

# Analysis of Key Categories and Assessment of Uncertainties, Example from Japanese Cases

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GHG Inventory

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## 1. Uncertainties

- 1-1 What is the “Uncertainty”?
  - 1-2 The cause of the “Uncertainties”
  - 1-3 The reason to use “Uncertainties” in GHG Inventory
  - 1-4 Application of “Uncertainties” in GHG Inventory
  - 1-5 The method of estimation of “Uncertainties” in GHG Inventory

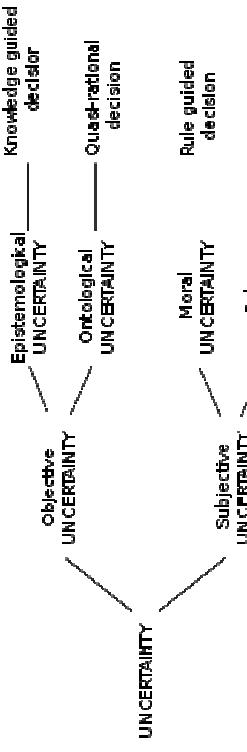
- 1. Uncertainties
  - 2. Japan's Case of Uncertainties
  - 3. Key Categories
  - 4. Japan's Case of Key Categories

## 1-1 What is the “Uncertainty”?

- Uncertainty: **Lack of knowledge of the true value** of a variable that can be described as a probability density function characterizing the range and likelihood of possible values.
  - Uncertainty depends on the **analyst's state of knowledge**, which in turn depends on **the quality and quantity of applicable data** as well as **knowledge of underlying processes and inference methods**.
  - It is assumed that no one knows the true value.

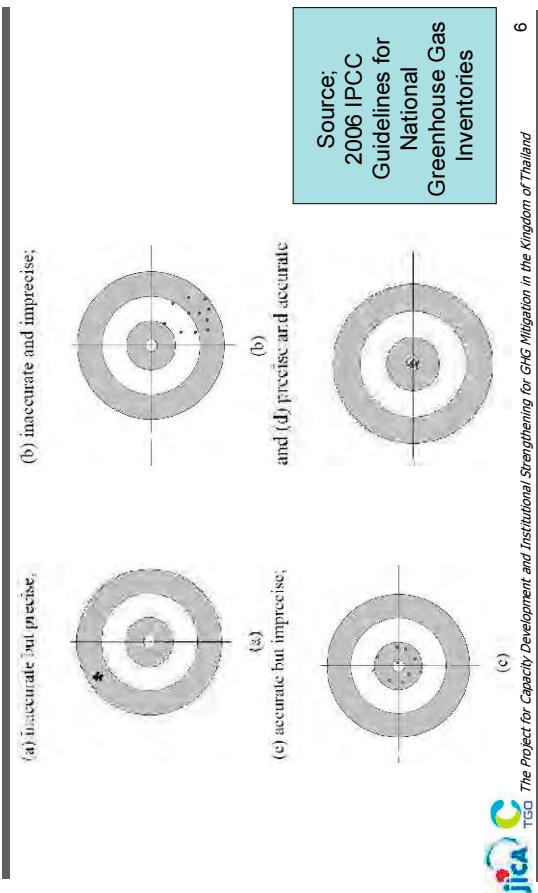
## 1-2 The cause of the "Uncertainties"

- "Uncertainties" can be generally classified as follows.



Source: <http://en.wikipedia.org/wiki/Uncertainty> 5

## Illustration of Accuracy and Precision



## 1-2 Other Comments

- Please refer "2006 IPCC Guidelines", "EMEP/EEA air pollutant emission inventory guidebook 2009" and "Mathematics textbook" (e.g. "Guide to the Expression of Uncertainty in Measurement" (ISO, Revised 1995)), about some details of "Uncertainty" (such as the concept, formula, etc.).
- Quantitative uncertainty (in some case)

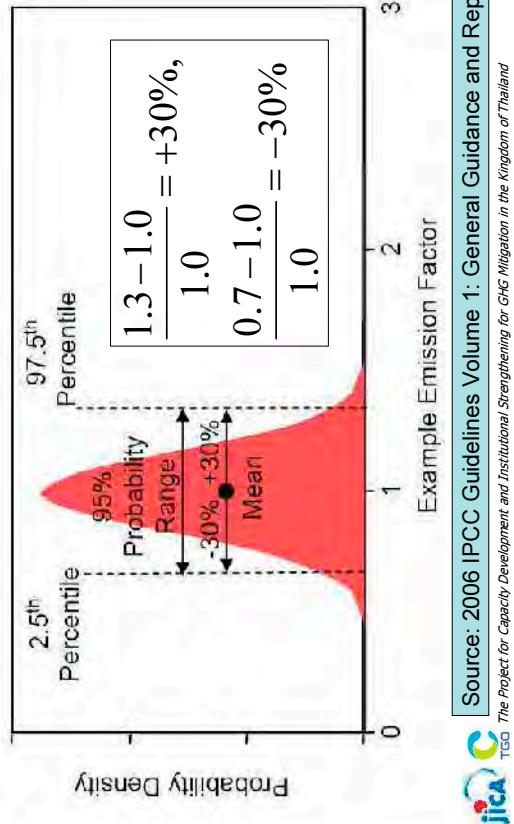
## 1-4 Application of Uncertainties in GHG Inventory

- Uncertainty Estimates
  - National level and trend estimate
  - Component parts such as Emission Factors (EFs), Activity Data (AD) and other parameters
- Key Category Analysis
  - A key category is on that is **prioritised** within national inventory system because its estimate has a significant influence on a country's total inventory of GHG in terms of the **absolute level**, **the trend**, or the **uncertainty**.
  - A key category is described below (next sector of this session)

## Overview of Uncertainty Analysis

- Uncertainty Estimates are an essential element
  - Determining uncertainties in individual variables
  - Aggregating the component uncertainties
  - Determining the uncertainty in the trend
  - Identifying significant sources of uncertainty
- Some uncertainty (not statistical means) is important
  - Omissions or double counting, or other conceptual errors, incomplete understanding of the processes, etc....
- Quantitative uncertainty analysis
  - 95% confidence interval of the emissions and removals estimate for individual categories and the total inventory

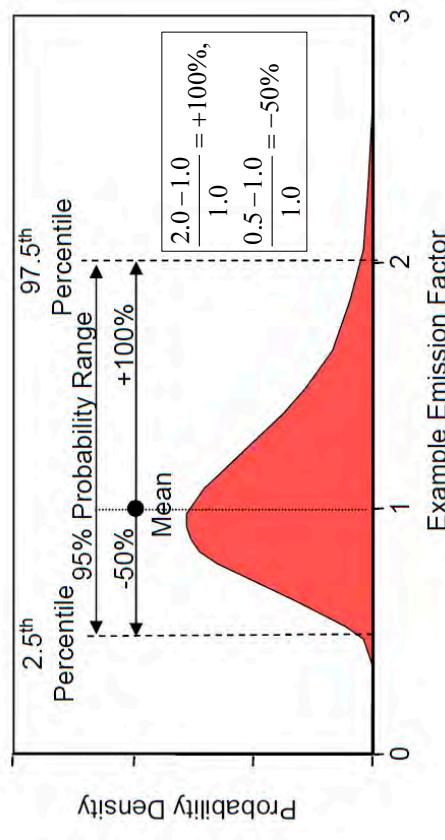
## Example of a symmetric uncertainty of 30 % relative to the mean



## 1-5 The method of estimation of “Uncertainties” in GHG Inventory

- Approach 1: Propagation of Error
- Approach 2: Monte Carlo Simulation

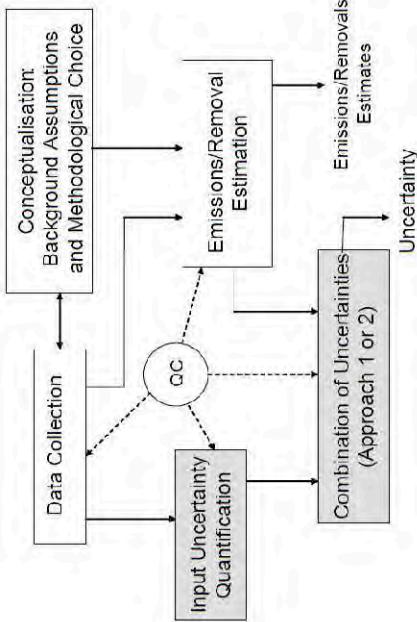
Example of an asymmetric uncertainty of -50% to +100% relative to the mean, or factor of two



Source: 2006 IPCC Guidelines Volume 1: General Guidance and Reporting  
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## Overall Structure of Uncertainty Analysis



Source: 2006 IPCC Guidelines Volume 1: General Guidance and Reporting  
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## Basic Equation of “Uncertainties”

- Multiplication:  $A_1 \times A_2$  (e.g. combine EF AD parameter)

$$U_A = \sqrt{U_{A_1}^2 + U_{A_2}^2}$$

- Addition and Subtraction:  $A_1 + A_2$  (e.g. overall uncertainty in national inventory)

$$U_{A-\text{total}} = \frac{\sqrt{(U_{A_1} \times A_1)^2 + (U_{A_2} \times A_2)^2}}{A_1 + A_2}$$

Source: 2006 IPCC Guidelines Volume 2: Energy  
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## Example of Emission Factor Uncertainties (from 2006 IPCC Guidelines)

TABLE 2.2 DEFAULT EMISSION FACTORS FOR STATIONARY COMBUSTION IN THE ENERGY INDUSTRIES (kg of greenhouse gas per TJ on a Net Calorific Basis)						
Fuel	CO <sub>2</sub>		CH <sub>4</sub>	N <sub>2</sub> O		
	Default Emission Factor	Lower		Default Emission Factor	Lower	Upper
Crude Oil	73.300	71.100	75.500	r	3	1
Ornithine	r 77.000	69.300	85.400	r	3	1
Natural Gas Liquids						
Motor Gasoline	75.500 – 73.300	75.500 – 73.300	73.300	+3%	71.100 – 73.300	73.300
Aviation Gasoline						
Jet Gasoline						
Gasoline	r 71.500	69.700	74.400	r	3	1
Jet Kerosene	r 71.900	70.800	73.700	r	3	1
Other Kerosene	73.300	67.800	79.200	r	3	1
Shale Oil	74.100	72.600	74.800	r	3	1
Gas/Diesel Oil						

Source: 2006 IPCC Guidelines Volume 1: General Guidance and Reporting  
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Source: 2006 IPCC Guidelines Volume 2: Energy  
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## Example of Activity Data Uncertainties

## Example of Combined Uncertainty

TABLE 2.15  
LEVEL OF UNCERTAINTY ASSOCIATED WITH STATIONARY COMBUSTION ACTIVITY DATA

Sector	Well developed statistical systems Surveys Extrapolation	Less developed statistical systems Surveys Extrapolation	Emissions (Gg CO <sub>2</sub> /year)	Activity Data Uncertainty (%)	EF Uncertainty (%)	Combined Uncertainty (%)	Contribution to Variance by Category
Main activity electricity and heat production	Less than 1%	3-5%	1-2%	≤10%	$CU1 = \frac{(CU1 \times E1)^2}{(E1 + E2 + E3)^2}$	$CV1 = \frac{(CU1 \times E1)^2}{(E1 + E2 + E3)^2}$	
Commercial, institutional, residential combustion	3-5%	5-10%	10-15%	15-25%	$CU2 = \frac{(CU2 \times E2)^2}{(E1 + E2 + E3)^2}$	$CV2 = \frac{(CU2 \times E2)^2}{(E1 + E2 + E3)^2}$	
Industrial combustion (Energy intensive industries)	2-3%	3-5%	2-3%	≤10%	$CU3 = \frac{(CU3 \times E3)^2}{(E1 + E2 + E3)^2}$	$CV3 = \frac{(CU3 \times E3)^2}{(E1 + E2 + E3)^2}$	
Industrial combustion (others)	3-5%	5-10%	10-15%	15-20%			
Biomass in small sources	10-30%	20-40%	30-60%	60-100%			
The inventory compiler should judge which type of statistical system best describes their national circumstances.							
Source: IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (2000)		Source: 2006 IPCC Guidelines Volume 2: Energy		17		18	



## Uncertainty Assessment Condition in Japan

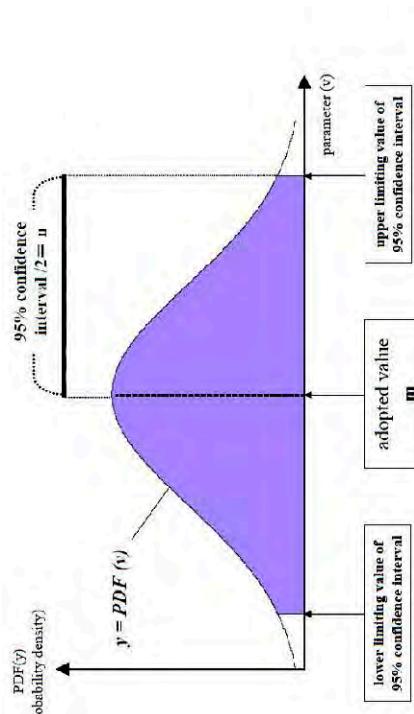
## Decision tree for assessing uncertainty associated with EFs (Japanese Case)

- Japan has a lot of emission factor data and detailed activity data.
- The uncertainty are estimated based on these data.
- However, there are **not enough data** which the "Uncertainties" are assessed completely.
- Therefore, the "Uncertainties" are estimated by setting some **assumptions and conditions**.

## (EF) Box 1 : Case where is measurement data with five or more samples

- The uncertainty is assessed quantitatively
  - Guideline 1 : Assuming that all averages  $\bar{x}$  and standard deviations  $\sigma/\sqrt{n}$  follow a normal distribution curve.
  - Guideline 2 : Assuming that systematic error inherent to individual items of data is already a factor in the distribution.
  - Guideline 3 : Items that may contribute to uncertainty, but which may not be readily quantitatively assessable, should be recorded for the future investigation. If, through expert judgment, it is possible to estimate their uncertainty, the uncertainty should be estimated in accordance with expert judgment.

When the distribution of the probability density function of emission factors can be obtained using expert judgment

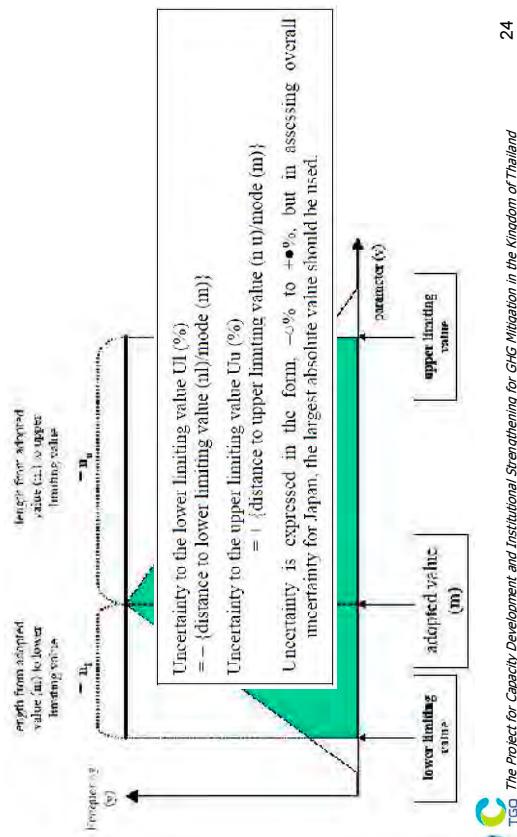


$$\text{Uncertainty of FF or } A = \frac{\text{95\% confidential interval} / 2 (n)}{|\text{Adopted Value of FF or } A (m)|}$$

## (EF) Box 2 : When Expert Judgment is feasible (no actual measurement data or less than five samples)

- When the distribution of the probability density function of emission factors can be obtained using expert judgment
  - Distribution and evidence
    - Upper and lower limiting values
    - Upper and lower limiting values of 95% confidence interval
    - Mean, first, and third quartile value
- When the distribution of the probability density function of emission factors cannot be obtained using expert judgment
  - Upper and lower limiting values, adopted value (EF used)
    - Triangular distribution

When the distribution of the probability density function of emission factors cannot be obtained using expert judgment



(EF) Box 3 : “When expert judgment is not possible” and “**A standard value** for uncertainty is provided in GPG”

- When the Good Practice Guidance (2000) provides a standard value for uncertainty for a particular emission source, an estimate of uncertainty should err on the safe side, and the upper limiting value of the standard uncertainty value given in the Good Practice Guidance (2000) should be used.

(EF) Box 4 : “When expert judgment is not possible” and “**No standard value** for uncertainty is provided in GPG”

Category	Judgment of EF
1. Energy	5%
1.A. CO <sub>2</sub>	3% ~ 10%
1.A. CH <sub>4</sub> , N <sub>2</sub> O	5%
1.A.3. Transport(C <sub>2</sub> H <sub>6</sub> , N <sub>2</sub> O)	3% ~ 10%
2. Industrial Processes	1% ~ 100%
Excluding HFCs, PFCs, SF <sub>6</sub>	5%
HFCs, PFCs, SF <sub>6</sub>	5% ~ 50%
3. Solvent and Other Product Use	5%
4. Agriculture	2% ~ 60%
5. Land Use, Changes in Land Use and Forestry	~ *
6. Waste	5% ~ 100%

\* Category 3: The use of organic solvents and other such products are not dealt within the GPG (2000).

\*\* Category 5: Changes in land use and forestry are not dealt with in the GPG (2000).

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)

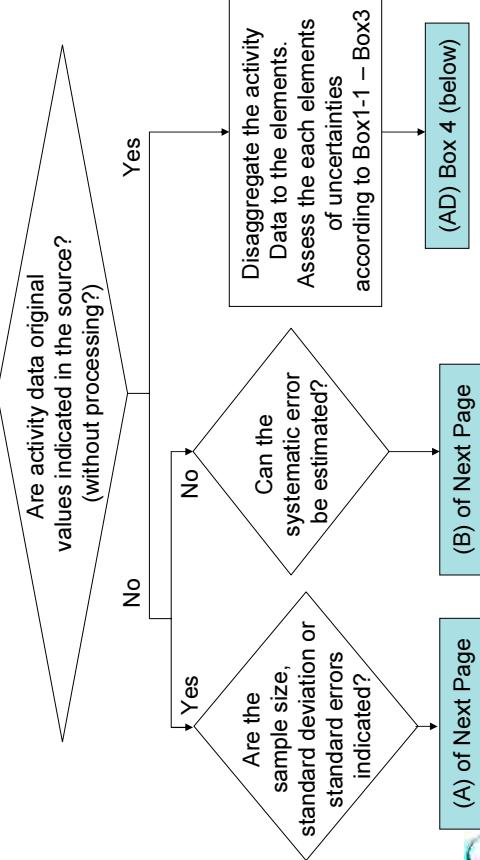
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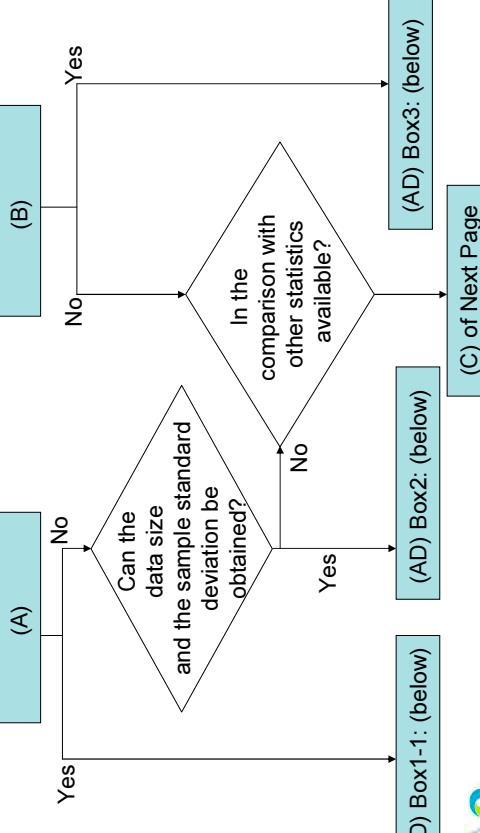
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## Decision tree for assessing uncertainty associated with Activity Data (part1)



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## Decision tree for assessing uncertainty associated with Activity Data (part2)



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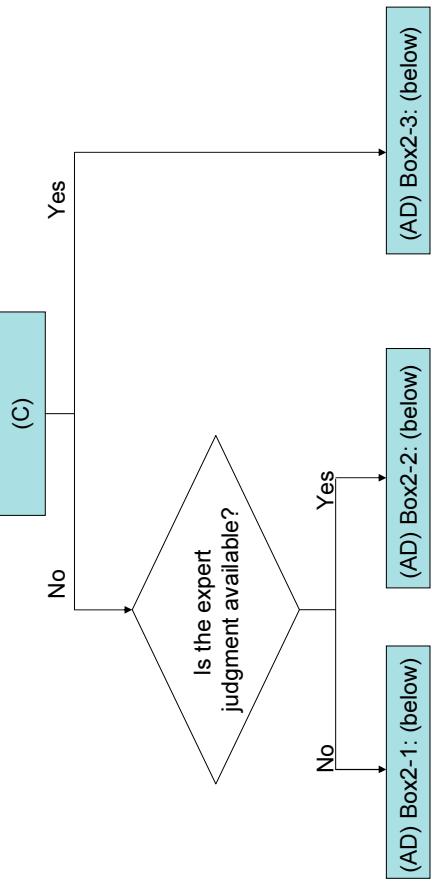
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## Decision tree for assessing uncertainty associated with Activity Data (part3)

### (Activity Data) Box 1-1



### (Activity Data) Box 1-2

- Box 1-2 : "Statistical values based on a sample survey" and "The publisher has not made errors public"
  - Enquire the publisher of the statistical document for the size of the sample, the sample average, and the standard deviation of the sample.

$$\text{Uncertainty } U = \left( 1.96 \times s / \sqrt{n} \right) / X_{\alpha}$$

$X_{\alpha}$  : Sample average  
 $s$  : Standard deviation of sample  
 $n$  : Number of items of data

If, however, distribution is asymmetrical, the uncertainty  $U$  is calculated by dividing the difference between the value of the 95 percent confidence limit furthest from  $X_{\alpha}$  and the average value, by  $X_{\alpha}$ .

### (Activity Data) Box 2-1

- "Statistical values based on a sample survey" and "Amount of data and sample standard deviation are not available, and expert judgment is not available"
  - The following standard values should be used

	Fundamental Statistics	Other Statistics
Sample survey	50 %	100 %

## (Activity Data) Box 2-2

- Box 2-2 : "Statistical values based on a sample survey" and "Amount of data and sample standard deviation are not available, and expert judgment is available"
  - Ask an expert for the upper and lower limiting values appropriate to activity data in Japan
  - Draw a triangular distribution for activity data with the Japanese activity data as the vertex
  - Upper limiting value is the upper limiting value of 95% confidence interval
  - Lower limiting value is the lower limiting value of 95% confidence interval



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## (Activity Data) Box 2-3

- Box 2-3 : "Statistical values based on a sample survey" and "Amount of data and sample standard deviation are not available, and crosschecking is possible"
  - In the case of statistics drawn from a sample survey,

$$\text{Uncertainty} \cdot U = (1.96 \times s) / X_{\text{ap}}$$

$X_{\text{ap}}$  : Value used for activity data  
 $s$  : Standard deviation (data to be cross-checked)

However, if a distribution is asymmetrical, the uncertainty  $U$  may be calculated by dividing the difference between the value of the 95 percent confidence limit furthest from  $X_{\text{ad}}$  and the average value, by  $X_{\text{ad}}$ .



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## (Activity Data) Statistical value not based on a sample survey

- "Systemic error can be estimated" : Box 3
- "Systemic error cannot be estimated, and crosschecking is possible" : Box 2-3
- "Systemic error cannot be estimated, crosschecking is not possible, and expert judgment is available" : Box 2-2
- "Systemic error cannot be estimated, crosschecking is not possible, and expert judgment is unavailable" : Box 2-1



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## (Activity Data) Box 3 (Statistical values not based on a sample survey, etc.)

- "Statistical value not based on a sample survey" and "Systemic error can be estimated" : Box 3
  - Where a systemic error can be estimated, it should be estimated and used. The method by which the systemic error is calculated should be documented, and the document should be retained.



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## (Activity Data) Box 2-1 (Statistical values not based on a sample survey, etc.)

- “Statistical value not based on a sample survey” and “Systemic error cannot be estimated, crosschecking is not possible, and expert judgment is unavailable” : Box 2-1
  - The following standard values established by the Committee for the GHGs Emissions Estimation Methods should be used.

	Fundamental Statistics	Other Statistics
Survey of total population (no rounding)	5 %	10 %
Survey of total population (rounding)	20 %	40 %

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## (Activity Data) Box 2-3 (Statistical values not based on a sample survey, etc.)

- “Statistical value not based on a sample survey” and “Systemic error cannot be estimated, and crosschecking is available” : Box 2-3
  - When systemic error cannot be estimated, but it is possible to compare the relevant statistical value with other statistical values, uncertainty should be assessed using the same means in Case 2 described at A1.2.3 of Section A1.7 of the Good Practice Guidance (2000).

## (Activity Data) Box 2-2 (Statistical values not based on a sample survey, etc.)

- “Statistical value not based on a sample survey” and “Systemic error cannot be estimated, crosschecking is not possible, and expert judgment is available” : Box 2-2
  - Same as for “Amount of data and sample standard deviation are not available, and expert judgment is available” of “Statistical values based on a sample survey” (Box 2-2).

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## (Activity Data) Box 4 (Using statistical values processed as activity data)

- Using statistical values processed as activity data (not original values in the source).
  - a) Breakdown of each element of activity data and assessment
  - b) Combining elements
    - Activity data is express as  $A1 + A2 \sqrt{\frac{(U_{A1} \times A_1)^2 + (U_{A2} \times A_2)^2}{A_1 + A_2}}$

$$U_{A\text{total}} = \sqrt{\frac{(U_{A1} \times A_1)^2 + (U_{A2} \times A_2)^2}{A_1 + A_2}}$$

– Activity data is express as  $A1 \times A2 \sqrt{\frac{(U_{A1} \times A_1)^2 + (U_{A2} \times A_2)^2}{A_1 + A_2}}$

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## (Activity Data) Box 2-2 (Statistical values not based on a sample survey, etc.)

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# Uncertainty of Japan's Total Net Emissions

## Consideration of the results

IPCC Category	GHGs	Emissions / Removals [Gg CO <sub>2</sub> eq.]	Combined Uncertainty [%]	rank	Combined uncertainty as % of total national emissions	rank
	A	[%]	B	C		
1A. Fuel Combustion (CO <sub>2</sub> )	(CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O)	1,161,985.3	58.9%	1%	10	0.76%
1A. Fuel Combustion (Stationary/CH <sub>4</sub> ,N <sub>2</sub> O)	(CH <sub>4</sub> , N <sub>2</sub> O)	5,060.9	0.4%	27%	3	0.11%
1A. Fuel Combustion (Transport/CH <sub>4</sub> ,N <sub>2</sub> O)	(CH <sub>4</sub> , N <sub>2</sub> O)	2,982.5	0.2%	35%	1	0.37%
1B. Fugitive Emissions from Fuels	(CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O)	446.4	0.0%	19%	5	0.01%
2. Industrial Processes (CO <sub>2</sub> ,CH <sub>4</sub> ,N <sub>2</sub> O)	(CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub> )	51,667.6	4.0%	7%	7	0.32%
3. Solvent & other Product Use	N <sub>2</sub> O	23,642.7	1.8%	26%	4	0.52%
4. Agriculture	(CH <sub>4</sub> , N <sub>2</sub> O)	160.4	0.0%	5%	9	0.00%
5. LULUCF	(CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O)	25,844.9	2.0%	15%	6	0.38%
6. Waste	(CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O)	-78,807.9	-6.1%	6%	8	0.42%
Total Net Emissions		20,058.0	1.6%	32%	2	0.38%
1) C = A × B / D	(D)	1,203,020.6	[D]	2%		
2) E= $\sqrt{C_1^2 + C_2^2 + \dots}$						

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)



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## Issue in Uncertainty Assessment in Japan (part1)

- Only emission sources of which emissions had already been calculated were the subject of uncertainty assessment. No assessment has been made for emission sources such as "NE" and "PART".
- Therefore, the uncertainty of total emissions prepared by compiling the uncertainty of emissions does not depict the uncertainty of inventory in context of the realities of emissions.

