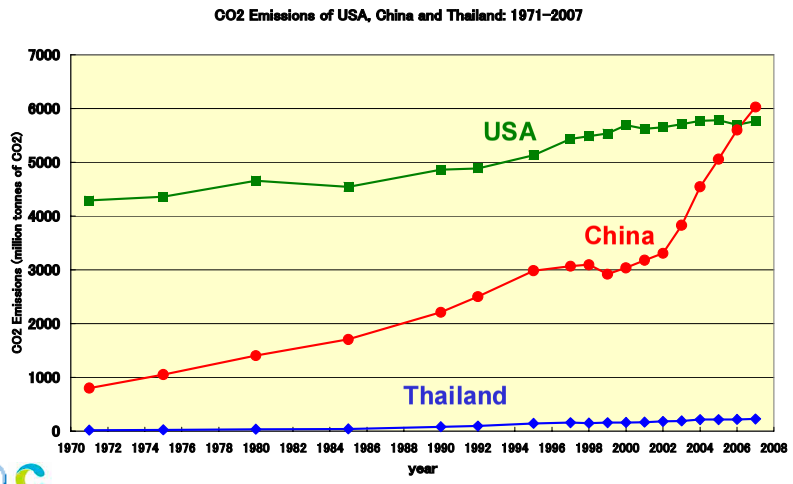
UNFCCC crediting system can survive if EPA administrator confirms their possibility to use the system.

Japan is also considering bilateral carbon crediting system.

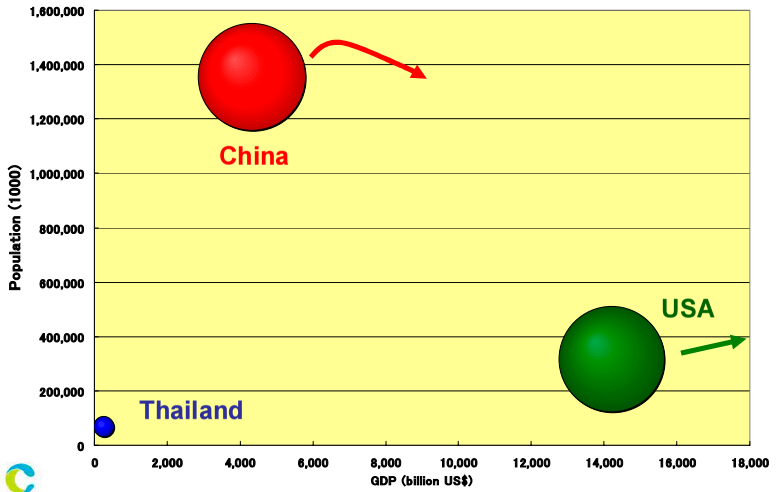
Carbon credit until 2020 buyers and sellers



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

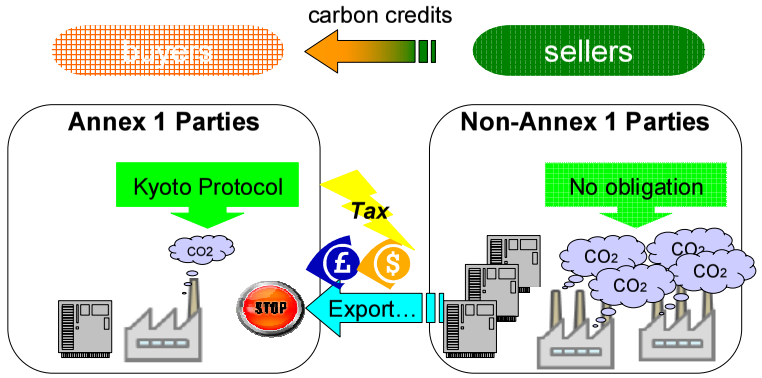


Carbon credit until 2020
NO.1 buyer and NO.1 seller



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.

Carbon Trading 4: Overview of Voluntary Emission Trading System in Japan - J-VER

29 June, 2010

Deputy Chief Advisor of JICA Expert Team
Kazuhito YAMADA

A1-81

Objectives of this section

Objectives of this section are:

To understand basic concept and latest situation of one of the Japanese Ministry of Environment's carbon offsetting activities called 'J-VER',

To discuss:

What are the possible 'T-VER' project candidates in Thailand?

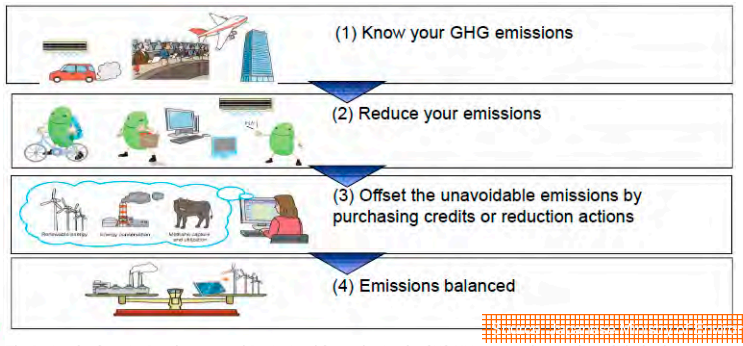
Carbon Trading 3: J-VER

- What is the 'Carbon offsetting'?
- What is the 'J-VER'?
- Structure of the J-VER
- Organization of the J-VER
- Related body of the J-VER
- Guidelines of the J-VER
- Positive lists of J-VER
- Application - Certification - Issuance of the J-VER
- Project examples
- Discussion

What is the 'Carbon offsetting'? (1)

Carbon offsetting is defined as:

(1) first knowing your GHG emissions, (2) then making efforts to reduce the emissions, (3) offsetting unavoidable emissions by purchasing GHG reduction credits or undertaking reduction activities.



What is the 'Carbon offsetting'? (2)

The benefit of carbon offsetting includes:

1. Promotion of proactive GHG reduction activities by companies and citizens;
2. Shifting the corporate activities and lifestyles towards low-carbon society by visualizing the cost of GHG emission;
3. Providing funds to GHG reduction/removal activities both domestically and abroad.

Source: Japanese Ministry of Environment

What is the 'Carbon offsetting'? (3)

Examples of Carbon offsetting:

Source: Japanese Ministry of Environment

As of the end of December 2009, there were over 750 offsetting products & services, events or other initiatives in the carbon offsetting business in Japan (according to the press).

What is the 'J-VER'? (1)

There is a need for an **official verification scheme** to ensure that credits used for carbon offset fulfill requirements. These requirements would ensure, for example, that emissions are actually reduced/removed and that the same emissions reduction/removal activities are not double-counted. "The guideline for carbon offset"

→ However, **no such official VER scheme existed in Japan**.
→ In response, MOEJ set up a review commission in March 2008 to look into VER (Verified Emission Reduction) certification standards.

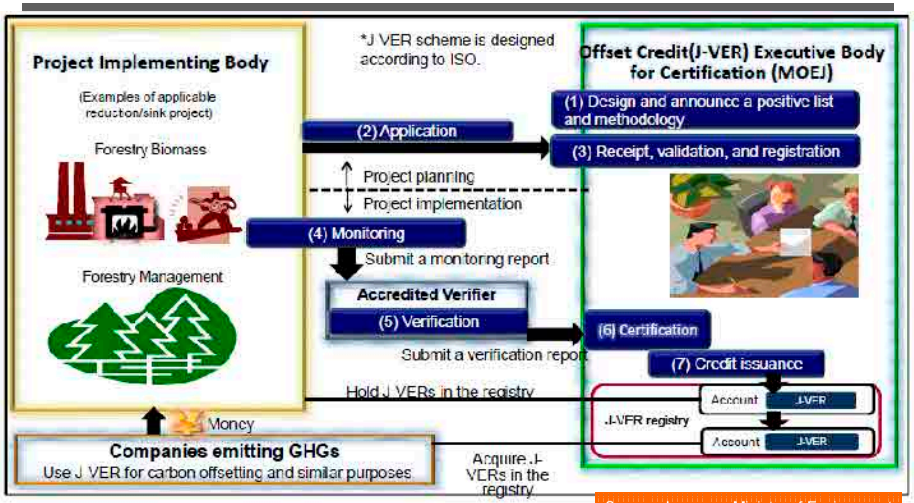
In November 2008, MOEJ set up the **Offset Credit (J-VER) Scheme**, a verification scheme for credits generated through the reduction/removal by sink of greenhouse gases carried out via domestic projects.

Source: Japanese Ministry of Environment

What is the 'J-VER'? (2)

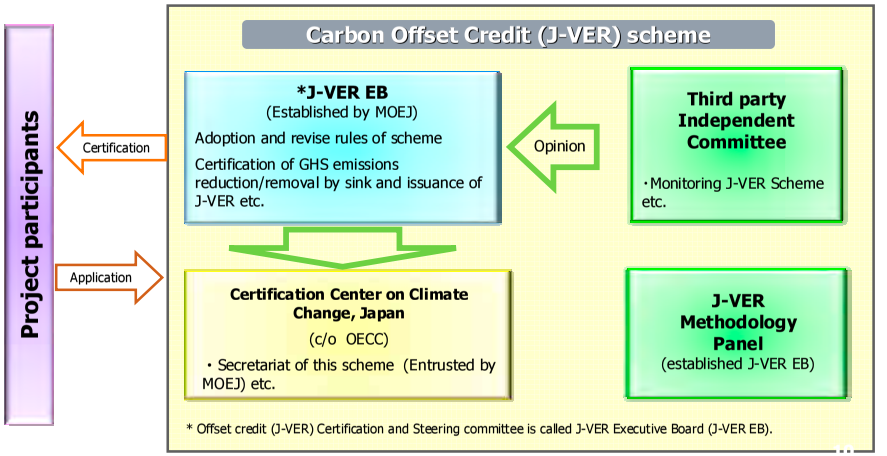
- J-VER Scheme is a **verification scheme** for credits generated through the reduction/removal by sinks of GHGs carried out via domestic projects.
- By utilizing the J-VER scheme, individuals, businesses, municipal governments and others can return funds for carbon offsetting (funds for purchasing J-VER) to domestic project planners in forest management or local industries.
- J-VER is a new mechanism to promote the domestic ***Green New Deal* program** through a global warming prevention campaign, expansion of job opportunities, and economic measures by using private-sector capital.