## Issue in Uncertainty Assessment in Japan (part2)

- The number of decimal places to be used when depicting uncertainty was set as follows;
  - Uncertainty of EF is given to one decimal place.
  - Uncertainty of AD is also given one decimal place.
  - Uncertainty of emissions is given as an integer.
- As the precision of uncertainty assessment varies between emission sources, further consideration needs to be given to the number of decimal place that are effective in uncertainty assessment.

### 3. Key Categories

- 3-1 What is the “Key Category”?
- 3-2 The Method of Key Category Analysis

### 3-1 What is the “Key Categories”?

- A “Key Category” is one that is **prioritised** within the national inventory system because its estimate has a **significant influence** on a country’s total inventory of greenhouse gas in terms of **the absolute level, the trend, or the uncertainty** in emissions and removals. Whenever the term key category is used, it includes both source and sink categories.



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### Introduction of “Key Categories” 1

- **Methodological choice** for individual source and sink categories is **important in managing overall inventory uncertainty**.
- By identifying these key categories in the national inventory, inventory compilers can **prioritise their efforts and improve their overall estimates**.

### Introduction of “Key Categories” 2

- It is good practice for each country to identify its national key categories in a **systematic and objective manner**.
- Consequently, it is good practice to use results of key category analysis as a **basis for methodological choice**.



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## Overview of the Key Category Analysis

- Purpose of "Key Category analysis"
  - (Firstly); Identification of key categories enables **limited resources available** for preparing inventories to be prioritised.
  - (Secondly); In general, more **detailed higher tier methods** should be selected for key categories.
  - (Thirdly); It is good practice to give **additional attention** to key categories with respect to **QA/QC**.
- The **key category analysis** is to figure out the **important sub-sectors** of GHG inventory using the amount of emission, uncertainty and these of time-series.



## 3-2 The Method of Key Category Analysis

- A "Key Category" is prioritized within the national inventory system
  - (Estimate) The absolute Level (Level Assessment)
  - (Estimate) The Trend (Trend Assessment)
  - (Estimate) The Uncertainty (Both Level and Trend)
- Approach 1 : Level Assessment and Trend Assessment (Sources and Sinks)
- Approach 2 : Level Assessment / Trend Assessment and Based on the results of the "Uncertainty" (Sources and Sinks)



### Estimation Methods for Key Category Analysis

	Level Assessment	Trend Assessment
Approach 1	Sources and Sinks Only Level 95% add up	Source and Sinks <b>Significantly different</b> from the trend 95% add up
Approach 2	Sources and Sinks (based on the <b>Uncertainty</b> analysis) Only Level 90% add up	Sources and Sinks (based on the <b>uncertainty</b> analysis) <b>Significantly different</b> from the trend 90% add up

### Approach 1: Level Assessment

- LEVEL ASSESSMENT
  - Key category level assessment =  $|E_{x,t}| / \sum_y |E_{y,t}|$
- $L_{x,t} = |E_{x,t}| / \sum_y |E_{y,t}|$
- $L_{x,t}$  = level assessment for source or sink x in latest inventory year (year t)
- $|E_{x,t}|$  = absolute value of emission or removal estimate of source or sink category x in year t
- $\sum_y |E_{y,t}|$  = total contribution, which is the sum of the absolute values of emissions and removals in year t
- The key categories are those that add up to 95 % of the sum of all  $U_{x,t}$ .



## Approach 1: Trend Assessment

- TREND ASSESSMENT
$$T_{x,t} = \frac{|E_{x,0}|}{\sum_y |E_{y,0}|} \bullet \left[ \frac{(E_{x,t} - E_{x,0})}{|E_{x,0}|} \right] - \frac{\left( \sum_y E_{y,t} - \sum_y E_{y,0} \right)}{\left| \sum_y E_{y,0} \right|}$$

  - $T_{x,t}$  = trend assessment of source or sink category x in year t as compared to the base year (year 0)
  - $|E_{x,0}|$  = absolute value of emission or removal estimate of source or sink category x in year 0
  - $E_{x,t}$  and  $E_{x,0}$  = real value of estimate of source or sink category x in year t and 0, respectively
  - $\sum_y E_{y,t}$  and  $\sum_y E_{y,0}$  = total inventory estimates in year t and 0, respectively
  - The key categories are those that add up to 95 % of the sum of all  $T_{x,t}$ .



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## 4 Case Study of “Key Categories” (Japan’s cases)

### • Level Assessment

- Calculating the proportion of emissions and removals in each category to the total emissions and removals
- The calculated values of proportion are added from the category that accounts for the largest proportion, until the sum reaches 95% for “Approach 1”, 90% for “Approach 2”.
- “Approach 1” level assessment use emissions and removals from each category directly and “Approach 2” level assessment analyzes the emissions and removals of each category, multiplied by the uncertainty of each category.

### Key category analysis (Level Assessment in Japan)

### • [key category analysis]

- First (1) : Estimate excluding LULUCF
- Second (2) : Estimate including LULUCF
- In accordance with the GPG-LULUCF,
  - Pattern1 : A source category, which was identified as key in (1) but not in (2), was still regarded as key.
  - Pattern2 : A source category, which was not identified as key in (1) but was done in (2), was not regarded as key.



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## Approach 2: Level Assessment and Trend Assessment

- Level Assessment
$$LU_{x,t} = |L_{x,t} \bullet U_{x,t}| / \sum_y |(L_{y,t} \bullet U_{y,t})|$$
    - The key categories are those that add up to 90 % of the sum of all  $LU_{x,t}$ .
- Trend Assessment
$$TU_{x,t} = (T_{x,t} \bullet U_{x,t})$$
    - The key categories are those that add up to 90 % of the sum of all  $TU_{x,t}$ .



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## Results of Approach 1 Level Assessment (FY2008)

## Results of Approach 2 Level Assessment (FY2008)

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)

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## Key category analysis (Trend Assessment in Japan) part 1

- Step 1: The difference between the rate of change in emissions and removals in a category
  - Step 2: The rate of change in total emissions and removals
  - Step 3: Multiplying this value by the ratio of contribution of the relevant category to total emissions and removals

## Key category analysis (Trend Assessment in Japan) part2

- Trend Assessment
    - Until the sum reaches 95% for Approach 1 (emissions and removals from each category directly)
    - Until the sum reaches 90% for Approach 2 (emissions and removals of each category multiplied by the uncertainty of each category)
  - First (1) : Estimate excluding LULUCF
  - Second (2) : Estimate including LULUCF
  - In accordance with the GPG-LULUCF,
  - Pattern 1 : A source category, which was identified as key in (1) but not in (2), was still regarded as key.
  - Pattern 2 : A source category, which was not identified as key in (1) but was done in (2), was not regarded as key.  
(note: same as "level Assessment")

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)  
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Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)  
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## Results of Approach 1 Trend Assessment (FY2008)

A IPCC Category	B Direct Emissions of CO <sub>2</sub> eq. GHGs	C Indirect Emissions (e.g. CO <sub>2</sub> eq.)	D Current Year Estimate [e.g. CO <sub>2</sub> eq.]	E H Contributed to Treat.	F Cumulative Contribution	
					G Year Estimate [e.g. CO <sub>2</sub> eq.]	H Contributed to Treat.
#1.1.1. Sanitary Combustion	Liquid Fuel	CO <sub>2</sub>	45169	33591	30.4%	30.1%
#1.1.1. Sanitary Combustion	Solid Fuel	CO <sub>2</sub>	45148	20572	18.0%	22.8%
#1.1.2. Sanitary Combustion	Gaseous Fuels	CO <sub>2</sub>	32620	218	3.7%	3.7%
#4.2. Production of Hydrocarbons and Sls	1. By-product Emissions (from Refining of Oil [1.1.1-2])	HFCs	11145	16965	7.1%	7.6%
#5.3. Motor Product	1. Current Production	CO <sub>2</sub>	37946	30776	7.2%	7.8%
#6.1.2. Consumption of Hydrocarbons and Solid Fuels (emissions - see 1.2)	8. Electrical Equipment	SFC	1305	977	2.7%	8.1%
#7.1.2. Consumption of Hydrocarbons and Solid Fuels (emissions - see 1.2)	1. Radiator, u.e. Air Conditions, Equipment	HFCs	340	1148	2.7%	3.1%
#8.2.1a. Consumption of Hydrocarbons and Solid Fuels (emissions - see 1.2)	5. Sovens	PFCs	10364	1927	1.9%	8.5%
#8.2.1b. General emissions - see 1.2						
#9.1.3. Metal Smelting	b. Road Transport	CO <sub>2</sub>	149228	21487	1.3%	87.7%
#10.2.1b. Chemical Industry	3. Adipic Acid	N2O	750	271	1.0%	89.9%
#11.2.1. Soil	2. Land converted to Settlements	CO <sub>2</sub>	5162	696	1.0%	90.0%
#11.2.5. Forest and Land	1. Forest and Remaining Forest Land	CO <sub>2</sub>	721	5209	1.0%	91.5%
#11.4.2. Other Gases	1. Other Gases	CO <sub>2</sub>	9102	1406	0.9%	92.4%
#11.4.2. Soil, Waste Disposal and Land	1.1.14					
#11.5.1. Production of Hydrocarbons and Sls	2. Fugitive Emissions	Sfc	408	1193	0.9%	93.2%
#11.6.1.3. Motor Vehicles	3. Fug. At Atmos.	CO <sub>2</sub>	7162	1876	0.8%	93.5%
#11.6.1.3. Motor Vehicles	4. Gasoline and Handling (under g)	CH <sub>4</sub>	2785	46	0.5%	94.2%
#11.6.1.3. Motor Vehicles	5. Petroleum	CO <sub>2</sub>	13731	1270	0.8%	95.1%

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2018)  
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Sample of Data used for the key category analysis (FY2008)

The Sample of Data used for the key category analysis (FY1990)

A IPCC Categories		B Direct GHG	C Base Version	D Current Value Estimate (Gt C/yr)	E Slope/90k Estimate (Gt C/yr)	F M Combustion Intensity	G M Combustion Intensity	H M Combustion Intensity
# 1	The Consumption of Fossil Fuels	1. Fossil Fuel Combustion	HEC	1325.09	42%	13.06	15.06	15.06
# 2	2. Oil, Gasoline, LPG, Diesel, Kerosene	STG	1110.58	166.05	40%	10.25	21.25	21.25
# 3	3. Solid Fuels	PPG	265.21	-213.27	-	3.9%	3.9%	3.9%
# 4	4. Fuels & Lubricants	STG	4.70E-07	100%	-	3.75%	3.75%	3.75%
# 5	5. Industrial Combustion	N2O	0.03172	103.5	-	7.0%	8.5%	8.5%
# 6	6. Land Use, Land-Use Change, and Forestry	N2O	11.85	-109.93	-	6.5%	6.5%	6.5%
# 7	7. Agriculture, Forestry, and Other Emissions	N2O	4.70E-07	100%	-	3.75%	3.75%	3.75%
# 8	8.4.1. Methane Emissions	CH4	308.58	52.11	-	60.2%	60.2%	60.2%
# 9	8.4.2. Fugitive Emissions	CH4	183.91	77.97	-	58.5%	58.5%	58.5%
# 10	8.4.3. Natural Methane Leaks	CH4	120.58	25.11	-	59.0%	59.0%	59.0%
# 11	8.4.4. Coal Mining and Natural Gas Leaks	CH4	260.15E-05	1.5%	-	5.75%	6.1%	6.1%
# 12	8.4.5. Shale Gas Combustion	CH4	9.02E-04	128.12	-	28%	32.5%	32.5%
# 13	8.4.6. Shale Gas Leaks	CH4	3.72E-04	219.96E-05	-	10%	2.7%	6.9%
# 14	8.4.7. Natural Product	CH4	1.30E-03	24.98E-05	-	2.5%	7.7%	7.7%
# 15	8.4.8. Methane Leaks	CH4	1.80E-03	24.98E-05	-	2.5%	7.7%	7.7%
# 16	8.4.9. Land-Use Emissions	N2O	1.61E-05	111.07	50%	2.3%	3.4%	3.4%
# 17	8.4.10. Soil Emissions	N2O	1.61E-06	69.7	5%	2.0%	3.0%	3.0%
# 18	8.4.11. Biogenic Methane Leaks	N2O	1.21E-03	4.05E-03	3.27%	1.0%	7.5%	7.5%
# 19	8.4.12. Methane Leaks	N2O	7.91E-07	9.79E-05	9%	1.7%	8.5%	8.5%
# 20	8.4.13. Land-Use Change & Forestry	CH4	2.27E-05	22.13	2.5%	-	-	-
# 21	8.4.14. Deforestation	CH4	3.97E-05	2.92E-03	63%	1.3%	38.8%	38.8%
# 22	8.4.15. Indirect Emissions	CH4	3.97E-03	2.27E-03	54%	1.1%	34.4%	34.4%
# 23	8.4.16. Land-Use Change	N2O	5.33E-03	4.57E-01	48%	1.0%	33.1%	33.1%
# 24	8.4.17. Fossil Fuel Combustion	CH4	7.20E-06	7.96E-02	9.9%	1.0%	36.3%	36.3%
# 25	8.4.18. Land-Use Change	CH4	5.65E-05	1.60E-02	21%	2.0%	37.9%	37.9%
# 26	8.4.19. Other Land	CH4	1.65E-05	3.1E-03	20%	2.0%	38.7%	38.7%
# 27	8.4.20. Chemical Industry	CH4	1.65E-05	3.27E-01	20%	1.0%	33.5%	33.5%
# 28	8.4.21. Fossil Fuel Combustion	CH4	3.34E-05	1.693E-03	21%	2.0%	39.2%	39.2%
# 29	8.4.22. Land-Use Change	CH4	4.00E-01	6.5E-01	50%	1.0%	39.0%	39.0%

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)  
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## Results of Approach 2 Trend Assessment (FY2008)

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010)

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Source: National Greenhouse Gas Inventory Report of JAPAN (April 2018) 61  
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**Source:** National Greenhouse Gas Inventory Report of JAPAN (April 2010) for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand

**Sources:** National Greenhouse Gas Inventory Report of JAPAN (April 2010)  
for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand

Source: National Greenhouse Gas Inventory Report of JAPAN (April 2010) 6  
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## Japan's Key Source Categories in 1990

is present recorded in the column I. [Seven] indicate the ranking of level access means.

## Example of “Key Category Ranking”

- EMEP/EEA air pollutant emission inventory guidebook 2009
  - 2. key category analysis and methodological choice
  - Table A-2 Final category ranking across all pollutants considered in analysis.

## Example of “Key Category Ranking”

Section number	Description	% contribution to total fuel use (equivalent carbon dioxide emissions)	NO <sub>x</sub>	SO <sub>x</sub>	SO <sub>2</sub>	Particulates	Status of Emissions control measures	Rank
1.A.1.a	Industrial activity and production other than manufacturing, mining and construction	4	1	15	1	1	+	1
1.A.3.b.i	Road transport: passenger cars, localised haulage and transport, heavy-duty vehicles	10	7	13	9	7	73	3
1.A.4.b.i	Road transport: heavy-duty vehicles	1.5	2	2	1	1.5	22	4
1.A.3.b.m	Road transport: heavy-duty vehicles	1.5	2	13	5	7	32	5
1.B.1.a	Tertiary activities other sectors and other product use facilities	7%	23	23	23	23	6	6
1.B.1.b	Manufacturing processes combustion fuels (heavy metals) and POPs	13	23	23	23	23	4	4
1.A.3.b.m	Road transport: heavy-duty vehicles	1.5	2	13	5	7	32	5

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## Japan's Key Source Categories in 2008

7. B. Features recorded in the Level and -scaled columns indicate the radiuses of individual level and trend assessments.

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## Example of “Key Category Ranking”

Source;  
Table A-2  
of “EMEP/  
EEA  
emission  
inventory  
guidebook  
2009”

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## Key Category Ranking (presenter's opinion)

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- I think that it is good practice that the level assessment and trend assessment of each category are **simply summed up** and the priorities of key category are decided from these results.
- I think that in Thailand it is **not bad** that key category ranking is decided in preference to the level of assessment.  
(present)

- ありがとうございました
- ขอบคุณมาก ครับ/ค่ะ
- Thank you very much

# INV09 and INV10 Review and Practice of Greenhouse Gas Inventory

February, 2011

GHG Inventory  
Fumihiro KUWAHARA

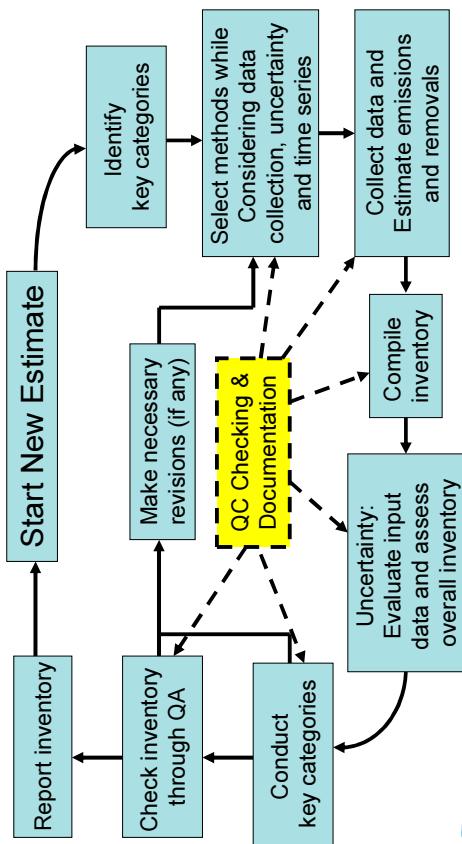
## Contents

- Review of GHG Inventory
  - Components of Inventory Work
  - Inventory Development Cycle
- Practice
  - 1 Data Collection
  - 2 Uncertainty Analysis
  - 3 Calculation Practice
  - 4 Key Category Analysis
  - 5 Other Issues

## Components of Inventory Work

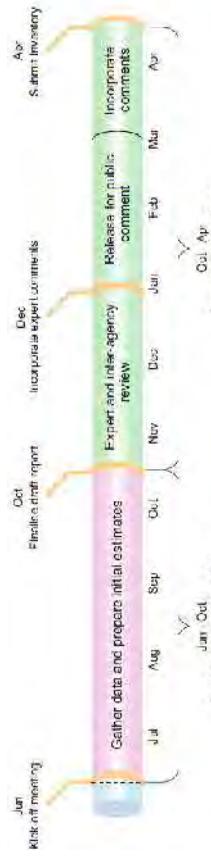
- Data Collection and Methodological Choice
- Uncertainty Assessment
  - Important for developing mitigation policies & monitoring their impacts
- Identification of Key Categories
- Quality Assurance and Quality Control
  - Verification
- Ensuring time series consistency
  - Recalculations
  - Reconstruction of missing data

## Inventory Development Cycle



## Example of Inventory Development Cycle

- In a **mature** inventory system, the **review** phase is longer than the compilation phase, because the review step is more **important**.



Example: An illustration of the timing of an annual inventory process

Source : 2006 IPCC Guidelines for national Greenhouse gas Inventories –PRIMER-



Source : 2006 IPCC Guidelines for national Greenhouse gas Inventories –PRIMER-

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## Collection process of activity data in Japan

- If the activity data are **available** from sources such as **publications** and the **internet**, these data are gathered from these media.
- If the activity data are **not released** in publications, the internet, or other media, these data are obtained by the MOE or the GIO by **requesting** them from the **relevant ministries and agencies** and the **relevant organization** which **control those data**.

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## Practice1: Data Collection

- 1-1 Japan's Case (current situation; from Japanese expert)
- 1-2 Thailand's Case (future vision; from TGO staffs)



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## Major data or statistics and data providers in Japan (1)

Ministry	Major data or statistics
Ministry of the Environment	Research of Air Pollutant Emissions from Stationary Sources / Volume of Waste in Landfill / Volume of Incinerated Waste / Number of People per Johkasou facility / Volume of Human Waste treated at Human Waste Treatment Facilities
Ministry of the Economy, Trade and Industry	General Energy Statistics / Yearbook of Production, Supply and Demand of Petroleum, Coal and Coke / Yearbook of Iron and Steel, Non-ferrous Metals, and Fabricated Metals Statistics / Yearbook of Chemical Industry Statistics / Yearbook of Ceramics and Building Materials Statistics / Census of Manufactures / General outlook on electric power supply and demand

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## Major data or statistics and data providers in Japan (2)

Ministry	Major data or statistics
Ministry of Land, Infrastructure, Transport and Tourism	Annual of Land Transport Statistics / Survey on Transport Energy / Statistical Yearbook of Motor Vehicle Transport / Survey on Current State of Land Use, Survey on Current State of Urban Park Development / Sewage Statistics
Ministry of Agriculture, Forestry and Fisheries	Crop Statistics / Livestock Statistics / Vegetable Production and Shipment Statistics / World Census of Agriculture and Forestry / Statistics of Arable and Planted Land Area / Handbook of Forest and Forestry Statistics / Table of Food Supply and Demand
Ministry of Health, Labour and Welfare	Statistics of Production by Pharmaceutical Industry

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## Major data or statistics and data providers in Japan (3)

Agencies/Organizations	Major data or statistics
Federation of Electric Power Companies	Amount of Fuel Used by Pressurized Fluidized Bed Boilers
Japan Coal Energy Center	Coal Production
Japan Cement Association	Amount of clinker production / Amount of waste input to in raw material processing / Amount of RPF incineration
Japan Iron and Steel Federation	Emissions from Coke Oven Covers, Desulfurization Towers, and Desulfurization Recycling Towers
Japan Paper Association	Amount of final disposal of industrial waste / Amount of RPF incineration
Local Public Entity	Carbon Content of Waste by Composition

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## 1-2 Thailand's Case of Data Collection (Please talk TGO Staff's Opinions)

- Please introduce Thailand's Future Plan (Vision) of Data Collection. (from GHG Information Center Staffs)
  - Mr. Tony-san (Mr. Chetsada)
  - Ms. Note-san (Ms. Wasinee)
  - Ms. B-san (Ms. Wararat)
  - Ms. May-san (Ms. Mewadee)
- Not Published Data / Data Incompatibility / Missing Data etc.
  - The development of new methods of data collection (private sector's data, academic data, etc.)
  - Consideration of the Surrogate Data and adapting data
  - Please refer "IPCC Guidelines" and "National Greenhouse Gas Inventory Report of Annex I countries"

## Practice2: Uncertainty Analysis

- Review of Basic Methods of Uncertainty Analysis
- Introduction of Example of Uncertainty Estimation in "2006 IPCC Guidelines"



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## Review: Example of Emission Factor Uncertainties from 2006 IPCC Guidelines)

TABLE 2.2 DEFAULT EMISSION FACTORS FOR STATIONARY COMBUSTION IN THE ENERGY INDUSTRIES (kg of greenhouse gases per 1 J on a Net Calorific Basis)							
Fuel	CO <sub>2</sub>		CH <sub>4</sub>		N <sub>2</sub> O		
	Default Emissions Factors	Lower Emissions Factors	Upper Emissions Factors	Default Emissions Factors	Lower Emissions Factors	Upper Emissions Factors	
Coke Oil	11.100	11.100	11.540	1.1	1.0	1.0	2
Ornithine	77 000	69 300	85 400	1.1	1.0	1.0	2
Natural Gas Liquids							2
Motor Gasoline	75500 – 73300	75500 – 73300	77300	71100 – 73300	71100 – 73300	73300	0.3
Airline Gasoline							2
Av. Gasoline							2
Gas Turbines	7.1900	6.9700	7.4400	1.1	1.0	1.0	2
Other Sources	72 300	57 500	73 200	1.1	1.0	1.0	2
Soil Oil	14 140	12 500	14 800	1.1	1.0	1.0	2
Gas Diesel Oil							2

TABLE 2.2  
DEFAULT EMISSION FACTORS FOR STATIONARY COMBUSTION IN THE ENERGY INDUSTRIES  
(kg of greenhouse gases per 1 J on a Net Calorific Basis)

TABLE 2.5  
LEVEL OF UNCERTAINTY ASSOCIATED WITH STATIONARY COMBUSTION ACTIVITY DATA

Sector	Well developed statistical systems		Extrapolation	Survey	Less developed statistical systems	Extrapolation
	Surveys	Surveys				
Manufacturing, electricity and heat production	± 2.5%	± 2.5% (from 1%)	± 3.5%	± 3.5%	± 1.5%	± 1.5%
Commercial, institutional, residential, construction	± 4.5%	± 4.5%	± 4.5%	± 4.5%	± 2.5%	± 2.5%
Industrial combustion (Energy intensive in industry)	± 2.3%	± 2.3%	± 3.5%	± 3.5%	± 1.5%	± 1.5%
Industrial combustion (fertilizers)	± 4.5%	± 4.5%	± 4.5%	± 4.5%	± 1.5%	± 1.5%
Biomass in small sources	± 0.3%	± 0.3%	± 0.3%	± 0.3%	± 0.1%	± 0.1%

Source: 2006 IPCC Guidelines Volume 2: Energy

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## Review: Example of Activity Data Uncertainties

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## Review: Basic Equation of “Uncertainties”

- Multiplication: A1 × A2 (e.g. combine EF AD parameter)
- Addition and Subtraction: A1 + A2 (e.g. overall uncertainty in national inventory)

$$U_A = \sqrt{U_{A1}^2 + U_{A2}^2}$$

$$U_{A\text{-total}} = \frac{\sqrt{(U_{A1} \times A_1)^2 + (U_{A2} \times A_2)^2}}{A_1 + A_2}$$

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## Review: Example of Combined Uncertainty

### Example of Default Uncertainty Values (Cement Production: IPPU Sector)

	Emissions (Gg CO <sub>2</sub> /year)	Activity Data Uncertainty (%)	EF Uncertainty (%)	Combined Uncertainty (%)	Contribution to Variance by Category
Source 1	E1	U <sub>A1</sub>	U <sub>EF1</sub>	$CV1 = \sqrt{U_{A1}^2 + U_{EF1}^2}$	$CV1 = \frac{(CU1 \times E1)^2}{(E1 + E2 + E3)^2}$
Source 2	E2	U <sub>A2</sub>	U <sub>EF2</sub>	$CU2 = \sqrt{U_{A2}^2 + U_{EF2}^2}$	$CV2 = \frac{(CU2 \times E2)^2}{(E1 + E2 + E3)^2}$
Source 3	E3	U <sub>A3</sub>	U <sub>EF3</sub>	$CU3 = \sqrt{U_{A3}^2 + U_{EF3}^2}$	$CV3 = \frac{(CU3 \times E3)^2}{(E1 + E2 + E3)^2}$
Total	E1+E2+E3				$\sqrt{CV1^2 + CV2^2 + CV3^2}$

Percentage uncertainty in total Inventory

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### Example of Default Uncertainty Values (Rice Cultivation: AFOLU Sector)

Water regime	Water regime	Disaggregated case		
		Scaling factor (SF <sub>w</sub> )	Error range	Scaling factor (SF <sub>w</sub> )
Upfield <sup>a</sup>	Continuously flooded	1	-	-
Upfield <sup>a</sup>	Intermittently flooded - single season	0.78	0.62 - 0.98	0.60 - 0.80
Upfield <sup>a</sup>	Intermittently flooded - multiple seasons	0.52	0.41 - 0.66	0.41 - 0.66
Rainfed and deep water <sup>c</sup>	R	0.98 - 0.78	≈ +25.6%, 0.78	0.62 - 0.78 0.78 ≈ -20.5%

Source: 2006 IPCC Guidelines Volume 4: AFOLU

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Source: 2006 IPCC Guidelines Volume 3: IPPU

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### Example of Default Uncertainty Values of Parameter (Waste Sector)

#### 3.7.2.2 Uncertainties associated with parameters

##### Methane conversion factor (MCF)

There are two sources of uncertainty in the MCF:

- Uncertainty in the value of the MCF for each type of site (managed-animal manure, municipal sludge, under high water table, untreated, shallow). These MCF values are based on one experimental study, and are not independent and not on measured data.
- Uncertainty in the classification of sites into the different site types. For example, the distinction between deep and shallow sites (in depth of water) is based on expert opinion. Uncertainty in this classification is also nonnegligible and can affect the MCF values based on measured data. It can also be difficult to determine which sites fall into the MCF categories for managed sites.

Production Data  
Reported (global-level) cement production data  
Assumption that country output is 100% portland cement

Production Data  
Reported (global-level) cement production data  
Assumption that country output is 100% portland cement

Source: 2006 IPCC Guidelines Volume 5: Waste

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## Practice3: Emission Calculation and Uncertainty Calculation

- 3-1 Calculation of Case Study (Every Sector)
- 3-2 Introduction of the Example of GHG inventory (Case Study; based on the example of “2006 IPCC Guidelines”; from Japanese Expert)
- 3-3 Practice of Uncertainty Analysis of above GHG inventory (Case Study; calculated by TGO Staffs)
- 3-4 Discussion “Issue of Uncertainty Analysis in Thailand”

## Practice3-1: Calculation Practice of GHG Inventory (easy case study) (part2)

- (3) AFOLU Sector
  - Activity Data: Thailand’s Initial National Communication & FAO Statistics
  - EF and Uncertainty: 2006 IPCC Guidelines
- (4) Waste Sector
  - Activity Data: United Nations data (Industrial Commodity Statistics Database)
  - EF and Uncertainty: 2006 IPCC Guidelines

## Practice3-1: Calculation Practice of GHG Inventory (easy case study) (part1)

- (1) Energy Sector
  - Activity Data: IEA Energy Statistics
  - EF and Uncertainty: 2006 IPCC Guidelines
- (2) IPPU Sector
  - Activity Data: United Nations data (Industrial Commodity Statistics Database)
  - EF and Uncertainty: 2006 IPCC Guidelines

## 3-2 Introduction of the Example of GHG inventory and Uncertainty

- JICA Expert prepares the Excel file.
- This Excel file is a case study of “Uncertainty Analysis” and “Key Category Analysis”.
- This case study is the example of “2006 IPCC Guidelines”.
- JICA Expert will explain the outline of this Excel file at first.

### 3-3 Practice of Uncertainty Analysis of above GHG inventory and Uncertainty

- TGO (GHG Information Center) staffs will calculate the “Uncertainty” in this case study (this Excel file).
- JICA Expert will advise the calculation methods.
- The calculation method of the “Uncertainty” is not difficult in itself.
- The set of values of the “Uncertainty” is very difficult.

### 3-4 Comments about Uncertainty Analysis (not official opinion)

- If the uncertainty value of each sub-category can be set, it is **not difficult** to **calculate** the **mathematical expression** of uncertainty analysis.
- It is difficult to **set the uncertainty values** of activity and emission factors of each sub-category. Moreover, the **explanation of the reasons of these value** is also difficult.

### 3-4 Discussion “Issue of Uncertainty Analysis in Thailand”

- Please discuss the issue of the “Uncertainty Analysis” in Thailand. (Thai Language is OK.)

### Practice4: Key Category Analysis

- 4-1 Basic Methods of Key Category Analysis (from Japanese Expert)
- 4-2 Practice of Key Category Analysis of above GHG inventory and Uncertainty Analysis (calculated by TGO Staffs)
- 4-3 Discussion “Issue of Key Category Analysis in Thailand”

## 4-1 Basic Methods of Key Category Analysis (from Japanese Expert)

- JICA Expert prepares the Excel file.
- This Excel file is a case study of "Uncertainty Analysis" and "Key Category Analysis".
- This case study is the example of "2006 IPCC Guidelines".
- JICA Expert will explain the outline of this Excel file at first.



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## 4-3 Discussion “Issue of Key Category Analysis in Thailand”

- Please discuss the issue of the "Key Category Analysis" in Thailand. (Thai Language is OK.)

## 4-2 Practice of Key Category Analysis of above GHG inventory and Uncertainty Analysis

- TGO staffs will calculate the "Key Category Analysis" in this case study (this Excel file).
- JICA Expert will advise the calculation methods.
- The calculation method of the "Key Category Analysis" is a little complex (not easy).



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## 4-3 Comments about Key Category Analysis (not official opinion)

- Though the calculation procedure may be complicated, it is **not difficult** to calculate the "key category analysis" using the "2006 IPCC Guidelines".
- It is necessary to prepare the **amounts of emission of the base year and current year and uncertainty analysis of each sub-category**, and it is **very complex**.



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## 4-3 Comments about Uncertainty and Key Category Analysis (not official opinion)

- First, it is important to **understand the flow from the uncertainty analysis to the key category analysis** by using a simple **Tier1 method**. (not only the level but also the uncertainty)
- If the **secular change** of GHG inventory are obtained, it is good practice to execute the **trend assessment**.



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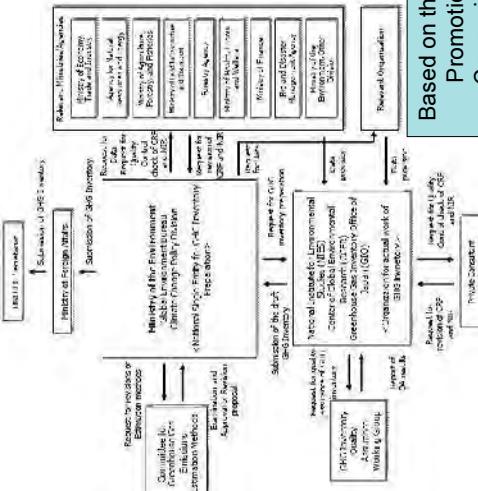
## Practice 5: Other Issues

- 5-1 QA/QC system in Japan
- 5-2 QA/QC system in Thailand (future plan)
- 5-3 Discussion "Development of GHG Inventory in Thailand"



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## 5-1 QA/QC system in Japan



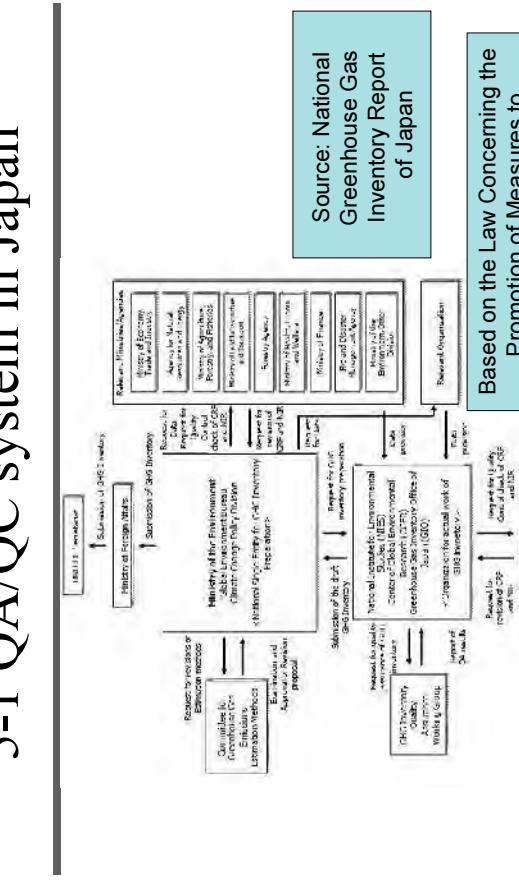
## 5-1 Summary of Japan's QA/QC activity (Quality Control Part1)

Implementing entity	Main contents of activity
Ministry of Environment (Climate Change Policy Division, Global Environment Bureau)	<ul style="list-style-type: none"> <li>• Progress management of the inventory compilation and over all control</li> <li>• Check of inventory compiled by the GIO (CRF, NIR, spreadsheets, and other information)</li> <li>• Establishment and inventory improvement plan</li> <li>• Check of the inventory improvement plan</li> <li>• Holding the meeting of the Committee for the Greenhouse Gas Emissions Estimation Methods</li> </ul>



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## 5-1 Summary of Japan's QA/QC activity



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## 5-1 Summary of Japan's QA/QC activity (Quality Control Part2)

Implementing entity	Main contents of activity
Greenhouse Gas Inventory Office of Japan, Center for Global Environmental Research, National Institute for Environmental Studies (GIO)	<ul style="list-style-type: none"> <li>•QC Check in inventory compilation</li> <li>•Archiving of QA/QC activity records and relevant data and documents</li> <li>•Development of information system</li> <li>•Making of inventory improvement plan</li> <li>•Making of revised QA/QC plan</li> </ul>

## 5-1 Summary of Japan's QA/QC activity (Quality Control Part4)

Implementing entity	Main contents of activity
Committee for the Greenhouse Gas Emissions Estimation Methods	<ul style="list-style-type: none"> <li>•Discussion and Assessment for estimation methods, emission factors, and activity data</li> </ul>
Private Consultant Companies	<ul style="list-style-type: none"> <li>•Check of inventory compiled by the GIO (CRF, NIR, spreadsheets, and other information)</li> </ul>

## 5-1 Summary of Japan's QA/QC activity (Quality Control Part3)

Implementing entity	Main contents of activity
Relevant Ministry and Agencies (including the Ministry of the Environment) and relevant organization	<ul style="list-style-type: none"> <li>•Preparation of activity data, emission factor, and other data needed for inventory compilation, and submission of the data by the submission deadline</li> <li>•Check of various data supplying to the GIO</li> <li>•Check and validation of inventory compiled by GIO (CRF, NIR, spreadsheets, and other information)</li> </ul>

## 5-1 Summary of Japan's QA/QC activity (Quality Control Part3)

## 5-2 Future Plan of Thailand's QA/QC

- Freely
- Who?
- What?
- How?



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## 5-4 Comments of Other Issue

- Inventory compilers must make the GHG inventory step by step.
  - First: Data Collection
  - Second: Inventory Production Cycle
  - Third and fourth..... : the "Key category Analysis", "Uncertainty Analysis" .....
- There are many manuals such as each "IPCC Guidelines", "EMEP/EEA emission inventory guidebook 2009" etc.. The more recent manual include more useful information. So inventory compilers should collect recent information about Manual.



## Conclusions (part 1)

- Inventories are very useful for the rational policy development for Low Carbon Society.
- Inventory can be used;
  - To identify the major sectors where abatement will have a real impact.
  - To predict and compare impacts of various policies.
  - To choose cost-effective options.



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## Conclusions (part 1)

- Inventories are very useful for the rational policy development for Low Carbon Society.
- Inventory can be used;
  - To identify the major sectors where abatement will have a real impact.
  - To predict and compare impacts of various policies.
  - To choose cost-effective options.



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## 5-3 Discussion “Development of GHG Inventory in Thailand”

- Freely
- Bottle neck of development of GHG Inventory
- Data collection (missing data/ confidential data/ exclusive data/generating new data, etc. ....)
- Development of Inventory Production Cycle



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## Conclusions (part 2)

- Inventories are very essential to monitor the impacts of mitigation policies and measures.
  - Policy makers need to know if policies are working.
  - Inventory methods should be chosen to reflect impacts of mitigation actions.

Source: Kiyoto Tanabe's Presentation Material (12 July 2010, Thailand)  
45  
 TGO The Project for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand

## Conclusions (part 3)

- Good quality national GHG inventories are getting more and more important as they are key to mitigation actions in a MRV ("Measurable, Reportability and Verifiability") manner.

Source: Kiyoto Tanabe's Presentation Material (12 July 2010, Thailand)  
46  
 TGO The Project for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand

## Conclusions (part 4)

- Key factors for success in inventory development are, among others;
  - Frequent and sustained inventory cycle.
    - Routinized inventory work helps improve inventory team's capacity and facilitate data collection.
  - Institutional arrangements
  - Quality Assurance and Quality Control
    - Systematic quality check procedures help continuously improve inventory quality.

Source: Kiyoto Tanabe's Presentation Material (12 July 2010, Thailand)  
47  
 TGO The Project for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand

Source: Kiyoto Tanabe's Presentation Material (12 July 2010, Thailand)  
48  
 TGO The Project for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand

成果品 2：研修教材、トレーナー訓練用ガイドライン

**Target Groups**

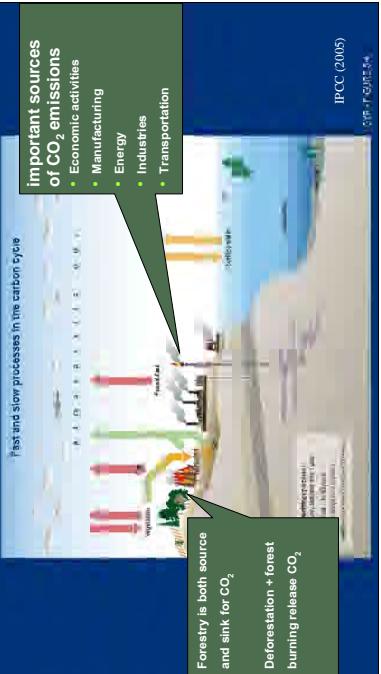
<b>Code</b>	<b>Target group</b>
G	General audience
PP	Project proponent and Consultant
A	Thai governmental agencies and DNAs in Southeast Asia

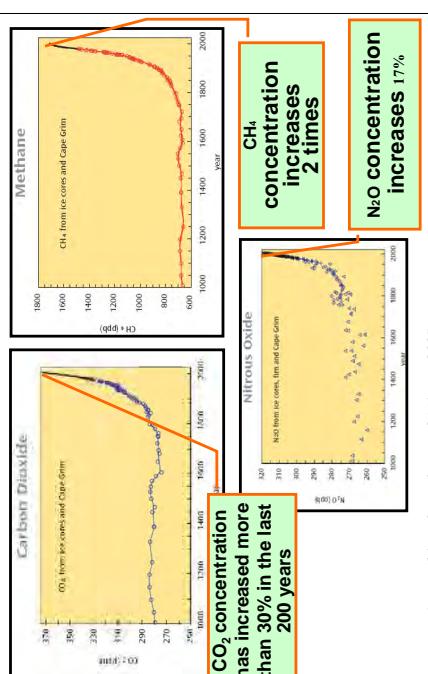
## Clean Development Mechanism (CDM)

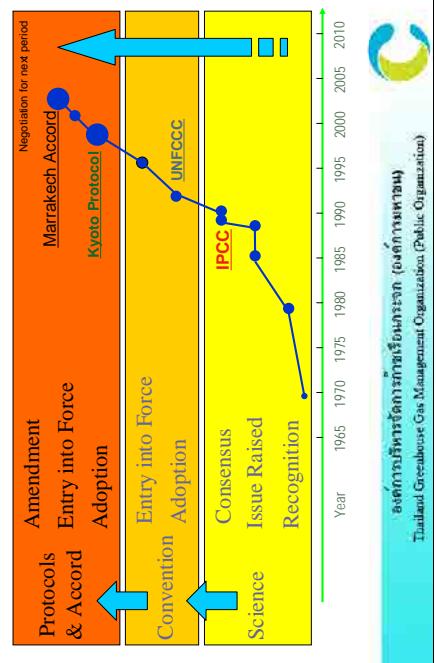
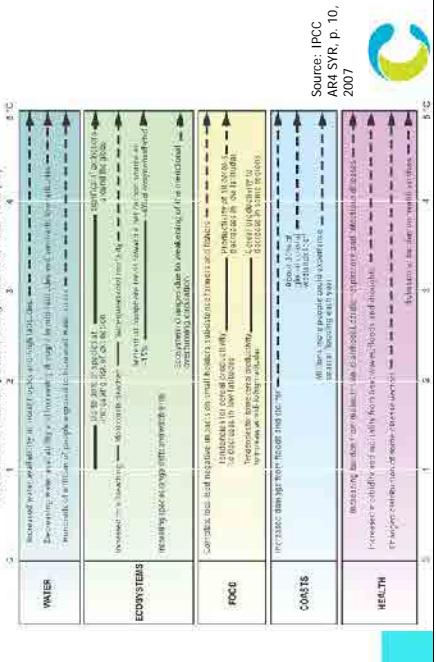
**Update History**

<b>Version</b>	<b>Date</b>	<b>Update Contents</b>
01	29/07/2010	Initial adoption

<p><b>CDM01-01</b></p>	<p><b>Target Group: G, PP, A</b></p>	<p><b>CDM01-02</b></p>	<p><b>Target Group: G</b></p>
<p><b>Basic Knowledge about CDM</b></p> <p></p> <p><b>prepared by:</b> Paweena Panichayapichet Review and Approval Office</p> <p></p> <p>ประเทศไทย Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p>(Mention A/R CDM is not covered in this presentation.)</p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Human activities have increased the <b>GHG concentration</b> in the atmosphere faster than natural level</li> <li>- Such increasing volume of greenhouse gases is trapped in the atmosphere, causing <b>rapid temperature increase</b> in global level</li> <li>- GHG (Greenhouse Gases)</li> </ul> <p></p>	<p><b>Reference and Additional Information</b></p> <p></p> <p><b>Greenhouse Gases (GHGs) and Global Warming</b></p> <ul style="list-style-type: none"> <li>▪ Gases absorb some of the outgoing infrared radiation and trap the heat in the atmosphere. </li> <li>▪ These gases are essential to maintain the temperature of the earth for living, <b>However, human activities generate greenhouse gases more than natural level</b> </li> <li>▪ Increase in the temperature of the earth</li> </ul> <p></p> <p>ประเทศไทย Thailand Greenhouse Gas Management Organization (Public Organization)</p>

<p><b>CDM01-04</b></p>	<p><b>Target Group: G</b></p>
<p><b>Human activities have increased GHG concentration</b></p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p><b>Human activities are major cause for the increase of CO<sub>2</sub> concentration in carbon cycle</b></p>  <p>IPCC (2007)</p> </div>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The graph is showing a general <b>carbon cycle</b>, both <b>natural</b> and <b>anthropogenic</b> (human induced)</li> <li>- Natural cycles include rather slow carbon release from water body or natural soil</li> <li>- <b>Anthropogenic cycle</b> is much faster than natural cycles, which include <ul style="list-style-type: none"> <li>• Economic activities, manufacturing, energy generation and consumption, various industrial activities, transportation activities, etc. as well as,</li> <li>• Carbon release from deforestation</li> </ul> </li> </ul>

<p><b>CDM01-03</b></p>	<p><b>Target Group: G</b></p>
<p><b>Human activities have increased GHG concentration</b></p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p><b>CO<sub>2</sub> concentration has increased more than 30% in the last 200 years</b></p> <p><b>CH<sub>4</sub> concentration increases 2 times</b></p> <p><b>N<sub>2</sub>O concentration increases 17%</b></p> <p>Source : Australian Greenhouse Office, 2005</p> </div>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- 3 graphs are showing how three major GHGs have increased in the last 1000 years</li> <li>- All gases have <b>rapidly increased in the past 200 years</b> corresponding to the increase of human activity levels that rocketed after the start of the industrial revolution</li> </ul>

<b>CDM01-06</b>	<b>Target Group: G</b>  <div style="border: 1px solid black; padding: 10px; width: 100%;"> <p style="text-align: center;"><b>Development of International Treaties</b></p>  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Protocols &amp; Accord</th> <th style="text-align: left;">Amendment</th> <th style="text-align: left;">Entry into Force</th> <th style="text-align: left;">Adoption</th> </tr> </thead> <tbody> <tr> <td>Marrakech Accord</td> <td>Marrakech Accord</td> <td>Marrakech Accord</td> <td>Marrakech Accord</td> </tr> <tr> <td>Kyoto Protocol</td> <td>Kyoto Protocol</td> <td>Kyoto Protocol</td> <td>Kyoto Protocol</td> </tr> </tbody> </table> <p style="text-align: right;">Year 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010</p> <p style="text-align: right;">UNFCCC</p> <p style="text-align: right;">Kyoto Protocol</p> <p style="text-align: right;">Marrakech Accord</p> </div>	Protocols & Accord	Amendment	Entry into Force	Adoption	Marrakech Accord	Marrakech Accord	Marrakech Accord	Marrakech Accord	Kyoto Protocol	Kyoto Protocol	Kyoto Protocol	Kyoto Protocol													
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<b>CDM01-06</b>	<b>Target Group: G PP,A</b>  <div style="border: 1px solid black; padding: 10px; width: 100%;"> <p style="text-align: center;"><b>Impacts of Climate Change</b></p>  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">WATER</th> <th style="text-align: left;">ECOSYSTEMS</th> <th style="text-align: left;">INSET</th> <th style="text-align: left;">COASTS</th> <th style="text-align: left;">HEALTH</th> </tr> </thead> <tbody> <tr> <td>Increased precipitation in most regions, especially in developing countries.</td> <td>Increased incidence of droughts and desertification.</td> <td>Projected increase in global average temperature by 2050.</td> <td>Approx. 3°C increase in coastal areas due to sea level rise.</td> <td>Global mean annual temperature change relative to 1986-1990 (°C)</td> </tr> <tr> <td>Extreme weather events like floods and storms will become more frequent and intense.</td> <td>Loss of biodiversity and ecosystem services.</td> <td>Impact of climate change on health through vector-borne diseases, heatwaves, and malnutrition.</td> <td>Sea level rise, coastal flooding, and erosion.</td> <td>Health</td> </tr> <tr> <td>Increased risk of coastal flooding and saltwater intrusion.</td> <td>Loss of habitat for many species.</td> <td>Heatwaves, vector-borne diseases, and malnutrition.</td> <td>Sea level rise, coastal flooding, and erosion.</td> <td>Health</td> </tr> <tr> <td>Increased risk of coastal flooding and saltwater intrusion.</td> <td>Loss of habitat for many species.</td> <td>Heatwaves, vector-borne diseases, and malnutrition.</td> <td>Sea level rise, coastal flooding, and erosion.</td> <td>Health</td> </tr> </tbody> </table> <p style="text-align: right;">Source: IPCC AR4 SR, p. 10. 2007</p> <p style="text-align: right;">UNFCCC</p> </div>	WATER	ECOSYSTEMS	INSET	COASTS	HEALTH	Increased precipitation in most regions, especially in developing countries.	Increased incidence of droughts and desertification.	Projected increase in global average temperature by 2050.	Approx. 3°C increase in coastal areas due to sea level rise.	Global mean annual temperature change relative to 1986-1990 (°C)	Extreme weather events like floods and storms will become more frequent and intense.	Loss of biodiversity and ecosystem services.	Impact of climate change on health through vector-borne diseases, heatwaves, and malnutrition.	Sea level rise, coastal flooding, and erosion.	Health	Increased risk of coastal flooding and saltwater intrusion.	Loss of habitat for many species.	Heatwaves, vector-borne diseases, and malnutrition.	Sea level rise, coastal flooding, and erosion.	Health	Increased risk of coastal flooding and saltwater intrusion.	Loss of habitat for many species.	Heatwaves, vector-borne diseases, and malnutrition.	Sea level rise, coastal flooding, and erosion.	Health
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### Key Points

- The graph is taken from the latest **IPCC report released in 2007**
- The graph is showing the expected and possible impacts of climate change depending on the temperature increase

*(Choose several impact elements which target audience has the highest interest, and explain in detail)*

### Reference and Additional Information

- IPCC report (Climate Change 2007: Synthesis Report)  
[http://www.ipcc.ch/publications\\_and\\_data/ar4/syr/en/spm3.html](http://www.ipcc.ch/publications_and_data/ar4/syr/en/spm3.html)

- Currently international world is negotiating about the framework after 2013, often referred as **post-Kyoto regime**
- International world reacted to climate change first at scientific level in the early 1970's, in which scientists argued the relationship between greenhouse gases concentrations and global temperature change
- IPCC** (Intergovernmental Panel on Climate Change) issued a first report on climate change impacts **in 1990**
- As a result of this IPCC report and international recognition, **UNFCCC** (United Nations Framework Convention on Climate Change) was **adopted in 1992**
- Since UNFCCC does not impose any numerical reduction requirement for developed countries (Annex-I countries), **Kyoto Protocol was adopted in 1997** and then **entered into force in 2005**