Structure of the J-VER



Source: Japanese Ministry of Environment

Organization of the J-VER



Source: Japanese Ministry of Environment

Related body of the J-VER

Related Bodies for Certification	Role
Offset credit (J-VER) Certification and Steering Committee (J-VER EB)	Establishment of a positive list, methodology etc. Decision on a project registration Decision on management of J-VER registry Discussion on a received complaint
Certification Center on Climate Change, Japan (4CJ)	Receipt of the application Support for J-VER EB Other activities under J-VER EB decision
Methodology Panel	Established by J-VER EB. Discussion on a positive list, methodology and other related technical issues.
The third party Independent Committee	Submission of opinion to the J-VER EB activities

Guidelines of the J-VER

Subject	Title
General Rule	Rules and Regulations for Offset Credit (J-VER) scheme
Monitoring and Calculation Rule	Monitoring guideline for Offset Credit (J-VER) scheme
Validation and Verification Rule	Validation and Verification guideline for Offset Credit (J-VER) scheme
List of Applicable Project	Positive List for guideline for Offset Credit (J-VER) scheme
Calculation of reduction amount of each project	Methodologies for calculation and monitoring for Offset Credit (J-VER)
Rule for J-VER EB	Management rules for J-VER EB

*The name of each guideline is a provisional translation.

Source: Japanese Ministry of Environment

Positive lists of J-VER (1)

Sector	No.	Project
Emission Reduction	E001	Fuel substitution from fossil fuel to forestry biomass fuel for a boiler
	E002	Fuel substitution from fossil fuel to biomass pellet for a boiler
	E003	Use of a pellet stove
	E004	Use of biodiesel fuels from waste food oil for a car
	E005	Fuel substitution from fossil fuel to biomass fuel made from sewerage sludge
	E006	Low-temperature waste heat recovery and utilization
	E007	Utilization of fuel wood by wood stove
	E008	Energy saving through transportation efficiency improvement by utilizing information and communication technology (ICT)
	E009	Energy saving through reducing the use of meter-checking vehicles by utilizing information and communication technology (IT)

Source: Japanese Ministry of Environment

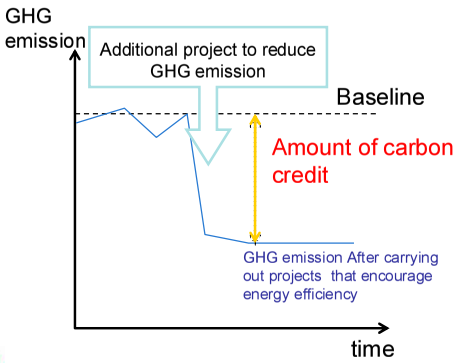
Positive lists of J-VER (2)

Sector	No.	Project
Sink	R001	Forest management (logging)
	R002	Forest management (logging, planting etc.)
	R003	Afforestation

Source: Japanese Ministry of Environment

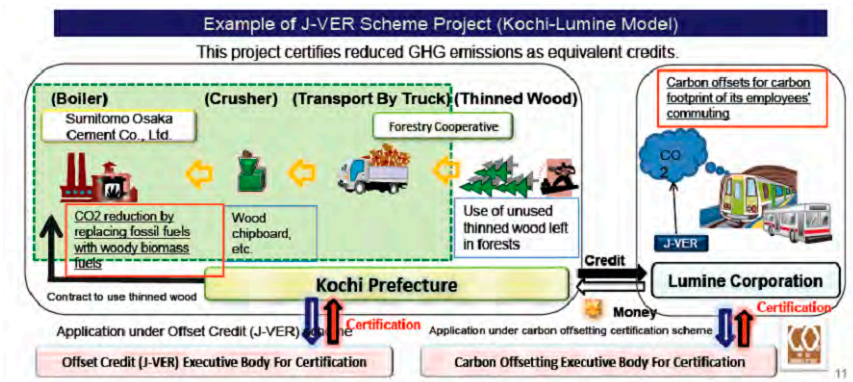
Application - Certification - Issuance of the J-VER

- similar to CDM
- Basically, according with ISO 14064-2
- Internal validation by 4CJ for cost cutting for project participants



Source: Japanese Ministry of Environment

Project examples (1)



This project certifies reduced GHG emissions as equivalent credits by replacing fossil fuels used in cement factory boilers with unused trees in the forest.
(Date of application: December 3, 2008, certified on March 10, 2009.
Estimated emissions reduction: 1,039t , from April to September 2008)

Source: Japanese Ministry of Environment

Project examples (2)

Use of biodiesel fuels of waste food oil for a car

Source: Japanese Ministry of Environment

Project examples (3)

Use of a pellet stove

Source: Japanese Ministry of Environment

Project examples (4)

Forest management (logging, planting etc.)

Source: Japanese Ministry of Environment

Discussion

- What are the possible 'T-VER' project candidates in Thailand?