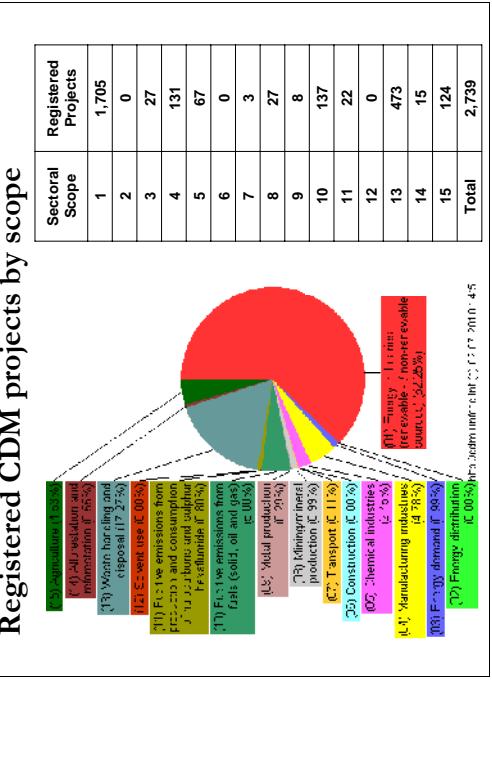
<h3>UNFCCC Participant Parties</h3> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Currently 194 countries, or "Parties," join the <b>UNFCCC</b></li> <li>- Under UNFCCC, 41 developed countries, or "Annex I countries," have commitment to reduce GHG, while the remaining 153 developing countries, or "Non-Annex I countries," do not have commitment to reduce GHG emissions.</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- List of Annex-I countries <a href="http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php">http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php</a></li> <li>- List of Non Annex-I countries <a href="http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php">http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php</a></li> </ul>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Under <b>Kyoto Protocol</b>, Annex-I countries are required to reduced GHG emissions by 5% below that of 1990 emission level between the years 2008 to 2012, which is called the first commitment period</li> <li>- Annex I countries also have commitment to submit National Communication and give financial support and technology transfer to non-Annex I countries</li> <li>- Non-Annex I countries are also required to prepare and submit to UNFCCC a National Communication report if a country receives financial support.</li> <li>- But all Non-Annex I countries basically share the principle of UNFCCC and support climate change alleviation</li> </ul>
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<p><b>CDM01-07</b></p>	<p><b>Target Group: G, PP, A</b></p>																	
<h3>Emission Reduction Target under Kyoto Protocol</h3> <table border="1"> <thead> <tr> <th></th> <th>% reduction from 1990</th> </tr> </thead> <tbody> <tr> <td>EU-15</td> <td>-8%</td> </tr> <tr> <td>(US)</td> <td>(-7%)</td> </tr> <tr> <td>Canada, Hungary, Japan, Poland</td> <td>-6%</td> </tr> <tr> <td>Croatia</td> <td>-5%</td> </tr> <tr> <td>New Zealand, Russian Federation, Ukraine</td> <td>0%</td> </tr> <tr> <td>Norway</td> <td>+1%</td> </tr> <tr> <td>Australia</td> <td>+8%</td> </tr> <tr> <td>Iceland</td> <td>+10%</td> </tr> </tbody> </table> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Table shows the <b>legally-binding commitment</b> of some of the major <b>Annex-I countries</b> for their reduction target under Kyoto Protocol</li> <li>- Countries have different level of reduction target depending on their economic activity size and growth from base year of 1990 and also as a result of long and intense international negotiations</li> <li>- As for the <b>United States</b>, they adopted the Kyoto Protocol but later withdrew from the Protocol and thus they do not have any reduction commitment</li> <li>- Although reduction targets for each EU member state Parties are -8%, targets are adjusted among the EU countries</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- Emission target of Annex-I countries <a href="http://unfccc.int/kyoto_protocol/items/3145.php">http://unfccc.int/kyoto_protocol/items/3145.php</a></li> </ul>		% reduction from 1990	EU-15	-8%	(US)	(-7%)	Canada, Hungary, Japan, Poland	-6%	Croatia	-5%	New Zealand, Russian Federation, Ukraine	0%	Norway	+1%	Australia	+8%	Iceland	+10%
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CDM01-09	Target Group: G, PP, A	<p><b>CDM</b></p> <p><b>CDM</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Defined in Kyoto Protocol as one of Kyoto Mechanisms</li> <li><input type="checkbox"/> Annex I countries invest in projects that can reduce GHG emissions in Non-Annex I countries</li> <li><input type="checkbox"/> The resulting certified emission reductions (CERs) are counted toward Annex-I country's own target</li> </ul> <p>Source: Kyoto Mechanisms Information Platform <a href="http://www.kemetcha.org/">www.kemetcha.org/</a></p>	<p><b>Target Group: G, PP, A</b></p>
CDM01-10	Target Group: G, PP, A	<p><b>Clean Development Mechanism</b></p> <p><b>CDM</b></p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p>Reference and Additional Information</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Clean Development Mechanism is one of the schemes stipulated in Kyoto Protocol, together with Joint Implementation (JI) and Emission Trading (these 3 mechanisms are called <b>Kyoto Mechanism</b>)</li> <li>- Under CDM, developed country provides <b>finance and/or clean technology</b> and carries out GHG emission reduction project in developing country</li> <li>- Amount of GHG emissions reduced in that developing country (or so called host country) is counted as a carbon credit called <b>Certified Emission Reductions (CER)</b> and can be transferred to the Annex-I country (or called investment country) to meet its reduction target under Kyoto Protocol</li> </ul> <p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- CDM official website <a href="http://cdm.unfccc.int/index.html">http://cdm.unfccc.int/index.html</a></li> </ul>	<p><b>Target Group: G, PP, A</b></p>

CDM01-11	Target Group: G, PP, A	Target Group: G, PP, A																						
	<p><b>Major GHGs defined in Kyoto Protocol</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding-bottom: 5px;">Greenhouse Gas</th> <th style="text-align: left; padding-bottom: 5px;">Formula</th> <th style="text-align: left; padding-bottom: 5px;">Global Warming Potential (CO<sub>2</sub> equivalent)</th> </tr> </thead> <tbody> <tr> <td style="padding-top: 5px;"><b>Carbon dioxide</b></td> <td style="padding-top: 5px;">CO<sub>2</sub></td> <td style="padding-top: 5px;">1</td> </tr> <tr> <td style="padding-top: 5px;"><b>Methane</b></td> <td style="padding-top: 5px;">CH<sub>4</sub></td> <td style="padding-top: 5px;">21</td> </tr> <tr> <td style="padding-top: 5px;"><b>Nitrous oxide</b></td> <td style="padding-top: 5px;">N<sub>2</sub>O</td> <td style="padding-top: 5px;">310</td> </tr> <tr> <td style="padding-top: 5px;"><b>Hydrofluorocarbons</b></td> <td style="padding-top: 5px;">HFCs</td> <td style="padding-top: 5px;">140 - 11,700</td> </tr> <tr> <td style="padding-top: 5px;"><b>Perfluorocarbons</b></td> <td style="padding-top: 5px;">PFCs</td> <td style="padding-top: 5px;">6,500 - 9,200</td> </tr> <tr> <td style="padding-top: 5px;"><b>Sulphur hexafluoride</b></td> <td style="padding-top: 5px;">SF<sub>6</sub></td> <td style="padding-top: 5px;">23,900</td> </tr> </tbody> </table> <p>Source: IPCC, 2005</p>  <p style="text-align: right; font-size: small;">ประเทศไทยเพื่อการจัดการกําลังไอน้ำและกําลังตํารุณ (ประเทศไทยเพื่อการจัดการกําลังไอน้ำและกําลังตํารุณ) Thailand Greenhouse Gas Management Organization (Public Organization)</p>	Greenhouse Gas	Formula	Global Warming Potential (CO <sub>2</sub> equivalent)	<b>Carbon dioxide</b>	CO <sub>2</sub>	1	<b>Methane</b>	CH <sub>4</sub>	21	<b>Nitrous oxide</b>	N <sub>2</sub> O	310	<b>Hydrofluorocarbons</b>	HFCs	140 - 11,700	<b>Perfluorocarbons</b>	PFCs	6,500 - 9,200	<b>Sulphur hexafluoride</b>	SF <sub>6</sub>	23,900	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Voluntary participation by Parties involved</li> <li>- Real, measurable &amp; long-term benefits related to the mitigation of climate change</li> <li>- Emission reductions are additional to any that would occur in the absence of the CDM project</li> <li>- Sustainable development</li> </ul> <p></p> <p style="text-align: right; font-size: small;">ประเทศไทยเพื่อการจัดการกําลังไอน้ำและกําลังตํารุณ (ประเทศไทยเพื่อการจัดการกําลังไอน้ำและกําลังตํารุณ) Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- Kyoto Protocol defines target GHGs</li> <li>- A project that reduces only these 6 types of gases is eligible to CDM</li> <li>- A level of global warming impacts is different depending on the gas. For example, 1 ton of nitrous oxide has the same <b>global warming impacts</b> as 310 tons of carbon dioxide.</li> <li>- Amount of GHG reduction in all CDM projects is expressed in <b>ton of CO<sub>2</sub>-equivalent</b>.</li> </ul>
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CDM01-12	Target Group: G, PP, A	Target Group: G, PP, A
	<p><b>Principle of CDM</b></p> <ul style="list-style-type: none"> <li>- Voluntary participation by Parties involved</li> <li>- Real, measurable &amp; long-term benefits related to the mitigation of climate change</li> <li>- Emission reductions are additional to any that would occur in the absence of the CDM project</li> <li>- Sustainable development</li> </ul> <p></p> <p style="text-align: right; font-size: small;">ประเทศไทยเพื่อการจัดการกําลังไอน้ำและกําลังตํารุณ (ประเทศไทยเพื่อการจัดการกําลังไอน้ำและกําลังตํารุณ) Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Four of the major <b>principles of CDM</b></li> <li>- A participating country must host or invest to CDM project <b>on a voluntary basis</b>, instead of being forced to join</li> <li>- Emission reduction must be real and <b>can be measured or calculated</b>, and also the project must bring long-term benefit</li> <li>- CDM project must be <b>additional</b>, in other words, proposed CDM project would not occur without CDM and CER revenue</li> </ul> <p style="text-align: right; font-size: small;"><i>(Additionality is explained in later slides in more detail)</i></p> <p style="text-align: right; margin-top: 10px;">☞ CDM-01-26</p> <ul style="list-style-type: none"> <li>- CDM project must contribute to <b>sustainable development</b> of host country. This point is the key issue in obtaining national approval from TGO.</li> </ul>

CDM01-13	Target Group: G, PP, A	CDM01-14	Target Group: G, PP, A																																		
<p><b>Registered CDM projects by scope</b></p>  <table border="1"> <thead> <tr> <th>Sectoral Scope</th> <th>Registered Projects</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1,1705</td> </tr> <tr> <td>2</td> <td>0</td> </tr> <tr> <td>3</td> <td>27</td> </tr> <tr> <td>4</td> <td>131</td> </tr> <tr> <td>5</td> <td>67</td> </tr> <tr> <td>6</td> <td>0</td> </tr> <tr> <td>7</td> <td>3</td> </tr> <tr> <td>8</td> <td>27</td> </tr> <tr> <td>9</td> <td>8</td> </tr> <tr> <td>10</td> <td>137</td> </tr> <tr> <td>11</td> <td>22</td> </tr> <tr> <td>12</td> <td>0</td> </tr> <tr> <td>13</td> <td>473</td> </tr> <tr> <td>14</td> <td>15</td> </tr> <tr> <td>15</td> <td>124</td> </tr> <tr> <td>Total</td> <td>2,739</td> </tr> </tbody> </table> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- There are 15 sectors, or <b>sectoral scopes</b>, eligible for CDM project activities.</li> <li>- Most of the registered projects in Thailand are from <ul style="list-style-type: none"> <li>• sector 1 (energy industries, such as biomass power generation), and</li> <li>• sector 13 (waste handling and disposal, including waste and wastewater management)</li> </ul> </li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- Sectoral scopes <a href="http://cdm.unfccc.int/DOE/scopes.html">http://cdm.unfccc.int/DOE/scopes.html</a></li> </ul>				Sectoral Scope	Registered Projects	1	1,1705	2	0	3	27	4	131	5	67	6	0	7	3	8	27	9	8	10	137	11	22	12	0	13	473	14	15	15	124	Total	2,739
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CDM01-13	Target Group: G, PP, A
<p><b>Scope of CDM projects</b></p> <ol style="list-style-type: none"> <li>1. Energy Industries</li> <li>2. Energy Distribution</li> <li>3. Energy Demand</li> <li>4. Manufacturing Industries</li> <li>5. Chemical Industries</li> <li>6. Construction</li> <li>7. Transport</li> <li>8. Mining/mineral production</li> <li>9. Metal production</li> <li>10. Fugitive emissions from fuels</li> <li>11. Fugitive emissions from production and consumption of halocarbons and SF<sub>6</sub></li> <li>12. Solvent use</li> <li>13. Waste handling and disposal</li> <li>14. Afforestation and reforestation</li> <li>15. Agriculture</li> </ol> <p>Source: <a href="http://cdm.unfccc.int/DOE/scopes.html">http://cdm.unfccc.int/DOE/scopes.html</a></p>  <p>Thailand Greenhouse Gas Management Organization. (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- There are 15 sectors, or <b>sectoral scopes</b>, eligible for CDM project activities.</li> <li>- Most of the registered projects in Thailand are from <ul style="list-style-type: none"> <li>• sector 1 (energy industries, such as biomass power generation), and</li> <li>• sector 13 (waste handling and disposal, including waste and wastewater management)</li> </ul> </li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- Sectoral scopes <a href="http://cdm.unfccc.int/DOE/scopes.html">http://cdm.unfccc.int/DOE/scopes.html</a></li> </ul>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This graph is taken from CDM Executive Board official website, showing the distribution of registered project by sectoral scope in the world</li> <li>- As of (July 2nd 2010), (2,739) CDM projects have been registered in the world.</li> <li>- The largest portion is from the <b>Sectoral Scope 1 “Energy Industries (renewable/non-renewable sources)”</b> which includes for example, a construction of grid-connected renewable energy power generation plant.</li> <li>- Second most common sector is 13 “Waste handling and disposal”</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- CDM statistics <a href="http://cdm.unfccc.int/Statistics/index.html">http://cdm.unfccc.int/Statistics/index.html</a></li> </ul>

CDM01-15	Target Group: G, PP, A	<p><b>Registered CDM projects by host country</b></p> <table border="1"> <thead> <tr> <th>Host Country</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>China</td><td>50.7%</td></tr> <tr><td>India</td><td>11.59%</td></tr> <tr><td>Brazil</td><td>5.68%</td></tr> <tr><td>Republic of Korea</td><td>4.03%</td></tr> <tr><td>Mexico</td><td>2.55%</td></tr> <tr><td>Malaysia</td><td>1.37%</td></tr> <tr><td>Chile</td><td>1.27%</td></tr> <tr><td>Indonesia</td><td>1.17%</td></tr> <tr><td>Argentina</td><td>1.13%</td></tr> <tr><td>Nigeria</td><td>1.12%</td></tr> <tr><td>Others</td><td>9.70%</td></tr> </tbody> </table> <p><a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a> (c) 02.07.2010 14:53 Thailand Greenhouse Gas Management Organization. (Public Organization)</p>	Host Country	Percentage	China	50.7%	India	11.59%	Brazil	5.68%	Republic of Korea	4.03%	Mexico	2.55%	Malaysia	1.37%	Chile	1.27%	Indonesia	1.17%	Argentina	1.13%	Nigeria	1.12%	Others	9.70%
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CDM01-16	Target Group: G, PP, A	<p><b>CDM Cycle</b></p> <pre> graph TD     PDD[PDD (Project Design Document)] --&gt; Validation[Validation]     Validation --&gt; DOE1[Designated Operational Entity (DOE 1)]     DOE1 --&gt; Registration[Registration]     Registration --&gt; ProjectImplementation[Project Implementation]     ProjectImplementation --&gt; Monitoring[Monitoring]     Monitoring --&gt; Verification[Verification/Certification]     Verification --&gt; CERs[CERs]     CERs --&gt; DOE2[Designated Operational Entity (DOE 2)]     DOE2 --&gt; CDMExecutiveBoard1[CDM Executive Board]     CDMExecutiveBoard1 --&gt; CERs     CERs --&gt; CDMExecutiveBoard2[CDM Executive Board]     CDMExecutiveBoard2 --&gt; CERs     </pre> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Chart shows general CDM project cycle from project design to CER issuance</li> <li>- Project Proponent (PP) first prepares <b>Project Design Document (PDD)</b>, which describes project description, technology applied, baseline and additionality, how to monitor and calculate GHG emission reductions, etc. PP must use a standard format of PDD provided by CDM Executive Board</li> <li>- Using the developed PDD, PP must obtain <b>national approval from TGO</b>, and also has to go through a <b>validation</b> process that will be conducted by a third independent party called <b>Designated Operational Entity (DOE)</b>.</li> <li>- This graph is showing the number of registered projects by host country as of (July 2nd 2010)</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- CDM statistics <a href="http://cdm.unfccc.int/Statistics/index.html">http://cdm.unfccc.int/Statistics/index.html</a></li> </ul>																								

CDM01-17	Target Group: G, PP, A	<p><b>Type of CDM project</b></p> <p><input type="checkbox"/> <b>Size of project (Project participants can not choose)</b></p> <p><input type="checkbox"/> Large-scale</p> <p><input type="checkbox"/> Small-scale</p> <p><input type="checkbox"/> <b>Character of project (Project participants can choose)</b></p> <p><input type="checkbox"/> Normal</p> <p><input type="checkbox"/> Bundle</p> <p><input type="checkbox"/> PoA</p>  <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>
CDM01-18	Target Group: G, PP, A	<p><b>Type of CDM project:</b> <b>Small-scale projects</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Simplified rules and procedures:             <ul style="list-style-type: none"> <li><input type="checkbox"/> Project proponent can use simplified PDD and methodologies:                     <ul style="list-style-type: none"> <li><input type="checkbox"/> Can save transaction costs and time</li> <li><input type="checkbox"/> Types of project                         <ul style="list-style-type: none"> <li><input type="checkbox"/> Type I: Renewable energy                             <ul style="list-style-type: none"> <li><input type="checkbox"/> Max. capacity of 15 MW</li> <li><input type="checkbox"/> Type II: Energy efficiency improvement                                 <ul style="list-style-type: none"> <li><input type="checkbox"/> Supply and/or demand side</li> <li><input type="checkbox"/> Max. saving of 60 GWh/year</li> </ul> </li> <li><input type="checkbox"/> Type III: Other project activities                                 <ul style="list-style-type: none"> <li><input type="checkbox"/> Emission reductions of less than 60,000 tons of CO<sub>2</sub> equivalent annually</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul>  <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- PP of <b>small-scale CDM project</b> can benefit from various points, including they can use more simple PDD format and methodology than large-scale, which also means they can save significant time and cost in preparing the document</li> <li>- There are <b>three types of small-scale CDM project activities</b> depending on the technology/ sector of the proposed project</li> <li>- A proposed project must fall within the maximum allowed project size defined by CDM Executive Board in order to be eligible to small-scale</li> <li>- <b>Type I</b> project is a <b>renewable energy</b> project and its limit is 15 MW output capacity of the renewable unit</li> <li>- <b>Type II</b> is <b>energy efficiency</b> project and its limit is 60 GWh of energy saving per year</li> </ul> <p><b>Reference and Additional Information</b></p> </li></ul>

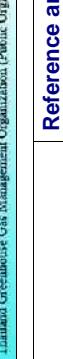
<b>CDM01-19</b>	<b>Target Group: G, PP, A</b>	
<b>Type of CDM project: Bundle projects</b> <ul style="list-style-type: none"> <li>■ F-CDM-BUNDLE – information related the bundle</li> <li>■ PDD (CDM-SSC-PDD) <ul style="list-style-type: none"> <li>■ Single CDM-SSC-PDD: all project activities in the bundle belong to the same type, category and technology/ measure</li> <li>■ If not: CDM-SSC-PDD for each of the project activities contained in the bundle must be submitted</li> </ul> </li> </ul>  <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<b>Type of CDM project : Programme of Activities (PoA)</b> <ul style="list-style-type: none"> <li>■ Unlimited number of CDM Programme Activities (CPAs) that is a project activity under a PoA</li> <li>■ A PoA shall be proposed by the Coordinating or Managing Entity (C/ME) which shall be a project participant authorized by all participating host country DNAs</li> <li>■ C/ME shall obtain <ul style="list-style-type: none"> <li>■ Letters of Approval (LoA) for the implementation of the PoA from each Host Party and Annex I Party involved in the PoA</li> <li>■ Letters of Authorization of its coordination of the PoA from each Host Party.</li> </ul> </li> <li>■ The duration of the PoA shall not exceed 28 years, whereas crediting period of a CPA is as same as normal CDM project.</li> </ul>  <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	

<b>CDM01-19</b>	<b>Target Group: G, PP, A</b>	
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#### Key Points

- **Bundling** is defined as bringing together of several small-scale project activities to make a single CDM project activity without the loss of distinctive characteristics of each project activity, including technology/ measure, location, and application of small-scale methodology.
  - The sum of the output capacity of projects within a sub-bundle projects must not exceed the maximum output capacity limit for its type.
  - PP must prepare and submit **bundling** format together with PDD.
  - The benefits of bundling may include reduction of project development costs, reduction of Engineering, Procurement and Construction (EPC) costs, reduction of O&M costs, reduction of transaction costs (general cost and CDM-related cost), and increase of total investment volume.
- (Source: CDM/JI Manual, Ministry of Environment, Japan, 2009)

CDM01-21	Target Group: G, PP, A	
	<p><b>Baseline: what is baseline?</b></p> <ul style="list-style-type: none"> <li>▪ Baseline scenario is needed to identify emission reduction by proposed project activity.</li> <li>▪ Baseline is different by each project, depending on technology/ measure, project type, condition, policy, etc.</li> <li>▪ <b>Baseline scenario</b> 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</li> </ul> <p style="text-align: right;"> Thailand Greenhouse Gas Management Organization (ประเทศไทย) (Public Organization)</p>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Baseline is one of the concepts PP must understand to implement CDM project</li> <li>- It is <b>necessary to determine emission reduction amount, or amount of credit PP will receive</b></li> <li>- Baseline scenario is a <b>project-specific</b> situation that would happen in the absence of the proposed project activity</li> </ul>

CDM01-22	Target Group: G, PP, A	
	<p><b>Baseline and GHG Emission Reduction</b></p> <p style="text-align: right;"> Thailand Greenhouse Gas Management Organization (ประเทศไทย) (Public Organization)</p>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This slide describes why baseline is essential and how baseline is used in order to determine the emission reduction of the CDM project</li> <li>- The difference between GHG emissions from baseline scenario, called <b>Baseline Emissions</b> (shown in the red line), and GHG emissions that are generated through the proposed CDM project activity, called <b>Project Emissions</b> (shown in the green line), is GHG emission reductions</li> <li>- Amount of baseline emissions and project emissions are different by each project type; <ul style="list-style-type: none"> <li>• e.g. renewable energy generation project does not generate any GHG emission from project activity, and therefore, project emission is zero. In this case, amount of emissions from baseline will become the emission reductions.</li> </ul> </li> </ul>

CDM01-23	Target Group: PP	<p><b>How to identify baseline? (1)</b></p> <ul style="list-style-type: none"> <li>■ Project proponent (PP) must identify baseline using the <u>methods and steps specified in the baseline methodology</u> that is applied to the project activity.</li> <li>■ PP will analyze all reasonable baseline scenario options, which may include:           <ul style="list-style-type: none"> <li>□ Continuation of the current activity</li> <li>□ Implementation of the proposed project activity</li> <li>□ Other scenarios</li> </ul> </li> <li>■ PP must describe how a baseline scenario is selected among possible baseline scenario options.</li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>
CDM01-24	Target Group: PP	<p><b>How to identify baseline? (2)</b></p> <ul style="list-style-type: none"> <li>■ Baseline is determined by applying one of the following 3 patterns, depending on the baseline methodologies applied:           <ul style="list-style-type: none"> <li>■ <b>Case 1: Methodology presents a fixed baseline scenario.</b> <ul style="list-style-type: none"> <li>□ PP demonstrates that the baseline scenario is the only relevant and plausible business-as-usual scenario.</li> <li>□ Small-scale methodologies and some large-scale methodologies</li> </ul> </li> <li>■ <b>Case 2: Methodology presents several possible baseline options</b> <ul style="list-style-type: none"> <li>□ PP selects the most plausible baseline scenario, which is a combination of baseline options.</li> </ul> </li> </ul> </li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>

CDM01-23	Target Group: PP	<p><b>How to identify baseline? (1)</b></p> <ul style="list-style-type: none"> <li>■ Project proponent (PP) must identify baseline using the <u>methods and steps specified in the baseline methodology</u> that is applied to the project activity.</li> <li>■ PP will analyze all reasonable baseline scenario options, which may include:           <ul style="list-style-type: none"> <li>□ Continuation of the current activity</li> <li>□ Implementation of the proposed project activity</li> <li>□ Other scenarios</li> </ul> </li> <li>■ PP must describe how a baseline scenario is selected among possible baseline scenario options.</li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>
CDM01-24	Target Group: PP	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Following slides explain <u>how</u> PP can set baseline in order to calculate GHG emission reduction</li> <li>- PP first identify methodology that is applicable to proposed project (<i>methodology will be explained in later slides</i>)</li> </ul> <p> CDM-01-32</p> <ul style="list-style-type: none"> <li>- PP can then find in the methodology about how to set the baseline</li> </ul>

CDM01-26	Target Group: PP	Target Group: G, PP, A
		<div style="border: 1px solid #ccc; padding: 10px;"> <p><b>Additionality</b></p> <ul style="list-style-type: none"> <li>■ Project Proponents are required to prove           <ul style="list-style-type: none"> <li>“additionality” of proposed project activity in the project design document (PDD).</li> <li>■ Additionality is stipulated as;</li> </ul> </li> <li>■ <b>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.</b> (paras. Paragraph 43 of the CDM modalities and procedures)</li> </ul>  <p style="text-align: center;">Thailand Greenhouse Gas Management Organization (Public Organization)</p> </div>

CDM01-25	Target Group: PP	<div style="border: 1px solid #ccc; padding: 10px;"> <p><b>How to identify baseline? (3)</b></p> <ul style="list-style-type: none"> <li>■ <b>Case 3: Methodology does not present any baseline option and PP must present possible baseline options using a step-wise approach</b> <ul style="list-style-type: none"> <li>□ To apply step 1 of the “Combined tool to identify the baseline scenario and demonstrate additionality”</li> <li>□ Only applicable if all potential alternative scenarios are available options to project participants, such as               <ul style="list-style-type: none"> <li>- Modifications to an existing installation operated by PP</li> <li>- Construction of new facilities, if all alternative scenarios are available options to PP</li> </ul> </li> </ul> </li> </ul>  <p style="text-align: center;">Thailand Greenhouse Gas Management Organization (Public Organization)</p> </div>
		<div style="border: 1px solid #ccc; padding: 10px;"> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- One of the principles of CDM is that project activity must be additional.</li> <li>- PP must prove in PDD that the proposed project is additional to that would occur in the absence of the project</li> <li>- <b>Additionality</b> is one of the key issues in CDM development and many PPs find it difficult to reasonably demonstrate additionality of their proposed project</li> <li>- This is also evident from the fact that most of the CDM projects that were rejected by the CDM Executive Board are due to insufficient demonstration of additionality</li> </ul> <p><b>Reference and Additional Information</b></p> </div>

CDM01-27	Target Group: G, PP, A	<p><b>What is additionality?</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Example to show the concept of additionality (using a biomass power plant construction project)</li> <li>- <b>Without CDM</b> and benefit from CER sales, project proponent usually finds many <b>barriers</b> to implement the project, including project is not financially feasible or attractive, and new clean technology is not readily accessible</li> <li>- CDM can remove these barriers and enable PP to implement the project</li> <li>- <b>Benefits</b> PP can receive from CDM includes additional revenue from carbon credit sales and also PP can receive clean image about their entity or products/ services from the customer/s, clients, and market</li> <li>- This CDM project can be considered <b>additional</b> since PP cannot carry out the project without CDM, but can implement the project if they register the project as CDM</li> </ul> <p><b>Reference and Additional Information</b></p>
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CDM01-28	Target Group: PP
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CDM01-28	Target Group: PP	<p><b>How to demonstrate additionality?</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Project proponent may use:       <ul style="list-style-type: none"> <li>□ Tool for the demonstration and assessment of additionality (CDM-EB16 – October 2004)</li> <li>□ Guidance on the assessment of investment analysis (CDM-EB added as an annex to the Additionality tool in July 2008)</li> <li>□ Combined additionality tool (CDM-EB27 – November 2006)</li> </ul> </li> </ul> <p><b>Reference and Additional Information</b></p>
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<b>CDM01-29</b>	<b>Target Group: PP</b>
<p><b>“Tool for the demonstration and assessment of additionality” (Additionality Tool)</b></p> <p>Provides a step-wise approach:</p> <ul style="list-style-type: none"> <li>▪ Identification of alternatives to the project activity</li> <li>▪ Investment analysis to determine that the proposed project activity is either           <ul style="list-style-type: none"> <li>□ Not the most economically or financially attractive</li> <li>□ Not economically or financially feasible</li> </ul> </li> <li>▪ Barrier analysis</li> <li>▪ Common practice analysis           <ul style="list-style-type: none"> <li>□ complement and reinforce the investment and/or barrier analysis</li> </ul> </li> </ul>	<p><b>Guidance on the assessment of investment analysis</b></p> <ul style="list-style-type: none"> <li>▪ General guidance for calculation and presentation of IRR/ NPV           <ul style="list-style-type: none"> <li>□ Investment comparison analysis and benchmark analysis</li> <li>□ Selection and validation of appropriate benchmarks</li> <li>□ Sensitivity analysis</li> </ul> </li> </ul> <p></p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>

<b>CDM01-30</b>	<b>Target Group: PP</b>
<p><b>“Tool for the demonstration and assessment of additionality” (Additionality Tool)</b></p> <p>Provides a step-wise approach:</p> <ul style="list-style-type: none"> <li>▪ Identification of alternatives to the project activity</li> <li>▪ Investment analysis to determine that the proposed project activity is either           <ul style="list-style-type: none"> <li>□ Not the most economically or financially attractive</li> <li>□ Not economically or financially feasible</li> </ul> </li> <li>▪ Barrier analysis</li> <li>▪ Common practice analysis           <ul style="list-style-type: none"> <li>□ complement and reinforce the investment and/or barrier analysis</li> </ul> </li> </ul>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Most commonly used tool to prove additionality</li> <li>- Many approved methodologies require to use this additionality tool</li> <li>- The tool provides a step-wise approach to analyze and prove additionality</li> <li>- PP must pass each step by proving the proposed project is facing various type of barriers that prohibit implementation of the project</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- For most CDM projects, PP must show financial performance of the project activity</li> <li>- This Guidance sets several rules to calculate financial indicator such as Internal Rate of Return (<b>IRR</b>) or Net Present Value (<b>NPV</b>)</li> </ul>

CDM01-32	Target Group: PP  Combined tool to identify the baseline scenario and demonstrate additivity  ▪ Methodologies using this tool are only applicable if all potential alternative scenarios to the proposed project activity are available options to project participants.	<p><b>Methodologies: Overview</b></p> <ul style="list-style-type: none"> <li>▪ <b>The roles of methodologies</b> are to ensure that CDM project activities have:           <ul style="list-style-type: none"> <li>□ <b>real, measurable, and long-term</b> benefits related to the mitigation of GHG emission reductions;</li> <li>□ reductions in emissions that are <b>additional</b> to any that would occur in the absence of the certified project activity.</li> </ul> </li> </ul> <p>Methodologies include appropriate formulae how to quantify baseline and project emissions, and leakage emissions.</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- In developing a CDM project, PP must identify the <b>methodology</b> that is applicable to the proposed project.</li> <li>- PP also must use the methodology that is officially <b>approved by the CDM Executive Board</b>.</li> <li>- A methodology is important and essential for many reasons.</li> </ul> <ol style="list-style-type: none"> <li>1. It is used to <b>calculate GHG emission reductions</b> from the project:       <ul style="list-style-type: none"> <li>• methodology defines the baseline emissions, project emissions, and leakage emissions with mathematical formulae to calculate such emissions. All PP must follow the equations and data parameters if they wish to use the approved methodology.</li> </ul> </li> <li>2. It is used to <b>identify the baseline scenario</b>:       <ul style="list-style-type: none"> <li>• related to the baseline GHG emissions, methodology allows you to select and identify “what would happen if the project is not implemented as CDM”</li> </ul> </li> </ol> <p><b>Reference and Additional Information</b></p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This tool provides a step-wise approach to identify the baseline scenario and simultaneously demonstrate additivity.</li> </ul>
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CDM01-34	Target Group: PP	Target Group: PP
<b>Small-scale Methodologies (AMS)</b>		
<p><b>Large-scale Methodologies (AM and ACM)</b></p> <ul style="list-style-type: none"> <li>▪ Approved Methodologies (AM): 70 meth. active.</li> <li>▪ Approved Consolidated Methodologies (ACM): 17 meth. active.</li> <li>▪ 10 tools such as 'additionality tool' are available:           <ul style="list-style-type: none"> <li>▪ ACM0002 (grid-connected renewable energy projects) is applied to 647 registered projects.</li> <li>▪ On the other hand, 46 AMs and 5 ACMs have no registered project (as of 2 July 2010)</li> </ul> </li> </ul> <p style="text-align: right; margin-top: -20px;">           ประเทศไทยเพื่อการจัดการกําลังงานทางชีวภาพ (ประเทศไทยเพื่อการจัดการกําลังงานทางชีวภาพ)          Thailand Greenhouse Gas Management Organization (Public Organization)       </p>		

<b>Large-scale Methodologies (AM and ACM)</b>	<b>Small-scale Methodologies (AMS)</b>
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Methodologies (except A/R) are distinguished by 3 categories           <ul style="list-style-type: none"> <li>- 1) Large-scale methodologies (AM), 2) Consolidated methodologies for large-scale (ACM), and 3) small scale methodologies (AMS)</li> </ul> </li> <li>- (As of July 2, 2010) There are currently (70) active <b>AMs, or Approved Methodologies</b> and (17) active <b>ACMs, or Approved Consolidated Methodologies</b> <ul style="list-style-type: none"> <li>- Also, there are several "Tools" that are associated with AM and ACM.</li> <li>- Some methodologies require to refer and apply these tools in calculating emissions or demonstrating additionality.</li> <li>- The latest list of AM and ACM, as well as Tool is available at the CDM EB website.</li> </ul> </li> </ul> <p style="text-align: right; margin-top: -20px;">           ประเทศไทยเพื่อการจัดการกําลังงานทางชีวภาพ (ประเทศไทยเพื่อการจัดการกําลังงานทางชีวภาพ)          Thailand Greenhouse Gas Management Organization (Public Organization)       </p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Small-scale approved methodologies, or <b>AMS</b> (standing for <b>Approved Methodologies for Small-scale project activity</b>), are different from the large-scale methodologies in various points, including in principle;</li> <li>- Methodology itself is usually <b>more simple and shorter</b></li> <li>- Baseline scenario is readily presented</li> <li>- Method to demonstrate additionality is not written as principally all small-scale projects can follow the same guidance to prove additionality</li> <li>- Monitoring parameters are fewer and formulae are less complicated</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- List of AMS           <ul style="list-style-type: none"> <li>- <a href="http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html">http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html</a></li> </ul> </li> </ul>

CDM01-35	Target Group: PP	<p><b>Methodologies used by registered CDM projects in Thailand</b></p> <table border="1"> <thead> <tr> <th>Methodology</th><th>Number of Registered Projects</th><th>Methodology</th><th>Number of Registered Projects</th></tr> </thead> <tbody> <tr> <td>AM-S-I.F.</td><td>7</td><td>ACM00017</td><td>3</td></tr> <tr> <td>AM-S-III.H.</td><td>1</td><td>AM00022</td><td>2</td></tr> <tr> <td>AM0022</td><td>6</td><td>AM00013</td><td>2</td></tr> <tr> <td>AM-S-I.G.</td><td>5</td><td>ACM0001</td><td>2</td></tr> <tr> <td>ACM0006</td><td>5</td><td>AM00028</td><td>1</td></tr> <tr> <td>AM-S-III.D.</td><td>4</td><td></td><td></td></tr> </tbody> </table> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>	Methodology	Number of Registered Projects	Methodology	Number of Registered Projects	AM-S-I.F.	7	ACM00017	3	AM-S-III.H.	1	AM00022	2	AM0022	6	AM00013	2	AM-S-I.G.	5	ACM0001	2	ACM0006	5	AM00028	1	AM-S-III.D.	4		
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AM-S-III.D.	4																													

CDM01-36	Target Group: PP	<p><b>New methodology approval process:</b></p> <p><b>Large-scale project</b></p> <ul style="list-style-type: none"> <li>PPs propose a new methodology, through a DOEAE, submitting the draft CDM-PDD, CDM-NM.</li> <li>The DOEAE determines whether the proposed project activity intends to use a new methodology, and check whether the documents are complete and forward them to <b>UNFCCC secretariat</b></li> <li>The secretariat check the completeness of the documents and publish the documents on the <b>UNFCCC CDM web site</b> and invite <b>public inputs</b> for a period of 15 working days.</li> <li>The documents and comments are forwarded to <b>Meth Panel</b>.</li> <li>EB approves the new methodology according to the final recommendation of Meth Panel.</li> <li>If Meth Panel does not approve the new methodology, PP's must provide clarification.</li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>
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Key Points		Reference and Additional Information
<ul style="list-style-type: none"> <li>The list of approved methodologies that are most frequently used by registered CDM projects in Thailand.</li> <li>The list includes all kinds of methodologies (AM, ACM, and AMS).</li> <li>Note that some of the methodologies are not active at present because some of these AMs have been combined and become ACM, or some ACM has been divided into 2 ACMs and so on.</li> <li>It is very important to <b>check the latest methodologies</b> by following decisions by CDM-EB, and also discussions by methodology panel and small-scale working group of CDM-EB in order to keep updated since PP is not allowed to use old version of approved methodology.</li> </ul>	<ul style="list-style-type: none"> <li>Frequently used approved methodologies include those for grid-connected renewable energy, wastewater treatment, thermal energy production, and energy generation using waste biomass.  CDM-01-41</li> </ul>	<ul style="list-style-type: none"> <li>In case PP cannot find any approved methodology that is applicable to their proposed project, a new methodology can be developed and submitted for approval. Once it is approved by CDM-EB, PP can apply that methodology to their CDM project.</li> <li>AE: applicant entity</li> <li>NM: new methodology</li> <li>Meth.: methodology</li> </ul>

#### Key Points

- The list of approved methodologies that are most frequently used by registered CDM projects in Thailand.
- The list includes all kinds of methodologies (AM, ACM, and AMS).
- Note that some of the methodologies are not active at present because some of these AMs have been combined and become ACM, or some ACM has been divided into 2 ACMs and so on.
- It is very important to **check the latest methodologies** by following decisions by CDM-EB, and also discussions by methodology panel and small-scale working group of CDM-EB in order to keep updated since PP is not allowed to use old version of approved methodology.

#### Reference and Additional Information

- In case PP cannot find any approved methodology that is applicable to their proposed project, a new methodology can be developed and submitted for approval. Once it is approved by CDM-EB, PP can apply that methodology to their CDM project.
- AE: applicant entity
- NM: new methodology
- Meth.: methodology



<p><b>CDM01-38</b></p>	<p><b>Target Group: PP</b></p>	<p><b>Target Group: G, PP, A</b></p>
<div style="border: 1px solid #ccc; padding: 10px;"> <h3 style="margin: 0;">Crediting Period of CDM project</h3> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <p><b>Options:</b></p> <ul style="list-style-type: none"> <li>1) A maximum of 10 years with no optional renewal <b>OR</b></li> <li>2) A maximum of 7 years which may be renewed at most 2 times</li> </ul> <div style="text-align: right; margin-top: 10px;">   Source: IGES         </div> <div style="text-align: center; margin-top: 20px;">   Thailand Greenhouse Gas Management Organization (Public Organization)       </div> </div> </div>		

<p><b>CDM01-37</b></p>	<p><b>Target Group: PP</b></p>	<p><b>Target Group: PP</b></p>
<div style="border: 1px solid #ccc; padding: 10px;"> <h3 style="margin: 0;">New methodology approval process: <u>Small-scale</u> project</h3> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <ul style="list-style-type: none"> <li>■ <b>PPs, DOEs, DNAs or stakeholders</b> propose a new <b>SSC</b> methodology, submitting the draft CDM-SSC-PDD, CDM SSC-NM;</li> <li>■ After performing a completeness check, the <b>UNFCCC secretariat</b> forwards the documentation to <b>EB</b> and <b>SSC-WG</b>:</li> <li>■ <b>The secretariat</b> also makes the proposed new <b>SSC</b> methodology publicly available on the <b>UNFCCC CDM website</b> and invite public inputs for a period of 10 working days;</li> <li>■ <b>Public inputs</b> are forwarded to <b>SSC WG</b> soon after receipt and made publicly available;</li> <li>■ <b>SSC WG</b> makes a <b>recommendation</b> regarding the approval of the proposed new <b>SSC</b> methodology to <b>EB</b> at its next meeting;</li> <li>■ <b>EB</b> finally decides whether the methodology is acceptable or not.</li> </ul> <div style="text-align: right; margin-top: 10px;">   Source: IGES         </div> <div style="text-align: center; margin-top: 20px;">   Thailand Greenhouse Gas Management Organization (Public Organization)       </div> </div> </div>		

Key Points	Reference and Additional Information
<ul style="list-style-type: none"> <li>- Key Points           <ul style="list-style-type: none"> <li>- PP must remember that carbon credits, or <b>CERs</b>, can be issued only during a <b>crediting period</b> that starts from the date of CDM registration.</li> <li>- PP can select the type of crediting period from 2 options;               <ul style="list-style-type: none"> <li>• A maximum of <b>10 years</b> with no option of renewal</li> <li>• A maximum of <b>7 years</b> which can be renewed up to 2 times.</li> </ul> </li> <li>(For each renewal, PP must prove the original baseline is still valid, or establish a new baseline)</li> </ul> </li> </ul>	<h3 style="margin: 0;">Reference and Additional Information</h3> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The difference between the process for large-scale and small-scale is that for large-scale, only PP can submit new methodology through DOE; however, for small-scale, all PP, DOE, DNA, or stakeholders can directly submit the new methodology</li> <li>- <b>SSC-WG</b>: small-scale working group</li> </ul> </div>

CDM01-39	Target Group: G, PP, A	
	<p><b>Monitoring</b></p> <ul style="list-style-type: none"> <li>PPs must monitor every parameters specified in PDD -- section B.7: Application of the monitoring methodology and description of the monitoring plan</li> <li>PPs must ensure that the required data is accurately monitored and recorded to enable the calculation of the emission reductions achieved by the proposed project activity.</li> <li>PPs must have procedures to cope with emergency case, instrument failure and inconsistent data.</li> <li>Emission reduction declared in monitoring report will become CER and money that PP will get.</li> </ul>  <p>ไทยกรีนхаузกําเเรมเเรงอร์เอนซิจิเนียร์ (เเธน) จำกัด Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- After registration, PP must conduct <b>monitoring in which PP will measure and calculate certain parameters</b> in order to calculate the amount of GHG emission reductions, and then record and report the monitoring result.</li> <li>- Parameters to be monitored are described in the <b>approved methodology</b> applied to the project and they must also be described in PDD</li> <li>- Depending on the sector, or methodology, or project size, <b>the number of parameters</b> to be monitored for one project is different.</li> <li>- <b>Frequency of monitoring</b> is different by each parameter, from every 15 minutes to every year.</li> <li>- Monitoring may be conducted by PP themselves or by an external entity such as consultant, but the monitoring report must be prepared by PP and submitted to DOE in order to get CERs</li> </ul>

CDM01-40	Target Group: PP																							
	<p><b>CDM update: Major EB decisions (1)</b></p> <ul style="list-style-type: none"> <li>Approval or revision of the manuals / guidelines</li> </ul> <table border="1"> <thead> <tr> <th>Name of manual/ guideline</th> <th>Version</th> <th>EB</th> </tr> </thead> <tbody> <tr> <td>Validation and Verification Manual</td> <td>01.1</td> <td>EB51</td> </tr> <tr> <td>Guidelines on the assessment of investment analysis</td> <td>03</td> <td>EB51</td> </tr> <tr> <td>Guidelines on the Registration Fee Schedule For Proposed Project Activities Under the Clean Development Mechanism</td> <td>01</td> <td>EB52</td> </tr> <tr> <td>Guidelines for completing the monitoring report form (CDM-MR)</td> <td>01</td> <td>EB54</td> </tr> <tr> <td>General guidelines to SSS CDM methodologies</td> <td>13</td> <td>EB54</td> </tr> <tr> <td>Guidelines for demonstrating additonality of renewable energy projects =&gt; 5MW and energy efficiency projects with energy savings &lt;= 20 GWh per year</td> <td>01</td> <td>EB54</td> </tr> </tbody> </table>  <p>ไทยกรีนхаузกําเเรมเเรงอร์เอนซิจิเนียร์ (เเธน) จำกัด Thailand Greenhouse Gas Management Organization (Public Organization)</p>	Name of manual/ guideline	Version	EB	Validation and Verification Manual	01.1	EB51	Guidelines on the assessment of investment analysis	03	EB51	Guidelines on the Registration Fee Schedule For Proposed Project Activities Under the Clean Development Mechanism	01	EB52	Guidelines for completing the monitoring report form (CDM-MR)	01	EB54	General guidelines to SSS CDM methodologies	13	EB54	Guidelines for demonstrating additonality of renewable energy projects => 5MW and energy efficiency projects with energy savings <= 20 GWh per year	01	EB54	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- These slides show recent major decisions by CDM Executive Board that may affect PP in Thailand.</li> <li>- CDM-EB is held once in every two or three months and the result of EB meeting is open to public, which is available on the website.</li> <li>- "Validation and verification manual (VVM)": originally designed for DOEs for validation but PP can also refer to the manual to check the key points in validation.</li> <li>- "Guidelines on the assessment of investment analysis." :Revision to provide guidance on the treatment of interest payments in income tax calculations.</li> <li>- "Guidelines on the Registration Fee Schedule For Proposed Project Activities Under the CDM", in order to defer the payment of the registration fee for projects hosted in countries with less than 10 registered CDM project activities.</li> </ul>	<p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- CDM EB meeting report <a href="http://cdm.unfccc.int/EB/index.html">http://cdm.unfccc.int/EB/index.html</a></li> </ul>
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CDM01-41	Target Group: PP	<p><b>CDM update: Major EB decisions (2)</b></p> <ul style="list-style-type: none"> <li>■ Revision of the approved methodologies (frequently used in Thailand)           <ul style="list-style-type: none"> <li>□ AMS-I.D (EB54, Annex7)</li> <li>□ AMS-III.H (EB53, Annex17)</li> <li>□ AMS-I.C (EB51, Annex19 / EB54, Annex9)</li> <li>□ ACM0002 (EB52, Annex7)</li> <li>□ ACM0006 (EB52, Annex8)</li> </ul> </li> </ul>
CDM01-42	Target Group: PP	<p><b>CDM update: Major EB decisions (3)</b></p> <ul style="list-style-type: none"> <li>■ Accreditation of operational entities           <ul style="list-style-type: none"> <li>□ EB 53 decided to suspend the accreditation and designation of the designated operational entity "TÜV SÜD Industrie Service GmbH".</li> <li>□ EB 54 decided to accredit and provisionally designate five entities.</li> </ul> </li> </ul> <div style="text-align: right; margin-top: 10px;">            ประเทศไทยส่งเสริมการจัดการกําลังงานทางชีวภาพ (ประเทศไทยสากล)                   Thailand Greenhouse Gas Management Organization (Public Organization)       </div>

Key Points	Reference and Additional Information
<ul style="list-style-type: none"> <li>- List of the recent changes in the approved methodologies that are frequently used in Thailand.</li> <li>- “<b>AMS-I.D Grid connected renewable electricity generation</b>” to clarify that revised AMS-I.D now covers <u>only supply of renewable electricity to a national or regional grid</u>. Projects that displace grid or captive electricity with renewable electricity are covered under AMS-I.F.</li> <li>- “<b>AMS-III.H: Methane recovery in wastewater treatment</b>”, to clarify the monitoring requirements of biogas flow rate and default model uncertainty factors to use in baseline and project emission calculations.</li> <li>- “<b>AMS-I.C: Thermal energy production with or without electricity</b>”, to expand its applicability to biomass-based cogeneration project activities supplying surplus electricity to a grid. The revision also clarifies that leakage from biomass transportation is to be considered only for cases where biomass is transported over a distance of 200 km or more.</li> </ul>	<ul style="list-style-type: none"> <li>- EB accredits entity who wishes to be a DOE and also suspends DOE</li> <li>- EB suspends all or some of the accredited sectoral scopes of the DOE</li> <li>- Latest DOE information is available at CDM-EB website</li> <li>- List of DOEs and status <a href="http://cdm.unfccc.int/DOE/list/index.html">http://cdm.unfccc.int/DOE/list/index.html</a></li> </ul>

Key Points	Reference and Additional Information
<ul style="list-style-type: none"> <li>- Also to clarify applicability to cogeneration systems, the use of solid biomass fuels (e.g. briquette) and to include the procedures to determine the baseline of projects switching from fossil fuel to renewable biomass.</li> <li>- <b>ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”</b> to clarify the applicability condition requesting availability of 5 years of historical data for capacity addition, retrofit and rehabilitation projects is not required for wind, solar, wave or tidal power capacity addition projects which directly meter the electricity generated by the added capacities.</li> <li>- <b>ACM0006: “Consolidated methodology for electricity generation from biomass residues in power and heat plants”</b> The applicability of the methodology was restricted to power and heat projects due to the approval of a new consolidated methodology ACM0018 for power-only projects. Power-only projects were excluded from this methodology.</li> </ul>	<ul style="list-style-type: none"> <li>- “<b>AMS-I.C: Thermal energy production with or without electricity</b>”, to expand its applicability to biomass-based cogeneration project activities supplying surplus electricity to a grid. The revision also clarifies that leakage from biomass transportation is to be considered only for cases where biomass is transported over a distance of 200 km or more.</li> </ul>

CDM01-43	Target Group: G, PP, A	<p><b>Thank you for your attention</b></p>  <p>Thailand Greenhouse Gas Management Organization (องค์กรจัดการกําลังกําลังประเทศไทย) Thailand Greenhouse Gas Management Organization (Public Organization)</p> 	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>-</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>-</li> </ul>
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**Target Groups**

Code	Target group
-	Advanced CDM developers
C	- CDM consultant (In Thailand and other countries)

**Update History**

Version	Date	Initial adoption	Update Contents
01	20/01/2011		

## Clean Development Mechanism (CDM)

CDM 02-01		Target Group: consultant
<b>Presentation outline</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Baseline</li> <li><input type="checkbox"/> Additionality</li> <li><input type="checkbox"/> Methodology</li> <li><input type="checkbox"/> Project type</li> <li><input type="checkbox"/> CDM development cycle</li> </ul>		

<p><b>Key Issues for CDM Project Implementation</b></p> <p>Presented to: CDM consultants prepared by: Paweena Panichayapichet Review and Approval Office November 29, 2010</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p>Target audience of this presentation is;</p> <ul style="list-style-type: none"> <li>- Advanced CDM developers</li> <li>- CDM consultant</li> <li>- In Thailand and other countries</li> </ul>
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CDM 02-04	Target Group: consultant
<h2 style="text-align: center;">Baseline and GHG Emission Reduction</h2> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>GHG Emission Reduction (tCO<sub>2</sub>/y)</b></p> <math display="block">\text{GHG Emission Reduction (tCO}_2\text{/y)} = \text{Baseline emission (tCO}_2\text{/y)} - \text{Project emission + Leakage (tCO}_2\text{/y)}</math> </div> <div style="text-align: center;"> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> </div> <div style="width: 45%;"> <p>นิตยสารบริหารจัดการกําลังกําลัง (นิตยสารมหาด្ឋាន) Thailand Greenhouse Gas Management Organization (Public Organization)</p> </div> </div>	

### Reference and Additional Information

#### Key Points

- This slide describes why baseline is essential and how baseline is used in order to determine the emission reduction of the CDM project
- The difference between GHG emissions from baseline scenario, called **Baseline Emissions** (shown in the red line), and GHG emissions that are generated through the proposed CDM project activity, called **Project Emissions** (shown in the green line), is GHG emission reductions
- Amount of baseline emissions and project emissions are different by each project type;
  - e.g. renewable energy generation project does not generate any GHG emission from project activity, and therefore, project emission is zero. In this case, amount of emissions from baseline will become the emission reductions.

CDM 02-03	Target Group: consultant
<div style="position: absolute; bottom: 0; left: 0; width: 100%; height: 100%;"> <p>นิตยสารบริหารจัดการกําลังกําลัง (นิตยสารมหาด្ឋាន) Thailand Greenhouse Gas Management Organization (Public Organization)</p> </div>	

CDM 02-05	Target Group: consultant
CDM 02-06	<h2>Example of registered PDD</h2> <p>A.1 Title of the project activity:</p> <p>Title: TDCC Tha Chang Biogas Project Version: 14 Date: 10<sup>th</sup> September 2010</p> <p>จังหวัดราชบุรีพัฒนาการท่าศาลาเริ่มต้นกระบวนการ (ผู้ดูแลโครงการฯ) Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p></p>

CDM 02-05	Target Group: consultant
CDM 02-06	<h2>Baseline: what is baseline?</h2> <ul style="list-style-type: none"> <li>▪ Baseline scenario is needed to identify emission reduction by proposed project activity.</li> <li>▪ Baseline is different by each project, depending on technology/ measure, project type, condition, policy, etc.</li> <li>▪ <b>Baseline scenario is</b></li> </ul> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity</p> </div> <p></p> <p>จังหวัดราชบุรีพัฒนาการท่าศาลาเริ่มต้นกระบวนการ (ผู้ดูแลโครงการฯ) Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Baseline is one of the concepts that PP must understand as to implement CDM project</li> <li>- It is necessary to determine emission reduction amount, or amount of credit PP will receive</li> <li>- Baseline scenario is a <b>project-specific</b> situation that would happen in the absence of the proposed project activity</li> </ul> <p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/Projects/Validation/DB/EM50CP12TAAWGA7OWCGMEFX9WRYZZSO/view.html">http://cdm.unfccc.int/Projects/Validation/DB/ EM50CP12TAAWGA7OWCGMEFX9WRYZZSO/view.html</a></p>

CDM 02-07	Target Group: consultant	CDM 02-08	Target Group: consultant
	<p><b>Example of registered PDD</b></p> <p><b>B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:</b></p> <p>The following approved baseline and monitoring methodologies have been applied to the project:</p> <ul style="list-style-type: none"> <li>• ACM001 "Mitigation of greenhouse gas emissions from treatment of industrial wastewater" (ACM001.4 Version 02.1, Second Scope: 13, ITB39).</li> <li>• "Tool to calculate the emission factor for an electricity system"</li> <li>• "Tool to determine project emissions from flaring gases containing methane" (Version 01, EB-35 Report, Annex 12)</li> <li>• "Tool for the demonstration and assessment of additioality" (Version 05.2, EB-39 Report, Annex 10)</li> </ul> <p>Further details of these approved baseline and monitoring methodologies can be found at the INTRCC CDM website at <a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p> <p> อินทราค สถาบันการจัดการกํา{}{   </p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>UNFCCC</b> CDM - Executive Board</p> <p>Approved consolidated baseline and monitoring methodology ACM001.4 Second Scope: 13 EB-35</p> <p>"Mitigation of greenhouse gas emissions from treatment of industrial wastewater"</p> <p><b>I. SOURCE, DEFINITIONS AND APPLICABILITY</b></p> <p>Sources</p> <p>The consolidated baseline and monitoring methodology is based on elements from the following approved baseline and monitoring methodologies and proposed new methodologies:</p> <ul style="list-style-type: none"> <li>• INTRCC-Rev. Methane Gas Capture and Electricity Production at Chisinau Wastewater Treatment Plant project, Moldova prepared by COWI A/S, Denmark;</li> <li>.....</li> <li>.....</li> </ul> <p>This methodology also refers to the latest approved versions of the following tools:</p> <ul style="list-style-type: none"> <li>• "Tool for the demonstration and assessment of additioality";</li> <li>• "Tool to determine project emissions from flaring gases containing methane";</li> <li>• "Tool to calculate the emission factor for an electricity system";</li> <li>• "Tool to calculate baseline project under leakage emissions from electricity consumption";</li> <li>• "Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion";</li> </ul>	<p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This slide shows the example of approved methodology naming ACM0014.</li> <li>- The first part of methodology describes the sources of the methodology.</li> <li>- The latest approved versions of tools required by the methodology are described in this part.</li> </ul>

CDM 02-07	Target Group: consultant	CDM 02-08	Target Group: consultant
	<p><b>Example of registered PDD</b></p> <p><b>B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:</b></p> <p>The following approved baseline and monitoring methodologies have been applied to the project:</p> <ul style="list-style-type: none"> <li>• ACM001 "Mitigation of greenhouse gas emissions from treatment of industrial wastewater" (ACM001.4 Version 02.1, Second Scope: 13, ITB39).</li> <li>• "Tool to calculate the emission factor for an electricity system"</li> <li>• "Tool to determine project emissions from flaring gases containing methane" (Version 01, EB-35 Report, Annex 12)</li> <li>• "Tool for the demonstration and assessment of additioality" (Version 05.2, EB-39 Report, Annex 10)</li> </ul> <p>Further details of these approved baseline and monitoring methodologies can be found at the INTRCC CDM website at <a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p> <p> อินทราค สถาบันการจัดการกํา{}{   </p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p> <p><a href="http://cdm.unfccc.int/methodologies/index.html">Panmethodologies/index.html</a></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The section describes the title and reference of the approved baseline and monitoring methodology applied to the project activity.</li> <li>- The latest approved versions of tools required by the methodology must also be described in this section along with the version of methodology and tool.</li> </ul>	<p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This slide shows the example of approved methodology naming ACM0014.</li> <li>- The first part of methodology describes the sources of the methodology.</li> <li>- The latest approved versions of tools required by the methodology are described in this part.</li> </ul>

CDM 02-10	Target Group: consultant	Target Group: consultant									
<b>Methodology -- ACM0014</b>											
<p><b>Table 1: Scenarios applicable to the methodology</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; background-color: #cccccc;">Scenario</th> <th style="text-align: center; background-color: #cccccc;">Description of the baseline situation</th> <th style="text-align: center; background-color: #cccccc;">Description of the project activity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>The wastewater is not treated, but directed to open lagoons that have clearly anaerobic conditions. In cases where solid materials are separated before directing the wastewater to the open lagoons, the solid materials have a different treatment than the wastewater.</td> <td>The wastewater is treated in a new anaerobic digester. In cases where solid materials are separated from the wastewater (both in the project and baseline scenarios), they will be treated separately and not treated with the new anaerobic digester employed for treatment of liquid effluents. The biogas extracted from the anaerobic digester and, if applicable, biogas<sup>3</sup> generated from the treatment of solid materials, is flared and/or used to generate electricity and/or heat. The residual from the anaerobic digester after treatment is directed to open lagoons or is treated under clearly aerobic conditions (e.g. dewatering and land application).</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center; vertical-align: top;">   <b>นิตยาภรณ์การจัดการกําลังไอน้ำเพื่อสิ่งแวดล้อม (องค์กรสาธารณะ)</b>          Thailand Greenhouse Gas Management Organization (Public Organization)       </td><td> <p>The wastewater is treated in the same wastewater treatment plant as in the baseline situation. The sludge from primary and/or secondary settler is treated in one or both of the following ways:</p> <ul style="list-style-type: none"> <li>(a) The sludge is treated in a new anaerobic digester. The biogas extracted from the anaerobic digester is flared and/or used to generate electricity and/or heat. The residual from the anaerobic digester after treatment is directed to open lagoons or is treated under clearly aerobic conditions (e.g. dewatering and land application);</li> <li>(b) The sludge is treated under clearly aerobic conditions (e.g. dewatering and land application)</li> </ul> </td></tr> </tbody> </table>			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 conditions. In cases where solid materials are separated before directing the wastewater to the open lagoons, the solid materials have a different treatment than the wastewater.	The wastewater is treated in a new anaerobic digester. In cases where solid materials are separated from the wastewater (both in the project and baseline scenarios), they will be treated separately and not treated with the new anaerobic digester employed for treatment of liquid effluents. The biogas extracted from the anaerobic digester and, if applicable, biogas <sup>3</sup> generated from the treatment of solid materials, is flared and/or used to generate electricity and/or heat. The residual from the anaerobic digester after treatment is directed to open lagoons or is treated under clearly aerobic conditions (e.g. dewatering and land application).	2	 <b>นิตยาภรณ์การจัดการกําลังไอน้ำเพื่อสิ่งแวดล้อม (องค์กรสาธารณะ)</b> Thailand Greenhouse Gas Management Organization (Public Organization)	<p>The wastewater is treated in the same wastewater treatment plant as in the baseline situation. The sludge from primary and/or secondary settler is treated in one or both of the following ways:</p> <ul style="list-style-type: none"> <li>(a) The sludge is treated in a new anaerobic digester. The biogas extracted from the anaerobic digester is flared and/or used to generate electricity and/or heat. The residual from the anaerobic digester after treatment is directed to open lagoons or is treated under clearly aerobic conditions (e.g. dewatering and land application);</li> <li>(b) The sludge is treated under clearly aerobic conditions (e.g. dewatering and land application)</li> </ul>
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2	 <b>นิตยาภรณ์การจัดการกําลังไอน้ำเพื่อสิ่งแวดล้อม (องค์กรสาธารณะ)</b> Thailand Greenhouse Gas Management Organization (Public Organization)	<p>The wastewater is treated in the same wastewater treatment plant as in the baseline situation. The sludge from primary and/or secondary settler is treated in one or both of the following ways:</p> <ul style="list-style-type: none"> <li>(a) The sludge is treated in a new anaerobic digester. The biogas extracted from the anaerobic digester is flared and/or used to generate electricity and/or heat. The residual from the anaerobic digester after treatment is directed to open lagoons or is treated under clearly aerobic conditions (e.g. dewatering and land application);</li> <li>(b) The sludge is treated under clearly aerobic conditions (e.g. dewatering and land application)</li> </ul>									

CDM 02-09	Target Group: consultant	Target Group: consultant							
<b>Methodology -- ACM0014</b>									
<p><b>Table 1: Scenarios applicable to the methodology</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; background-color: #cccccc;">Scenario</th> <th style="text-align: center; background-color: #cccccc;">Description of the project activity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>The wastewater is not treated, but directed to open lagoons that have clearly anaerobic conditions. In cases where solid materials are separated before directing the wastewater to the open lagoons, the solid materials have a different treatment than the wastewater.</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center; vertical-align: top;">   <b>นิตยาภรณ์การจัดการกําลังไอน้ำเพื่อสิ่งแวดล้อม (องค์กรสาธารณะ)</b>          Thailand Greenhouse Gas Management Organization (Public Organization)       </td><td> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- ACM0014 has 2 applicable scenarios concerning new treatment system for wastewater or sludge.</li> <li>- The first scenario concerns to new wastewater treatment system</li> <li>- For baseline situation, wastewater must be untreated and directly discharged to the open lagoons that have anaerobic conditions, whereas, project activity treats wastewater in anaerobic digester and produces biogas that is flared and/or used to generate electricity and/or heat.</li> <li>- Residual from the digester is directed to open lagoon or is treated under aerobic conditions.</li> </ul> <p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p> </td></tr> </tbody> </table>			Scenario	Description of the project activity	1	The wastewater is not treated, but directed to open lagoons that have clearly anaerobic conditions. In cases where solid materials are separated before directing the wastewater to the open lagoons, the solid materials have a different treatment than the wastewater.	2	 <b>นิตยาภรณ์การจัดการกําลังไอน้ำเพื่อสิ่งแวดล้อม (องค์กรสาธารณะ)</b> Thailand Greenhouse Gas Management Organization (Public Organization)	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- ACM0014 has 2 applicable scenarios concerning new treatment system for wastewater or sludge.</li> <li>- The first scenario concerns to new wastewater treatment system</li> <li>- For baseline situation, wastewater must be untreated and directly discharged to the open lagoons that have anaerobic conditions, whereas, project activity treats wastewater in anaerobic digester and produces biogas that is flared and/or used to generate electricity and/or heat.</li> <li>- Residual from the digester is directed to open lagoon or is treated under aerobic conditions.</li> </ul> <p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p>
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CDM 02-11	Target Group: consultant	CDM 02-12	Target Group: consultant
<b>Example of registered PDD</b>			

<h2>Methodology -- ACM0014</h2> <p>The following applicability conditions are for all scenarios:</p> <ul style="list-style-type: none"> <li>• The average depth of the open lagoons or sludge pits in the baseline scenario is at least 1m.<sup>4</sup></li> <li>• Heat and electricity requirements per unit input of the water treatment facility remain largely unchanged in the baseline scenario and the project activity.</li> <li>• Data requirements as laid out in this methodology are fulfilled.</li> </ul> <p>The following applicability conditions are for Scenario 1:</p> <ul style="list-style-type: none"> <li>• The residence time of the organic sludge in the open lagoon system should be at least 30 days.<sup>5</sup></li> <li>• Local regulations do not prevent discharge of wastewater in open lagoons</li> <li>• Inclusion of solid materials in the project activity is only applicable where: (i) Such solid materials are generated by the industrial facility producing the wastewater; and (ii) The solid materials would be generated both in the project and in the baseline scenario.</li> </ul> <p>The following applicability condition is for Scenario 2:</p> <ul style="list-style-type: none"> <li>• The sludge produced during the implementation of the project activity is not stored onsite before land application to avoid any possible methane emissions from anaerobic degradation.</li> </ul>	 <p>องค์การบริหารส่วนราชการจังหวัดเชียงราย (องค์กรมหาชน)</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The applicability conditions for all scenarios and for scenario 1 and 2 must be followed.</li> </ul>	<p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p>
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CDM 02-14	Target Group: consultant	<h3>How to identify baseline? (1)</h3> <ul style="list-style-type: none"> <li>■ Project proponent (PP) must identify baseline using the methods and steps specified in the baseline methodology(ies) that is applied to the project activity.</li> <li>■ Baseline methodologies shall require narrative descriptions of project. PP must analyze all reasonable baseline scenario options, which may include:           <ul style="list-style-type: none"> <li><input type="checkbox"/> Continuation of the current activity</li> <li><input type="checkbox"/> Implementation of the proposed project activity</li> <li><input type="checkbox"/> Other scenarios</li> </ul> </li> <li>■ PP must describe how a baseline scenario is selected among possible baseline scenario options.</li> </ul> <p style="text-align: right;"> นิตยสารบริหารจัดการสิ่งแวดล้อม (นิตยสารมหาสารคาม) National Greenhouse Gas Management Organization (Public Organization)</p>
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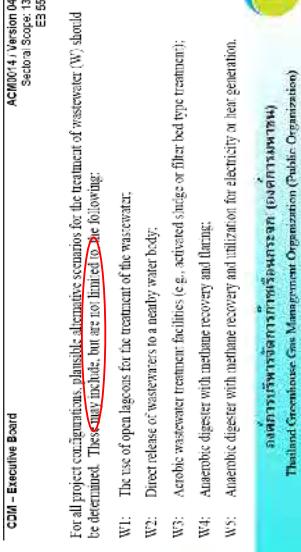
CDM 02-13	Target Group: consultant	<h3>Example of registered PDD</h3> <p>The project also complies with all other relevant applicability criteria as follows:</p> <ul style="list-style-type: none"> <li>• The average depth of the open lagoons or shafts/pits in the baseline scenario is at least 1 m. The average depth of individual digests varies between 0.5 and 2m, therefore the average depth of open lagoons is at least 1m.</li> <li>• Land and electricity requirements per unit input of the water treatment facility remain largely unchanged in the baseline scenario and the project activity.</li> <li>• As best is replicated by the project plan. Non-electricity consumption in the Project Scenario is zero as the project will produce sufficient renewable electricity to meet the needs of the biogas plant. The outcome of energy needs per unit input of the water treatment facility remain largely unchanged.</li> <li>• Data requirements as laid out in this methodology are fulfilled.</li> <li>• All necessary data requirements of the methodology are met as described in section B.6.2 and section B.7.</li> <li>• The residence time of the organic matter in the open lagoon system should be at least 30 days. The residence time of the organic matter in the open lagoon system is 55.7 day. Please see Annex 3 for more details.</li> <li>• Local regulations do not prevent discharge of wastewater in open lagoons.</li> <li>• Discharge of wastewater in open lagoons is not prevented by financial regulation and it is standard practice for the industry.</li> </ul> <p style="text-align: right;"> นิตยสารบริหารจัดการสิ่งแวดล้อม (นิตยสารมหาสารคาม) National Greenhouse Gas Management Organization (Public Organization)</p>
		<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The project activity also complies with other relevant applicability criteria of ACM0014.</li> </ul> <p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p>

CDM 02-16	Target Group: consultant	
		<p><b>CDM - Executive Board</b></p> <p><b>AM009 / Version 64</b> Section Scope 10 Ed-08</p> <p><b>Identification of the baseline scenario and demonstration of addititnality</b></p> <p>Project participants shall apply this following procedure:</p> <p><b>Step 1: Identify plausible alternative scenarios</b></p> <p>The project activity involves three components. Plausible alternative scenarios should indicate alternatives for the following components:</p> <p>Plausible alternative baseline scenario for the associated gas and/or gas-lift gas from the project oil wells could include, <i>other also</i>:</p> <ul style="list-style-type: none"> <li>(G1): Release of the associated gas and/or gas-lift gas into the atmosphere at the oil production site (venting).</li> <li>(G2): Flaring of the associated gas and/or gas-lift gas at the oil production site.</li> <li>(G3): On-site use of the associated gas and/or gas-lift gas for power generation.</li> <li>(G4): On-site use of the associated gas and/or gas-lift gas for liquefied natural gas (LNG) production.</li> <li>(G5): Ejection of the associated gas and/or gas-lift gas into an off-site gas reservoir.</li> <li>(G6): Recovery, transportation, processing of the associated gas and/or gas-lift gas and distribution of products thereof to end-users without being registered as a CDM project activity.</li> <li>(G7): Recovery, transportation and compression of the associated gas and/or gas-lift gas into a gas pipeline without prior processing, without being registered as a CDM project activity.</li> <li>(G8): Consumed on-site to meet energy demands without being registered as a CDM project activity.</li> <li>(G9): Recovery, transportation and utilization of the associated gas and/or gas-lift gas as feedstock for manufacture of useful products.</li> </ul> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This slide shows the example of methodology that presents a fixed baseline scenario. AM009 provides plausible alternative scenarios of three components. One component showed in this slide is the associated gas and/or gas-lift gas from the project oil wells (G). This component has 9 plausible alternative scenarios.</li> </ul> <p><b>Reference and Additional Information</b></p> <p><a href="http://cdm.unfccc.int/methodologies/">http://cdm.unfccc.int/methodologies/</a></p>

CDM 02-15	Target Group: consultant	
		<h2>How to identify baseline? (2)</h2> <ul style="list-style-type: none"> <li>▪ Baseline is determined by applying one of the following 3 patterns, depending on the baseline methodologies applied;</li> <li>▪ Case 1: Methodology presents a <b>fixed baseline scenario</b>. <ul style="list-style-type: none"> <li>□ PP demonstrates that the baseline scenario is the only relevant and plausible business-as-usual scenario</li> <li>□ Small scale methodologies and some large-scale methodologies</li> </ul> </li> </ul> <p style="text-align: right;"> Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- There are 3 cases to determine baseline scenario. The first case is that the applied methodology presents a <b>fixed baseline scenario</b>. PP only demonstrates that the baseline is the only business-as-usual scenario.</li> </ul> <p><b>Reference and Additional Information</b></p>

CDM 02-17	Target Group: consultant	
<h3>How to identify baseline? (4)</h3> <ul style="list-style-type: none"> <li>■ Case 3: Methodology does not present any baseline option and PP must present possible baseline options using a step wise approach resembling the additivity/combined tool for the identification of a baseline scenario.           <ul style="list-style-type: none"> <li>□ To apply step 1a of the "Combined tool to identify the baseline scenario and demonstrate additivity"</li> <li>□ Only applicable if all potential alternative scenarios are available options to project participants, such as               <ul style="list-style-type: none"> <li>- Modifications to an existing installation operated by PP</li> <li>- Construction of new facilities, if all alternative scenarios are available options to PP</li> </ul> </li> </ul> </li> </ul>		

CDM 02-18	Target Group: consultant	
<h3>How to identify baseline? (3)</h3> <ul style="list-style-type: none"> <li>■ Case 2: Methodology presents several possible baseline options for various components of the project activity.           <ul style="list-style-type: none"> <li>□ PP identifies the most plausible baseline scenario, which is a combination of baseline options.</li> </ul> </li> </ul>		


**Key Points**

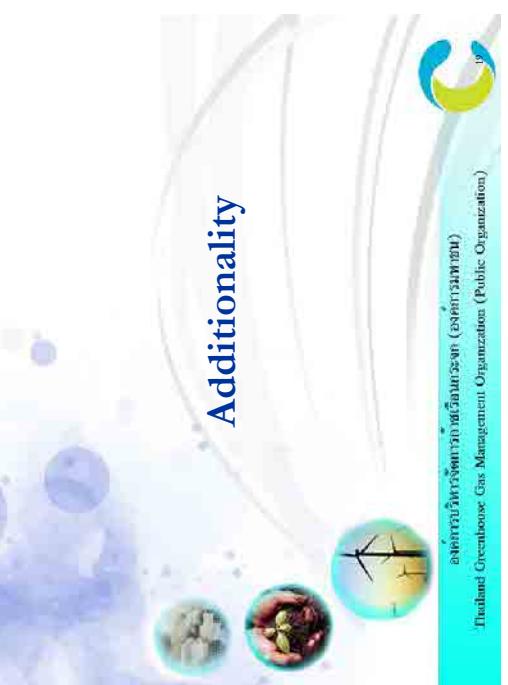
**Reference and Additional Information**  
<http://cdm.unfccc.int/methodologies/>

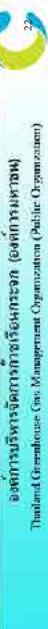
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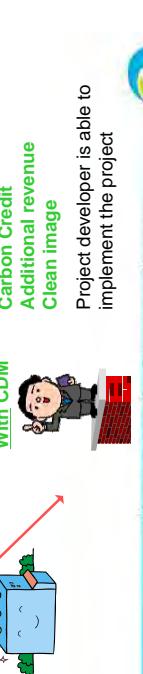
<http://cdm.unfccc.int/methodologies/>

- The third case is that the applied methodology does not present any baseline scenarios. PP must use a step-wise approach to identify the plausible baseline scenario.

CDM 02-19	Target Group: consultant	Target Group: consultant
	<p><b>Additionality</b></p> <ul style="list-style-type: none"> <li>▪ Project Proponents are required to prove “additionality” of proposed project activity in the project design document (PDD).</li> <li>▪ Additionality is stipulated as;</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>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.</b></p> <p>(para5. Paragraph 43 of the CDM modalities and procedures)</p> </div> 	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- One of the principles of CDM is that project activity must be additional.</li> <li>- PP must prove in PDD that the proposed project is additional to that would occur in the absence of the project</li> <li>- <b>Additionality</b> is one of the key issues in CDM development and many PPs find it difficult to reasonably demonstrate additionality of their proposed project</li> <li>- This is also evident from the fact that most of the CDM projects that were rejected by the CDM Executive Board are due to insufficient demonstration of additionality</li> </ul>

CDM 02-19	Target Group: consultant	
	<p><b>Additionality</b></p> 	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p>

CDM 02-21	Target Group: consultant	
	<h2>How to demonstrate additionality?</h2> <p><b>Large-Scale Project:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Steps as specified in the methodology</li> <li><input type="checkbox"/> Tool for the demonstration and assessment of additionality</li> <li><input type="checkbox"/> Guidance on the assessment of investment analysis (CDM-EB added as an annex to the Additionality tool in July 2008)</li> <li><input type="checkbox"/> Combined additionality tool</li> </ul> <p><b>Small-scale Project:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Barrier analysis: the project must have at least one of the following barriers → investment, technology, prevailing practice, other</li> <li><input checked="" type="checkbox"/> Non-binding best practice examples to demonstrate additionality for SSC project activities</li> <li><input type="checkbox"/> Guideline for demonstrating additionality of renewable energy projects ≤ 5 MW and energy efficiency projects with energy savings ≤ 20 GWh per year</li> </ul>  <p>องค์กรจัดการกําลังงานเขียวแห่งประเทศไทย (ประเทศไทย)</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	Target Group: consultant

CDM 02-22	Target Group: consultant	
	<h2>What is additionality?</h2> <p><b>Without CDM</b></p> <p><b>Financially not feasible</b> <b>Technology is not available</b></p> <p>Project developer can not implement the project due to many barriers</p>  <p><b>With CDM</b></p> <p><b>Carbon Credit</b> <b>Additional revenue</b> <b>Clean image</b></p> <p>Project developer is able to implement the project</p>  <p><b>Thailand Greenhouse Gas Management Organization (Public Organization)</b></p> <p>องค์กรจัดการกําลังงานเขียวแห่งประเทศไทย (ประเทศไทย)</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	

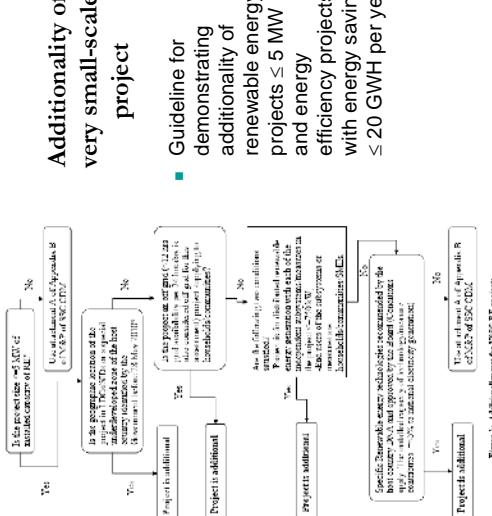
<b>Key Points</b>	<b>Reference and Additional Information</b>
<ul style="list-style-type: none"> <li>- PP must describe in PDD about the project additionality</li> <li>- Similar to baseline, PP can find the first step to prove, or demonstrate additionality in the applicable <b>methodology</b></li> <li>- Each methodology stipulates how to prove additionality of the project</li> <li>- Steps of demonstrating additionality of large-scale and Small-scale projects are different</li> <li>- CDM EB has published several tools and guidance that allow PP to demonstrate additionality</li> </ul>	

<b>Key Points</b>	<b>Reference and Additional Information</b>
<ul style="list-style-type: none"> <li>- Example to show the concept of additionality (using a biomass power plant construction project)</li> <li>- <b>Without CDM</b> and benefit from CER sales, project proponent usually finds many <b>barriers</b> to implement the project, including project is not financially feasible or attractive, and new clean technology is not readily accessible</li> <li>- CDM can remove these barriers and enable PP to implement the project</li> <li>- <b>Benefits</b> PP can receive from CDM includes additional revenue from carbon credit sales and also PP can receive clean image about their entity or products/ services from the customers/ clients, and market</li> <li>- This CDM project can be considered <b>additional</b> since PP cannot carry out the project without CDM, but can implement the project if they register the project as CDM</li> </ul>	

CDM 02-24	<p><b>Additionality of Large-scale project – Guidance on the assessment of investment analysis</b></p> <ul style="list-style-type: none"> <li>■ General guidance for calculation and presentation of IRR/ NPV</li> <li>□ Investment comparison analysis and benchmark analysis</li> <li>□ Selection and validation of appropriate benchmarks</li> <li>□ Sensitivity analysis</li> </ul>	 ឧបករណ៍គម្រោងអភិវឌ្ឍន៍ការបង់បានសំគាល់ (សាខាក្រសួងអំពីរដ្ឋាមេរោគ) National Greenhouse Gas Management Organization (Public Organization)
CDM 02-23	Target Group: consultant	Target Group: consultant

CDM 02-23	<p><b>Additionality of Large-scale project</b></p> <p><b>Tool for the demonstration and assessment of additionality</b></p> <p>Provides a step-wise approach:</p> <ul style="list-style-type: none"> <li>■ Identification of alternatives to the project activity</li> <li>■ Investment analysis to determine that the proposed project activity is either           <ul style="list-style-type: none"> <li>□ Not the most economically or financially attractive</li> <li>□ Not economically or financially feasible</li> </ul> </li> <li>■ Barrier analysis: Investment, technology, prevailing practice, other</li> <li>■ Common practice analysis</li> </ul>	 ឧបករណ៍គម្រោងអភិវឌ្ឍន៍ការបង់បានសំគាល់ (សាខាក្រសួងអំពីរដ្ឋាមេរោគ) National Greenhouse Gas Management Organization (Public Organization)
	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- For barrier analysis, a project is considered as having:           <ul style="list-style-type: none"> <li>- <u>investment barrier</u> if similar activities have been implemented with grants or other non-commercial finance or no private capital is available from domestic or international capital markets due to real or perceived risks associated with investment in the country.</li> <li>- <u>technology barrier</u> if skilled/ properly trained labor to operate and maintain the technology is not available in the relevant region or the technology is not available in the relevant region.</li> <li>- <u>bARRIER due to prevailing practice</u> if the project is first of its kind.</li> </ul> </li> <li>- Common practice analysis compares the CDM project with similar activity i.e. different investment climate, access to finance, technology or information.</li> </ul>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- There are 3 methods for investment analysis include           <ul style="list-style-type: none"> <li>- simple cost analysis,</li> <li>- investment comparison analysis i.e. IRR, NPV, cost-benefit ratio</li> <li>- benchmark analysis i.e. IRR, bank's interest rate, company's internal benchmark, etc.</li> </ul> </li> <li>- Parameters that are frequently used in sensitivity analysis include investment cost, load factor, electricity price, raw material cost, etc.</li> </ul>

CDM 02-26	Target Group: consultant
 <p><b>Methodology</b></p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	

CDM 02-25	Target Group: consultant
<p><b>Additionality of very small-scale project</b></p>  <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- CDM EB issued this guideline in order to facilitate the registration of very small-scale project. If the project meets the requirement of this guideline, additionality proof can be omitted.</li> <li>- This chart is used for very small-scale renewable energy project. There is another more chart for energy efficiency project.</li> </ul> <p><b>Reference and Additional Information</b></p>	

CDM 02-28	Target Group: consultant
<b>Small-scale Methodologies (AMS)</b>	
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>▪ Approved Methodologies (AM): 73 meth.,</li> <li>▪ <u>Approved Consolidated Methodologies (ACM)</u>: 17 meth. active;</li> <li>▪ 10 <u>tools</u> such as 'additionality tool' are available;</li> <li>▪ ACM0002 (grid-connected renewable energy projects) is applied to more than 772 registered projects;</li> <li>▪ On the other hand, some AMs and ACMs have no registered project (as of 26 November 2010)</li> </ul> <p style="text-align: right;">(all data is as of 26 November 2010)</p> <div style="text-align: center;">  <p>นิติบัตรการบริหารจัดการกิจกรรมเพื่อส่งเสริมการอนุรักษ์ (องค์กรภาคเอกชน) National Greenhouse Gas Management Organization (Public Organization)</p> </div>	

CDM 02-27	Target Group: consultant
<b>Large-scale Methodologies (AM and ACM)</b>	
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Methodologies (except A/R) are distinguished by 3 categories</li> <li>1) Large-scale methodologies (AM, 2)</li> <li>Consolidated methodologies for large-Scale (ACM), and 3) small scale methodologies (AMs)</li> <li>- (As of November 26, 2010) There are currently (73) active <b>AMs, or Approved Methodologies</b> and (17) active <b>ACMs, or Approved Consolidated Methodologies</b></li> <li>- Also, there are several "Tools" that are associated with AM and ACM.</li> <li>- Some methodologies require to refer and apply these tools in calculating emissions or demonstrating additionality.</li> <li>- The latest list of AM and ACM, as well as Tool is available at the CDM EB website</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- List of AM and ACM, Tools <a href="http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html">http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html</a></li> </ul>	

CDM 02-29	Target Group: consultant	<p><b>New methodology approval process:</b></p> <p><b>Large-scale project</b></p> <ul style="list-style-type: none"> <li>▪ PPs will propose a new BL methodology, through a DOE/AE.</li> <li>▪ submitting the draft CDM-PDD, CDM-NM.</li> <li>▪ The DOE/AE will determine whether the proposed project activity intends to use a new BL methodology, and check whether the documents are complete and forward them to UNFCCC secretariat</li> <li>▪ The secretariat check the completeness of the documents and publish the documents on the UNFCCC CDM web site and invite public inputs for a period of 15 working days.</li> <li>▪ The documents and comments shall be forwarded to Meth Panel;</li> <li>▪ EB approves the new BL methodology according to the final recommendation of Meth Panel.</li> <li>▪ If Meth Panel do not approve the new BL methodology, PPs must provide clarification.</li> </ul> <p></p>
CDM 02-30	Target Group: consultant	<p><b>New methodology approval process:</b></p> <p><b>Small-scale project</b></p> <ul style="list-style-type: none"> <li>▪ PPs, DOEs, DNAs or stakeholders will propose a new SSC-BL methodology, submitting the draft CDM SSC-PDD, CDM-SSC-NM.</li> <li>▪ After performing a completeness check, the UNFCCC secretariat shall forward the documentation to EB and SSC-WG;</li> <li>▪ The secretariat also will 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.</li> <li>▪ Public inputs will be forwarded to <b>SSC WG</b> soon after receipt and made publicly available.</li> <li>▪ <b>SSC WG</b> will make a recommendation regarding the approval of the proposed new SSC methodology to EB at its next meeting;</li> <li>▪ EB finally decide whether the BL meth. is acceptable or not.</li> </ul> <p></p>

CDM 02-29	Target Group: consultant	<p><b>New methodology approval process:</b></p> <p><b>Large-scale project</b></p> <ul style="list-style-type: none"> <li>▪ In case PP cannot find any approved methodology that is applicable to their proposed project, a new methodology can be developed and submitted for approval. Once it is approved by CDM-EB, PP can apply that methodology to their CDM project.</li> <li>- AE: applicant entity</li> <li>- NM: new methodology</li> <li>- Meth.: methodology</li> </ul>
CDM 02-30	Target Group: consultant	<p><b>New methodology approval process:</b></p> <p><b>Small-scale project</b></p> <ul style="list-style-type: none"> <li>▪ PPs, DOEs, DNAs or stakeholders will propose a new SSC-BL methodology, submitting the draft CDM SSC-PDD, CDM-SSC-NM.</li> <li>▪ After performing a completeness check, the UNFCCC secretariat shall forward the documentation to EB and SSC-WG;</li> <li>▪ The secretariat also will 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.</li> <li>▪ Public inputs will be forwarded to <b>SSC WG</b> soon after receipt and made publicly available.</li> <li>▪ <b>SSC WG</b> will make a recommendation regarding the approval of the proposed new SSC methodology to EB at its next meeting;</li> <li>▪ EB finally decide whether the BL meth. is acceptable or not.</li> </ul> <p></p>

CDM 02-31	Target Group: consultant	
<h2>Type of CDM project: Small-scale project</h2> <ul style="list-style-type: none"> <li>■ Simplified rules and procedures:           <ul style="list-style-type: none"> <li>■ Project proponent can use simplified PDD and methodologies;</li> <li>■ Can save transaction costs and time</li> </ul> </li> </ul> <p>Type I: Renewable energy</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Max. capacity of 15 MW</li> </ul> <p>Type II: Energy efficiency improvement</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Supply and/or demand side</li> <li><input type="checkbox"/> Max. saving of 60 GWh/year</li> </ul> <p>Type III: Other project activities</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Emission reductions of less than 60,000 tons of CO<sub>2</sub> equivalent annually</li> </ul>  <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- PP of <b>small-scale CDM project</b> can <b>benefit</b> from various points, including they can use more simple PDD format and methodology than large-scale, which also means they can save significant time and cost in preparing the document</li> <li>- There are <b>three types of small-scale</b> CDM project activities depending on the technology/ sector of the proposed project</li> <li>- A proposed project must fall within the maximum allowed project size defined by CDM Executive Board in order to be eligible to small-scale</li> <li>- <b>Type I</b> project is a <b>renewable energy</b> project and its limit is 15 MW output capacity of the renewable unit</li> <li>- <b>Type II</b> is <b>energy efficiency</b> project and its limit is 60 GWh of energy saving per year</li> </ul> <p><b>Reference and Additional Information</b></p>		

CDM 02-32	Target Group: consultant	
<h2>Project type</h2>  <p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>		

CDM 02-34	Target Group: consultant
<p><b>Programme of Activities (PoA)</b></p> <p><b>PoA</b> is a voluntary coordinated action by a private/public entity which coordinates and implements any policy/measure or stated goal 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 <b>CDM</b></p>	 <p>องค์กรบริหารจัดการกําลังไอน้ำเพื่อสิ่งแวดล้อม Thailand Greenhouse Gas Management Public Organization (Public Organization)</p> <p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>



CDM 02-33	Target Group: consultant
<h2>Type of CDM project: Bundle project</h2>	
<ul style="list-style-type: none"> <li>■ Single verification and certification report (covers the same verification period)</li> <li>■ F-CDM-BUNDLE – information related the bundle</li> <li>■ PDD (CDM-SSC-PDD)</li> <li>■ Single CDM-SSC-PDD: all project activities in the bundle belong to the same type, category and technology/ measure If not: CDM-SSC-PDD for each of the project activities contained in the bundle must be submitted</li> </ul>	 <p>ประเทศไทย การจัดการกําลังกําลัง (องค์กรภาครัฐ) Thailand Greenhouse Gas Management Organization (Public Organization)</p>
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>– <b>Bundling</b> is defined as bringing together of several small-scale project activities to make a single CDM project activity without the loss of distinctive characteristics of each project activity, including technology/ measure, location, and application of small-scale methodology.</li> <li>– The sum of the output capacity of projects within a sub-bundle projects must not exceed the maximum output capacity limit for its type.</li> <li>– PP must prepare and submit <b>bundle format</b> together with PDD.</li> <li>– The benefits of bundling may include reduction of project development costs, reduction of Engineering, Procurement and Construction (EPC) costs, reduction of O&amp;M costs, reduction of transaction costs (general cost and CDM-related cost), and increase of total investment volume.</li> </ul> <p>(Source: CDM/JI Manual, Ministry of Environment, Japan, 2009)</p>	<p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>– CDM/JI Manual, Ministry of Environment, Japan</li> <li>– <a href="http://gec.ji/p/main.nsf/en/Activities-CDMJ_1_Forum_Programme-CDMJ_Manual2009">http://gec.ji/p/main.nsf/en/Activities-CDMJ_1_Forum_Programme-CDMJ_Manual2009</a></li> </ul>



CDM 02-36	Target Group: consultant	
<b>PoA – Inclusion of CPA</b>		

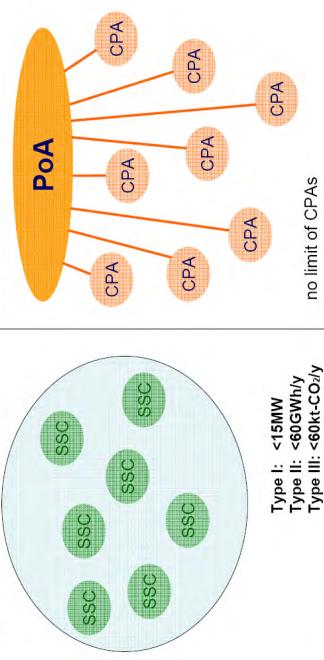
- Unlimited number of CDM Programme Activities (CPAs) that is a project activity under a PoA.
- A CPA can be included in a registered PoA at any time during the duration of the PoA.
- The duration of the PoA shall not exceed 28 years, whereas crediting period of a CPA is as same as normal CDM project.



อธิบดีกรมการพัฒนาพลังงานทดแทนและพลังงานทางเลือก (ผู้ดูแลกรมฯ)  
Thailand Greenhouse Gas Management Organization (Public Organization)

CDM 02-35	Target Group: consultant	
<b>PoA -- CPA</b>		

#### Small Scale CDM - bundling



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Thailand Greenhouse Gas Management Organization (Public Organization)

#### Key Points

- Developing CDM projects as a PoA can reduce the transaction cost, time and risk compared with general CDM project because unlimited projects can be grouped together as a CPA and several CPAs can be included to the registered PoA. Besides, voluntary projects developed according to regional, national and local policy can also be registered as a PoA.

#### Reference and Additional Information

#### Reference and Additional Information

CDM 02-38	Target Group: consultant	
<h3>PoA – Project Design document</h3> <ul style="list-style-type: none"> <li>■ <b>CDM-PoA-DD: additional information required</b> <ul style="list-style-type: none"> <li>□ Identification of the coordinating/managing entity</li> <li>□ Description of the policy/measure or stated goal that the PoA seeks to promote</li> <li>□ Definition of eligibility criteria for inclusion of a project activity as a CPA under the PoA</li> <li>□ Description of a monitoring plan for a CPA</li> </ul> </li> <li>■ <b>PoA generic CDM-CPA-DD</b> <ul style="list-style-type: none"> <li>□ specifies the generic information relevant to all CPAs that may be included in the PoA</li> </ul> </li> <li>■ <b>Completed CDM-CPA-DD</b> <ul style="list-style-type: none"> <li>□ based on the application of the PoA to one real case.</li> </ul> </li> </ul>		

CDM 02-37	Target Group: consultant	
<h3>PoA – C/ME</h3> <ul style="list-style-type: none"> <li>■ A PoA shall be proposed by the Coordinating or Managing Entity (C/ME) which shall be a project participants authorized by all participating host country DNAs</li> <li>■ C/ME shall obtain <ul style="list-style-type: none"> <li>□ Letters of Approval (LoA) for the implementation of the PoA from each Host Party and Annex I Party involved in the PoA</li> <li>□ Letters of Authorization of its coordination of the PoA from each Host Party.</li> </ul> </li> <li>■ To include an additional CPA in a registered PoA, the C/ME 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.</li> <li>■ C/ME may forward more than one specific CDM-CPA-DD at one time.</li> </ul>		

### Key Points

### Reference and Additional Information

### Reference and Additional Information

CDM 02-40	Target Group: consultant				
<b>PoA – registered PoA</b>					
Project Title	Country				
C/M/E	Project type				
CER of the first CPA (tCO <sub>2</sub> eq/y)	CER of overall PoA (tCO <sub>2</sub> eq/y)				
<b>CFL lighting scheme – “Bachat Lamp Yojana</b>	India	Bureau of Energy Efficiency	3:	34,892	34,892
Methane capture and combustion from Animal Waste Management System (AWMS) of the 3S Program farms of the Instituto Sadia de Sustentabilidade	Brazil	Instituto Sadia de Sustentabilidade (ISS)	15: Agricultural	139	591,418
GUIDEMOS Mexico (Campana De Uso Inteligente De Energia Mexico) - Smart Use of Energy Mexico	Mexico	Cooling Carbon Investments Pty Ltd	3: Energy demand	24,283	520,365
 บริษัทการจัดการกําลังงานเพื่อสิ่งแวดล้อม (มหาชน) จำกัด (มหาชน) (Public Organization)					
<b>Key Points</b> <ul style="list-style-type: none"> <li>The first project distribute CFL (self-ballasted compact fluorescent) bulb to grid-connected residential household to displace ICL (incandescent lamp) and collect and dispose the used CFL.</li> <li>The second project install biogester and enclosed flare system.</li> <li>The third project distribute energy efficient light bulbs to household across Mexico.</li> </ul>					
<b>Reference and Additional Information</b>					

CDM 02-39	Target Group: consultant
<b>PoA -- Validation &amp; verification</b>	
<ul style="list-style-type: none"> <li>■ Validation <ul style="list-style-type: none"> <li>□ additioality</li> <li>□ eligibility criteria for inclusion of a proposed CPA</li> <li>□ operational and management arrangements</li> <li>□ consistency between CDM-PoA-DD and the PoA generic CDM-CPA-DD; etc.</li> </ul> </li>   <li>■ Verification <ul style="list-style-type: none"> <li>same as typical CDM project</li> </ul> </li> </ul>	 <p>ประเทศไทยเพื่อการบริหารจัดการกําazi เศรษฐกิจอย่างยั่งยืน (องค์กรภาครัฐ)</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>

CDM 02-42	Target Group: consultant
<p style="text-align: center;"><b>CDM development cycle</b></p> <p>The diagram illustrates the CDM development cycle as a continuous loop. It starts with a 'Project idea' icon, followed by 'Concept Note', 'Feasibility Study', 'Registration', 'Implementation', 'Monitoring', 'Verification', 'Validation', 'Certification', and ends with 'Registration' again.</p>	

CDM 02-41	Target Group: consultant																		
<p><b>PoA – registered PoA (continued)</b></p> <table border="1"> <thead> <tr> <th>Project Title</th> <th>Country</th> <th>C/M/E</th> <th>Project type</th> <th>CER of the first CPA (tCO<sub>2</sub>e/y)</th> <th>CER of overall PoA (tCO<sub>2</sub>e/y)</th> </tr> </thead> <tbody> <tr> <td>Uganda Municipal Waste Compost Programme.</td> <td>Uganda</td> <td>National Environmental Management Authority (NEMA)</td> <td>13: Waste handling &amp; disposal</td> <td>8,370</td> <td>83,700</td> </tr> <tr> <td>Masca Small Hydro Programme</td> <td>Honduras</td> <td>Hidroeléctrica de Masca S.A. de C.V. (Hidromasca)</td> <td>E1: Energy industries</td> <td>4,395</td> <td>4,395</td> </tr> </tbody> </table> <p style="text-align: center;">องค์กรจัดการกําจัดขยะชุมชน (องค์กรมหาชน) Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The common practice of the fourth project is landfill disposal.</li> <li>- The last project is hydroelectric project.</li> </ul> <p><b>Reference and Additional Information</b></p>		Project Title	Country	C/M/E	Project type	CER of the first CPA (tCO <sub>2</sub> e/y)	CER of overall PoA (tCO <sub>2</sub> e/y)	Uganda Municipal Waste Compost Programme.	Uganda	National Environmental Management Authority (NEMA)	13: Waste handling & disposal	8,370	83,700	Masca Small Hydro Programme	Honduras	Hidroeléctrica de Masca S.A. de C.V. (Hidromasca)	E1: Energy industries	4,395	4,395
Project Title	Country	C/M/E	Project type	CER of the first CPA (tCO <sub>2</sub> e/y)	CER of overall PoA (tCO <sub>2</sub> e/y)														
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Masca Small Hydro Programme	Honduras	Hidroeléctrica de Masca S.A. de C.V. (Hidromasca)	E1: Energy industries	4,395	4,395														

CDM 02-44	Target Group: consultant
<h3 style="text-align: center;">Demonstration and assessment of prior consideration of the CDM</h3> <ul style="list-style-type: none"> <li>■ New Project (starting date, on or after 2 August 2008)           <ul style="list-style-type: none"> <li><input type="checkbox"/> 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</li> </ul> </li> <li>■ Existing Project (starting date, before 2 August 2008 and before the date of validation)           <ul style="list-style-type: none"> <li><input type="checkbox"/> Indicate awareness of the CDM prior to starting date</li> <li><input type="checkbox"/> 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)</li> </ul> </li> </ul> <p style="text-align: right;"></p>	

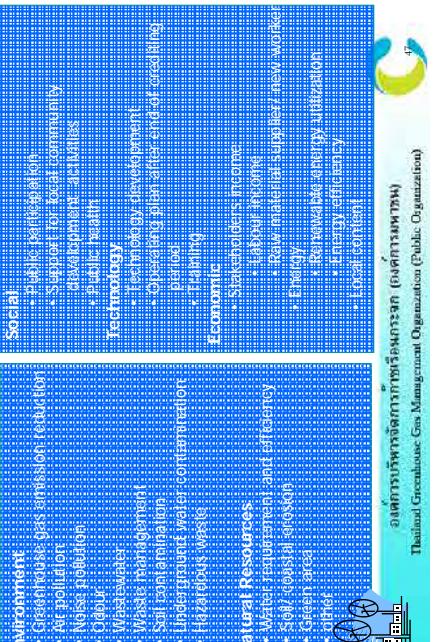
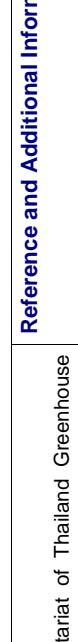
CDM Cycle	Target Group: consultant
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Chart shows general CDM project cycle from project design to CER issuance</li> <li>- <b>Project Proponent (PP)</b> first prepares <b>Project Design Document (PDD)</b>, which describes project description, technology applied, baseline and additionality, how to monitor and calculate GHG emission reductions, etc. PP must use a standard format of PDD provided by CDM Executive Board</li> <li>- Using the developed PDD, PP must obtain <b>national approval from TGO</b>, and also has to go through a <b>validation</b> process that will be conducted by a third independent party called <b>Designated Operational Entity (DOE)</b>.</li> <li>- The project that has obtained national approval and also successfully passed the validation process can <b>apply to registration</b> to CDM Executive Board.</li> </ul>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- After CDM project is registered and operation starts, PP must conduct <b>monitoring</b> activity in order to obtain data and information necessary to calculate GHG emission reduction amount from the project activity.</li> <li>- Result of monitoring will be then checked by <b>DOE</b> through <b>verification</b> and amount of CER is decided in <b>certification</b> stage.</li> <li>- After going through all these stages, <b>CER is issued</b> to the PP by the CDM Executive Board.</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- PDD formats: <a href="http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/index.html">http://cdm.unfccc.int/Reference/ PDDs_Forms/PDDs/index.html</a></li> <li>- List of DOEs: <a href="http://cdm.unfccc.int/DOE/list/index.html">http://cdm.unfccc.int/DOE/list/index.html</a></li> </ul>

CDM 02-45	Target Group: consultant	<p><b>Definition of Start date according to “Prior consideration of the CDM</b></p> <ul style="list-style-type: none"> <li>▪ Starting Date : “the earliest date at which either the implementation or construction or real action of a project activity begins”           <ul style="list-style-type: none"> <li>□ “the date on which the PP has committed to expenditures related to the implementation or related to the construction of the project activity”</li> </ul> </li> <li>▪ If starting date is before the date of publication of the PDD for global stakeholder consultation           <ul style="list-style-type: none"> <li>□ Need to show how the benefits of the CDM were seriously considered prior to the starting date</li> </ul> </li> </ul>
CDM 02-46	Target Group: consultant	<p><b>Host country approval -- required document</b></p> <ul style="list-style-type: none"> <li>▪ PDD</li> <li>▪ IEE-SD or EIA-SD report</li> <li>▪ Project details           <ul style="list-style-type: none"> <li>□ Necessary data for analysis the sustainability of the project</li> <li>□ Summary of the stakeholder consultation meeting</li> </ul> </li> </ul>

CDM 02-45	Target Group: consultant	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- PP must submit PDD, IEE-SD or EIA-SD to TGO for LoA approval.</li> <li>- SD: Sustainable Development</li> </ul>
CDM 02-46	Target Group: consultant	<p><b>Reference and Additional Information</b></p> <p><a href="http://www.tgo.or.th/index.php?option=com_content&amp;task=view&amp;id=32&amp;Itemid=60">http://www.tgo.or.th/index.php?option=com_content&amp;task=view&amp;id=32&amp;Itemid=60</a></p>

CDM 02-48	Target Group: consultant	<h2>VVM – Validation and Verification Manual</h2> <ul style="list-style-type: none"> <li>■ approved by CDM-EB at forty-fourth meeting (EB44) revised at EB55</li> <li>■ provides requirements to DOEs for their validation and verification work</li> <li>■ promotes quality and consistency in the preparation of their validations and verification reports</li> </ul> <p>DOEs must follow this manual and must integrate its provisions</p> <div style="text-align: right; margin-top: 20px;">            บริษัทการจัดซื้อจัดจ้างภาครัฐเพื่อส่งเสริมการแข่งขัน (องค์กรกลางของรัฐ)                   Thailand Government Procurement Organization (Public Organization)       </div>
Key Points	Reference and Additional Information	



CDM 02-47	Target Group: consultant	<h2 style="color: #0070C0;">Host country approval: SD-criteria of Thailand</h2> 	
		<h3 style="color: #0070C0;">Reference and Additional Information</h3>	
<b>Environment</b> <ul style="list-style-type: none"> <li>Greenhouse gas emission reduction</li> <li>Air pollution</li> <li>Water pollution</li> <li>Soil pollution</li> <li>Waste management</li> <li>Soil conservation</li> <li>Underground water contamination</li> <li>Hazardous waste</li> </ul>		<b>Social</b> <ul style="list-style-type: none"> <li>Public participation</li> <li>Support for local community development activities</li> <li>Public health</li> </ul>	
<b>Natural Resources</b> <ul style="list-style-type: none"> <li>Water requirement and efficiency</li> <li>Soil (fertilizer) selection</li> <li>Green area</li> <li>Plant</li> </ul>		<b>Technology</b> <ul style="list-style-type: none"> <li>Technology development</li> <li>Technology plan after end of crediting period</li> <li>Training</li> </ul>	
<b>Economic</b> <ul style="list-style-type: none"> <li>State of debt, income</li> <li>Labour income</li> <li>Business related support resources</li> <li>Energy</li> <li>Renewable energy utilization</li> <li>Energy efficiency</li> <li>Capital investment</li> <li>Local employment</li> </ul>			
<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>The secretariat of Thailand Greenhouse Gas and Management Organization : TGO analyses project data and gives score to each indicator. Minus score indicates negative impact of the project, on the other hand, positive score indicates positive impact.</li> <li>The proposed CDM project will be evaluated as a sustainable CDM project only if total score of each dimension and the total score of the project is positive. The project is approved by the Board of Director.</li> </ul>			



CDM 02-49	Target Group: consultant	<b>Important points of VVM: Methods of Validation</b>
CDM 02-50	Target Group: consultant	<p>The DOE will apply standard auditing techniques to assess the correctness of the information provided by the project participants using following methods:</p> <ul style="list-style-type: none"> <li>▪ Document review</li> <li>▪ Follow-up actions e.g. on site visit and telephone or email interviews,</li> <li>▪ Reference to available information relating to projects or technologies similar to the proposed CDM project activity under validation</li> <li>▪ Review of the appropriateness of formulae and correctness of calculations.</li> </ul>

CDM 02-49	Target Group: consultant	<b>Important points of VVM: Methods of Validation</b>
CDM 02-50	Target Group: consultant	<p>The DOE will raise a corrective action request (CAR) if one of the following occurs:</p> <ul style="list-style-type: none"> <li>▪ The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.</li> <li>▪ The CDM requirements have not been met;</li> <li>▪ There is a risk that emission reductions cannot be monitored or calculated.</li> </ul>



จังหวัดกรุงเทพมหานครและกรุงเทพ (องค์การมหาภัย)  
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จังหวัดกรุงเทพมหานครและกรุงเทพ (องค์การมหาภัย)  
Thailand Greenhouse Gas Management Organization (Public Organization)

#### Important points of VVM: Validation – CAR –

#### Key Points

#### Reference and Additional Information

#### Key Points

#### Reference and Additional Information

CDM 02-51	Target Group: consultant	
<p><b>Important points of VVM: Validation – CL and FAR</b></p> <p>The DOE will raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.</p> <p>The DOE will raise a forward action request (FAR) during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.</p>		

CDM 02-52	Target Group: consultant	
<p><b>Important points of VVM: Validation – CL and FAR</b></p> <p>The DOE will ensure that the baseline and monitoring methodologies selected by the project participants comply with the methodologies previously approved by the CDM Executive Board</p> <ul style="list-style-type: none"> <li>■ Project boundary;</li> <li>■ Baseline identification;</li> <li>■ Algorithms and/or formulae used to determine emission reductions;</li> <li>■ Additionality</li> <li>■ Monitoring methodology</li> </ul> <p> จุฬาลงกรณ์มหาวิทยาลัย สำนักงานบริหารจัดการสิ่งแวดล้อม (องค์กรมหาชน) Thammasat Greenhouse Gas Management Organization (Public Organization)</p> <p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>		

CDM 02-54	Target Group: consultant	
<p><b>Important points of VVM: Validation – monitoring plan</b></p> <p>The DOE will apply a two-step process to assessing compliance with this requirement as follows:</p> <ul style="list-style-type: none"> <li>■ Compliance of the monitoring plan with the approved methodology</li> <li>■ Implementation of the plan</li> </ul> <p>DOE will assess whether the monitoring arrangements described in the monitoring plan are feasible within the project design:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> State the DOEs opinion of the project participants ability to implement the monitoring plan</li> </ul>		

CDM 02-53	Target Group: consultant	
<p><b>Important points of VVM: Validation – Additivity of a project activity</b></p> <p>Prior consideration of the CDM</p> <ul style="list-style-type: none"> <li>■ Investment analysis           <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe in detail how the parameters used in any financial calculations have been validated.</li> <li><input type="checkbox"/> Describe how the suitability of any benchmark applied has been assessed.</li> <li><input type="checkbox"/> Confirm whether the underlying assumptions are appropriate and the financial calculations are correct</li> </ul> </li> </ul>		



จังหวัดกรุงเทพมหานครและกรุงเทพ (องค์การมหาภัย)  
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Thailand Greenhouse Gas Management Organization (Public Organization)

#### Important points of VVM: Validation – monitoring plan

#### Key Points

#### Reference and Additional Information

#### Key Points

CDM 02-56	Target Group: consultant	
<b>Monitoring</b>		
<ul style="list-style-type: none"> <li>■ PPs must monitor every parameters specified in PDD -- section B.7: Application of the monitoring methodology and description of the monitoring plan</li> <li>■ PPs must ensure that the required data is accurately monitored and recorded to enable the calculation of the emission reductions achieved by the proposed project activity.</li> <li>■ PPs must have procedures to cope with emergency case, instrument failure and inconsistent data.</li> </ul>		



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Thailand Greenhouse Gas Management Organization (Public Organization)

CDM 02-55	Target Group: consultant	
<b>Validation -- Example of reasons of request for review and rejection</b>		
<ul style="list-style-type: none"> <li>■ The DOE did not sufficiently explain how it has validated the project emissions from processing the briquettes and pellets in the manufacturing facilities in line with VVM version 0.1 para 76 (request for review).</li> <li>■ The DOE is required to clarify how it has validated the common practice analysis in line with VVM para 120 (c). (request for review)</li> <li>■ Project participants and the DOE (DNV) have failed to substantiate that the methodology has been correctly applied in line with the requirements of VVM version 1.1, paragraph 70, (rejected)</li> </ul>		



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Thailand Greenhouse Gas Management Organization (Public Organization)

<b>Key Points</b>	
<ul style="list-style-type: none"> <li>- After registration, PP must conduct <b>monitoring</b> in which <b>PP will measure and calculate certain parameters</b> in order to calculate the amount of GHG emission reductions, and then record and report the monitoring result.</li> <li>- Parameters to be monitored are described in the <b>approved methodology</b> applied to the project and they must also be described in PDD</li> <li>- Depending on the sector, or methodology, or project size, the <b>number of parameters</b> to be monitored for one project is different.</li> <li>- <b>Frequency of monitoring</b> is different by each parameter, from every 15 minutes to every year.</li> </ul>	<ul style="list-style-type: none"> <li>- PP is also required to establish and mention in PDD a <b>monitoring organization or structure</b>, in which responsible personnel or department and its monitoring responsibility is clearly described</li> <li>- Although PP is not required to be ISO-certified entity, PP must describe in PDD about quality assurance/ quality control (<b>QAQC</b>) procedures.</li> <li>- Monitoring activity is extremely important for PP and investors since <b>it is directly related to the CER or revenue they can receive</b>.</li> </ul>



#### Reference and Additional Information

#### Key Points

#### Reference and Additional Information

CDM 02-58	Target Group: consultant
<h3 style="text-align: center;">Difference of emission reduction in PDD and monitored results</h3>	

Ref. No.	Project Name	Emission Reduction in PDD	Actual emission reduction compared to expected emission reduction
1519	Surat Thani Biomass Power Generation Project in Thailand	106,592	40.3%
1024	Phu Khao Bio-Energy Cogeneration project (PKBC)	102,493	128.5%
1020	Dan Chang Bio-Energy Cogeneration project (DCBC)	93,129	117.7%
1036	Khon Kaen Sugar Power Plant	61,449	110.3%
1026	A.T. Biopower Rice Husk Power Project in Pichit, Thailand	70,772	98.6%


  
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CDM 02-57	Target Group: consultant
<h3 style="text-align: center;">Verification – Important points</h3> <ul style="list-style-type: none"> <li>■ The DOE will apply standard auditing techniques to assess the quality of the information,             <ul style="list-style-type: none"> <li>□ Desk review</li> <li>□ On-site assessment</li> </ul> </li> <li>■ The DOE will ensure that there is a clear audit trail that contains the evidence and records that validate or invalidate the stated figures.</li> <li>■ The DOE will ensure that monitoring has been implemented in accordance with the monitoring plan</li> <li>■ All parameters have been sufficiently monitored and updated as applicable</li> <li>□ The accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan</li> </ul> <p style="text-align: right; margin-top: -10px;">            จุลทรรศน์การบริหารจัดการกําลังฟ้า (องค์กรสาธารณะ)          Thailand Greenhouse Gas Management Organization (Public Organization)     </p>	

Key Points		Reference and Additional Information	
<p>– If actual emission reduction in monitoring report is less than the calculated figure in registered PDD, it means that PP will receive less CDM revenue than what they expect.</p> <p>– This table shows the figure of biomass project in Thailand. The actual emission reduction of four projects is close to or higher than the calculated figure in the PDD. Only one project has less than 50%.</p>			

Key Points		Reference and Additional Information	
<p>– If actual emission reduction in monitoring report is less than the calculated figure in registered PDD, it means that PP will receive less CDM revenue than what they expect.</p> <p>– This table shows the figure of biomass project in Thailand. The actual emission reduction of four projects is close to or higher than the calculated figure in the PDD. Only one project has less than 50%.</p>			

CDM 02-59	Target Group: consultant	<h3>Reasons of CER issuance rejection</h3> <ul style="list-style-type: none"> <li>▪ PP and DOE did not provide EB adequate evidence of the existence and significance of a barrier.</li> <li>▪ DOE has accepted a modification of the approved monitoring methodology from PP without requesting a deviation to EB,</li> <li>▪ DOE has not sufficiently verified that the monitoring plan is in accordance with the approved methodology.</li> <li>▪ 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.</li> <li>▪ There is no reference on what time the daily sample was taken</li> </ul> <p style="text-align: right;"></p> <p style="text-align: center;">อธิบดีกรมควบคุมมลพิษทรงเครื่องการจัดการเรื่องกําจัดเชื้อเพลิงธรรมชาติ (สังกัดกระทรวงมหาดไทย) Thailand Greenhouse Gas Management Organization (Public Organization)</p>
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CDM 02-59	Target Group: consultant	<h3>Certification / issuance of CER</h3> <pre> graph TD     subgraph Steps_and_necessary_documents [Steps and necessary documents]         direction TB         PP[PP] --&gt; Contract[Contract with a DOE]         Contract --&gt; MR[MR: Open to public]         MR --&gt; DOE[DOE]         DOE --&gt; EB[EB]         EB --&gt; CR[Receive the CR]         CR --&gt; Request[Request for issuance]         Request --&gt; Verification[Verification (on site inspection)]         Verification --&gt; Monitoring[Monitoring activities]         Monitoring --&gt; Report[Monitoring Report]         Report --&gt; Certification[Certification]         Certification --&gt; VR[VR &amp; C Report]         VR --&gt; Submit[Submit to PP, Parties, EB and open to public]         Submit --&gt; CER[Issuance of CERs]         CER --&gt; Approved[Issuance not approved]         Approved --&gt; EB         Approved --&gt; Outcome[Inform the outcome]         Outcome --&gt; Review[Review conducted]         Review --&gt; RequestReview[Request for review]         RequestReview --&gt; CR     end     subgraph Reference_and_Additional_Information [Reference and Additional Information]         direction TB         KeyPoints[Key Points]         KeyPoints --&gt; Reference[Reference and Additional Information]         Reference --&gt; Approved     end </pre> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- PP can not contact directly to EB. They shall submit document via DoE.</li> <li>- During the certification step, the MR is submitted to DoE in order to open for comment from public, verification and certification.</li> <li>- The VR and CR prepared by DoE will be submitted to EB for issuance of CERs if there is no any request for review.</li> </ul> <p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- MR : monitoring report</li> <li>- VR : verification report</li> <li>- CR : certification report</li> </ul> <p style="text-align: right;"></p> <p style="text-align: center;">อธิบดีกรมควบคุมมลพิษทรงเครื่องการจัดการเรื่องกําจัดเชื้อเพลิงธรรมชาติ (สังกัดกระทรวงมหาดไทย) Thailand Greenhouse Gas Management Organization (Public Organization)</p>
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**Target Groups**

<b>Code</b>	<b>Target group</b>
G	General audience and potential project proponent

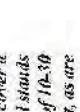
**Update History**

**Afforestation/ Reforestation  
Clean Development Mechanism**

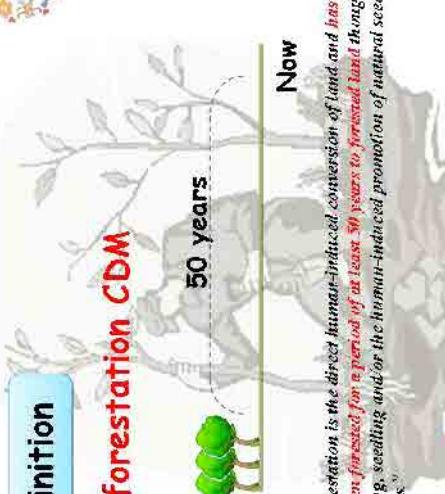
<b>Version</b>	<b>Date</b>	<b>Initial adoption</b>	<b>Update Contents</b>
01	08/2011		

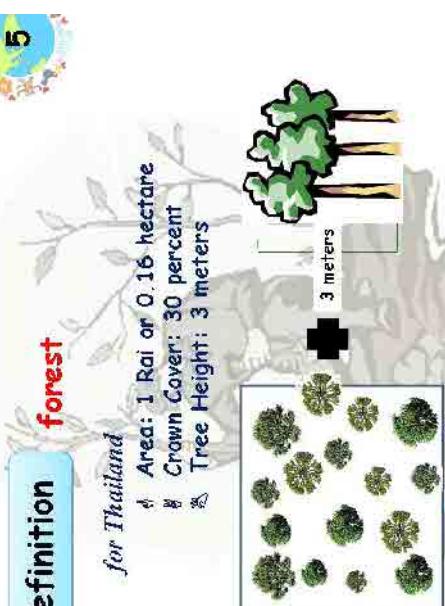
CDM 03-02	Target Group: G
<b>Concept of A/R CDM</b> 	<b>Reference and Additional Information</b>  <b>Key Points</b>   

CDM 03-01	Target Group: G
<b>Afforestation/ Reforestation Clean Development Mechanism: A/R CDM</b> 	<b>Reference and Additional Information</b>  <b>Key Points</b>   

CDM 03-04	Target Group: G	
CDM 03-04	Target Group: G	<p><b>Definition</b></p> <p><b>forest</b></p> <p>“a minimum area of land of 0.05-1.0 hectare with true crown cover (or equivalent stocking level) of more than 10-50 percent with trees with the potential to reach a minimum height of 2.5 meters at maturity in situ. A forest may consist either of closed forest formations where trees of various species and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-50 percent of tree height of 2.5 meters are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes, but which are expected to revert to forest”</p> <p>Annex to decision 16/CMP.1 (Land use, land-use change and forestry), para 1(g)</p>     

CDM 03-03	Target Group: G	
CDM 03-03	Target Group: G	<p><b>A/R CDM Features</b></p> <ul style="list-style-type: none"> <li>• <b>Non permanence</b> Carbon sequestration by tree is not permanent</li> <li>• <b>Non certainty</b> It is difficult to estimate GHG removals by sink</li> <li>• <b>Long term crediting period</b> It takes time to absorb GHG by forest</li> </ul>     

CDM 03-06	Target Group: G	
<p><b>Definition forest</b></p> <p>for Thailand</p> <ul style="list-style-type: none"> <li>1 Area: 1 Rai or 0.16 hectare</li> <li>2 Crown Cover: 30 percent</li> <li>3 Tree Height: 3 meters</li> </ul>  <p><small>Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>	<p><b>Afforestation CDM</b></p> <p><b>Definition</b></p> <p>Now</p> <p><i>"Afforestation is the direct human-induced conversion of land and <del>has not been forested</del>, for a period of at least 50 years to forested land through planting, seedling, and/or the human-induced promotion of natural seed sources."</i></p>  <p><small>Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>

CDM 03-05	Target Group: G	
<p><b>Definition forest</b></p> <p>for Thailand</p> <ul style="list-style-type: none"> <li>1 Area: 1 Rai or 0.16 hectare</li> <li>2 Crown Cover: 30 percent</li> <li>3 Tree Height: 3 meters</li> </ul>  <p><small>Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>	<p><b>Key Points</b></p>	

CDM 03-08	Target Group: G	
	<p><b>Carbon Pools</b></p> <p>8</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	

CDM 03-07	Target Group: G	
	<p><b>Definition</b></p> <p>7</p> <p>Reforestation is the conversion of non-forested land to forested land, or land that was forested but has been converted to non-forested land, for the 1st commitment period, reforestation activities will be limited to reforestation occurring on those land that did not contain forest on 31 December 1989.</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	

CDM 03-10	Target Group: G
	<h3>Demonstration of Land Eligibility 10</h3> <p><b>Afforestation:</b> Forestry activity on land which has not been forest for past 50 years at least</p> <p>Now 50 years 31 December 1989</p> <p><b>Reforestation:</b> Forestry activity on land which has not been forest since December 31, 1989</p> <p>Now 31 December 1989</p> <p><small>Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>

CDM 03-09	Target Group: G
	<h3>Eligibility of Land 9</h3> <p><b>Afforestation:</b> Forestry activity on land which has not been forest for past 50 years at least</p> <p>Now 50 years 31 December 1989</p> <p><b>Reforestation:</b> Forestry activity on land which has not been forest since December 31, 1989</p> <p>Now 31 December 1989</p> <p><small>Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>

#### Key Points

#### Reference and Additional Information

CDM 03-12	Target Group: G	
	<p><b>Additionality</b></p> <p><b>11</b></p> <p>The project is Additional!</p> <p>Reason:</p> <ul style="list-style-type: none"> <li>✓ Planting trees is not common (traditional barrier)</li> <li>✓ The area is degraded and not suitable (ecological barrier)</li> <li>✓ The area is too far from the factory and not economically attractive for plantation (investment analysis)</li> </ul> <p><b>12</b></p> <p>The project is NOT Additional</p> <p>Forest will be established without A/R CDM</p> <p><i>Thailand Greenhouse Gas Management Organization (Public Organization)</i></p>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p>

CDM 03-11	Target Group: G	
	<p><b>Baseline Scenario</b></p> <p><b>11</b></p> <p>"The Scenario that reasonably represents the change in carbon stocks in the carbon pools within the project boundary that occur in the event that A/R CDM project activity is not implemented"</p> <ul style="list-style-type: none"> <li>⌚ Existing historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary</li> <li>⌚ Changes in carbon stocks in the carbon pools within the project boundary from a land use that represent an economically attractive course of action, taking into account barriers to investment</li> <li>⌚ Changes in carbon stocks in the pools within the project boundary from the most likely land use at the time the project starts</li> </ul> <p><i>Thailand Greenhouse Gas Management Organization (Public Organization)</i></p>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p>

CDM 03-14	Target Group: G	
<b>Evaluation of Additionality</b>  13	<b>Evaluation of Additionality</b>  14	

CDM 03-13	Target Group: G	
<b>Evaluation of Additionality</b>  13	<b>Evaluation of Additionality</b>  14	

for Large-scale and small scale A/R CDM

- ▷ **Investment barriers, other than economic/financial barriers**
  - Debt funding not available for this type of project activity:
  - No access to international capital markets due to real or perceived risks associated with domestic of foreign direct investment in the country where the project activity is to be implemented;
  - Lack of access to credit

 Thailand Greenhouse Gas Management Organization (Public Organization)

#### Key Points

#### Reference and Additional Information

#### Key Points

#### Reference and Additional Information

CDM 03-16	Target Group: G	<h2>Evaluation of Additionality</h2> <p><b>15</b></p> <p>for Large-scale and small scale A/R CDM</p> <ul style="list-style-type: none"> <li>⇒ <b>Barriers due to prevailing practice</b> <ul style="list-style-type: none"> <li>- The project activity is the "first of its kind": No project activity of this type is currently operational in the host country or region;</li> </ul> </li> <li>⇒ <b>Barriers due to local ecological conditions</b> <ul style="list-style-type: none"> <li>- Degraded soil (e.g. water/wind erosion, salinization);</li> <li>- Catastrophic natural and/or human-induced events (e.g. land slides, fire);</li> <li>- Unfavorable meteorological conditions (e.g. early/late frost, drought);</li> <li>- Pervasive opportunistic species preventing regeneration of tree (e.g. grasses, weeds);</li> <li>- Unfavorable course of ecological succession;</li> <li>- Biotic pressure in terms of grazing, fodder collection, etc.</li> </ul> </li> </ul> <p><b>16</b></p> <p>for Large-scale and small scale A/R CDM</p> <ul style="list-style-type: none"> <li>⇒ <b>Barriers due to social condition</b> <ul style="list-style-type: none"> <li>- Demographic pressure on the land (e.g. increased demands on the land due to population growth);</li> <li>- Social conflict among interest groups in the region where the project activity takes place;</li> <li>- Widespread illegal practices (e.g. illegal grazing, non-timber product extraction and tree felling);</li> <li>- Lack of skilled and/or properly trained labor force;</li> <li>- Lack of organization of local communities;</li> <li>- Traditional equipment and technology;</li> </ul> </li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>
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CDM 03-15	Target Group: G	<h2>Evaluation of Additionality</h2> <p><b>15</b></p> <p>for Large-scale and small scale A/R CDM</p> <ul style="list-style-type: none"> <li>⇒ <b>Barriers due to prevailing practice</b> <ul style="list-style-type: none"> <li>- The project activity is the "first of its kind": No project activity of this type is currently operational in the host country or region;</li> </ul> </li> <li>⇒ <b>Barriers due to local ecological conditions</b> <ul style="list-style-type: none"> <li>- Degraded soil (e.g. water/wind erosion, salinization);</li> <li>- Catastrophic natural and/or human-induced events (e.g. land slides, fire);</li> <li>- Unfavorable meteorological conditions (e.g. early/late frost, drought);</li> <li>- Pervasive opportunistic species preventing regeneration of tree (e.g. grasses, weeds);</li> <li>- Unfavorable course of ecological succession;</li> <li>- Biotic pressure in terms of grazing, fodder collection, etc.</li> </ul> </li> </ul> <p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>
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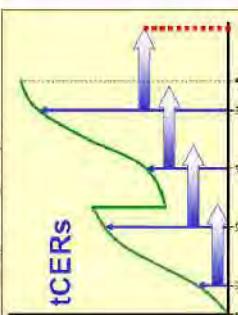
CDM 03-18	Target Group: G	<h2>Evaluation of Additionality</h2> <p><b>18</b></p> <p>for Large-scale A/R CDM</p> <ul style="list-style-type: none"> <li>⇒ Barriers due to land tenure, ownership, inheritance, and property rights           <ul style="list-style-type: none"> <li>- Communal land ownership with a hierarchy of rights for different stakeholders limits the incentives to undertake A/R activity;</li> <li>- Lack of suitable land tenure legislation and regulation to support the security of tenure;</li> <li>- Absence of clearly defined and regulated property rights in relation to natural resource products and services;</li> <li>- Formal and informal tenure systems that increase the risks of fragmentation of land holdings;</li> <li>- Barriers relating to markets, transport and storage;</li> <li>- Unregulated and informal markets for timber, non-timber products and services prevent the transmission of effective information to project participants;</li> </ul> </li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<h2>Evaluation of Additionality</h2> <p><b>17</b></p> <p>for Large-scale A/R CDM</p> <ul style="list-style-type: none"> <li>⇒ Barriers due to land tenure, ownership, inheritance, and property rights           <ul style="list-style-type: none"> <li>- Remoteness of A/R activities and undeveloped road and infrastructure incur large transportation expenditures, thus eroding the competitiveness and profitability of timber and non-timber products from the CDM activity;</li> <li>- Possibilities of large price risk due to the fluctuations in the prices of timber and non-timber products over the project period in the absence of efficient markets and insurance mechanisms;</li> <li>- Absence of facilities to convert, store and add value to production from CDM activities limits the possibilities to capture rents from the land use under A/R CDM project activity</li> </ul> </li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>
		<p><b>Key Points</b></p>	<p><b>Reference and Additional Information</b></p>

CDM 03-19	Target Group: G	
CDM 03-20	Target Group: G	<p style="text-align: center;"><b>Crediting Period</b></p> <p style="text-align: right;">20</p> <p style="text-align: center;">Thailand Greenhouse Gas Management Organization (Public Organizations)</p>

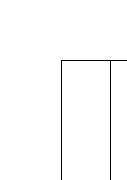
CDM 03-19	Target Group: G	
CDM 03-19	Target Group: G	<p style="text-align: center;"><b>Estimation of GHG Removals</b></p> <p style="text-align: center;"><b>N = T - B - L - P</b></p> <p>Where: N = Net anthropogenic GHG removals by sinks      T = Total GHG removals by sinks      B = Baseline net GHG removals by sinks      L = Leakage      P = Project GHG emission</p> <p style="text-align: right;">19</p> <p style="text-align: center;">Thailand Greenhouse Gas Management Organization (Public Organizations)</p>

#### Key Points

#### Reference and Additional Information

<p><b>CDM 03-22</b></p> <p><b>Starting Date</b></p>	<p><b>Target Group: G</b></p> <p><b>21</b></p>	<p><b>tCER &amp; ICER</b></p> <p><b>22</b></p>	<p><b>tCER (Temporary CER):</b></p> <p>tCER shall be issued based on the net anthropogenic GHG achieved by the project activity since the project start date. Each tCER shall expire at the end of the commitment period subsequent to the commitment period for which it was issued.</p>  <p><small>Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>
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<p><b>CDM 03-21</b></p> <p><b>Starting Date</b></p>	<p><b>Target Group: G</b></p> <p><b>21</b></p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>
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Starting date of the A/R CDM is the date that plant the seed or seedling to the soil

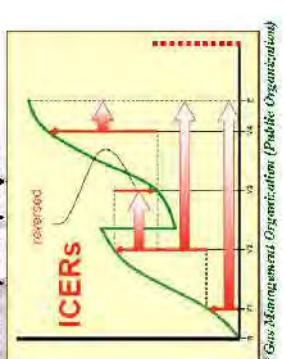
DoE will ask for the evidences of the starting

- Payment of the labor receives



Thailand Greenhouse Gas Management Organization (Public Organization)

CDM 03-24	Target Group: G	<b>Small Scale A/R CDM</b>  <b>24</b>						
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Small Scale A/R CDM</th> <th style="text-align: left; padding: 5px;">Benefit /disadvantage</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">           Limited max removals             PDD &amp; Methodology             Participation of low income community         </td> <td style="padding: 5px;">           Cost (\$/credit) could be increased            Small amount of credit compare with Large Scale project            Less complicated than normal scale to develop the project            Trans to be monitored is reduced            Cost for preparing and developing all documents are reduced            Contribution to the rural development            Sometimes difficult for local community to develop a project by themselves         </td> </tr> <tr> <td style="text-align: center; padding: 5px;">  </td> <td style="text-align: center; padding: 5px;">  </td> </tr> </tbody> </table>	Small Scale A/R CDM	Benefit /disadvantage	Limited max removals  PDD & Methodology  Participation of low income community	Cost (\$/credit) could be increased Small amount of credit compare with Large Scale project Less complicated than normal scale to develop the project Trans to be monitored is reduced Cost for preparing and developing all documents are reduced Contribution to the rural development Sometimes difficult for local community to develop a project by themselves		
Small Scale A/R CDM	Benefit /disadvantage							
Limited max removals  PDD & Methodology  Participation of low income community	Cost (\$/credit) could be increased Small amount of credit compare with Large Scale project Less complicated than normal scale to develop the project Trans to be monitored is reduced Cost for preparing and developing all documents are reduced Contribution to the rural development Sometimes difficult for local community to develop a project by themselves							
								

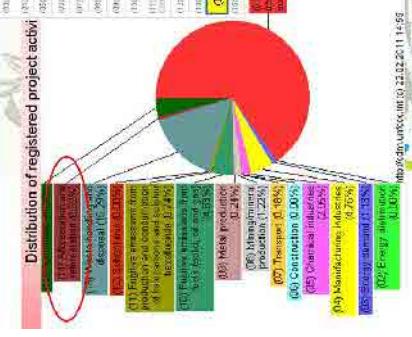
CDM 03-23	Target Group: G	<b>tCER &amp; ICER</b>  <b>23</b>
		<p><b>ICER (Long-term CER):</b></p> <p>ICER shall be issued based on the net anthropogenic GHG achieved by the project activity during each verification period. Each ICER shall expire at the end of the crediting period or, where a renewable crediting period is chosen.</p> <p></p> <p></p>

#### Key Points

#### Reference and Additional Information

CDM 03-26	Target Group: G	<b>Remarks for A/R CDM</b>
26		<p><b>1. The following points shall be described in PDD</b></p> <ul style="list-style-type: none"> <li>* The A/R CDM project activity must contribute to sustainable development in host country based on principle of CDM.</li> <li>* Environmental and socio-economic impacts shall be analyzed. If any significant negative impact is detected, environmental impact assessment shall be conducted and action shall be taken.</li> <li>* Project participants shall take action for <b>comments by stakeholders</b>.</li> <li>* Regarding "Diversion of CDA fund", project participants shall follow host country's interpretation.</li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>

CDM 03-25	Target Group: G	<b>Small Scale A/R CDM</b>																					
25		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; padding: 5px; vertical-align: top;"> <b>Small Scale A/R CDM</b> </td> <td style="width: 33%; padding: 5px; vertical-align: top;">  </td> <td style="width: 33%; padding: 5px; vertical-align: top;">  </td> </tr> <tr> <td style="padding: 5px;"> <b>Validation, Verification and Certification</b> </td> <td style="padding: 5px;"> <b>Benefit/Burden/cost</b> </td> <td style="padding: 5px;"> <b>Reduction of transaction cost</b> </td> </tr> <tr> <td style="padding: 5px;">           It is possible to bundle several projects into one for process of validation, verification, certification and monitoring. The same DUE can be used for validation and verification.         </td> <td style="padding: 5px;">           Reduction of transaction cost         </td> <td style="padding: 5px;">           Reduction of transaction cost (\$/project)         </td> </tr> <tr> <td style="padding: 5px;"> <b>Registration fee</b> </td> <td style="padding: 5px;"> <b>Share of proceeds to support developing countries</b> </td> <td style="padding: 5px;"> <b>Share of proceeds to support developing countries is not deducted (normally 2%). Share for proceed for management of CDM EB is reduced</b> </td> </tr> <tr> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> </tr> <tr> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> </tr> <tr> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> <td style="padding: 5px;">  </td> </tr> </table> <p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<b>Small Scale A/R CDM</b>			<b>Validation, Verification and Certification</b>	<b>Benefit/Burden/cost</b>	<b>Reduction of transaction cost</b>	It is possible to bundle several projects into one for process of validation, verification, certification and monitoring. The same DUE can be used for validation and verification.	Reduction of transaction cost	Reduction of transaction cost (\$/project)	<b>Registration fee</b>	<b>Share of proceeds to support developing countries</b>	<b>Share of proceeds to support developing countries is not deducted (normally 2%). Share for proceed for management of CDM EB is reduced</b>									
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CDM 03-28	Target Group: G	CDM 03-28	Target Group: G																																																						
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CDM 03-29	Target Group: G
<p><b>Registered A/R CDM Projects</b></p> <p><b>29</b></p>	
<p><small>Thailand Greenhouse Gas Management Organization (Public Organizations)</small></p>	

#### Key Points

#### Reference and Additional Information

CDM 03-32	Target Group: G																																							
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**Key Points**

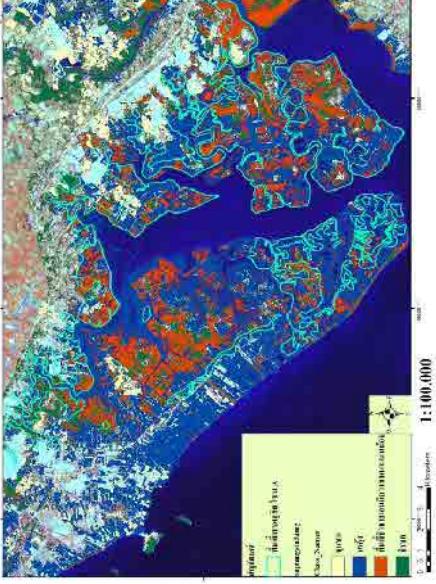
**Reference and Additional Information**

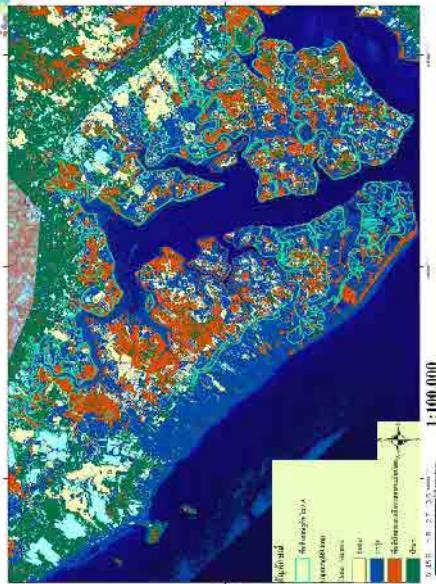
**Key Points**

**Reference and Additional Information**

CDM 03-34	Target Group: G	
34	Land use of Wetland in 1989 (Tandsat 5 TM)	<p><b>Pilot Project</b></p> <p><i>Mangrove Reforestation for Carbon Sequestration in Chanthaburi Province, Thailand</i></p>

CDM 03-33	Target Group: G	
33	<p><b>Pilot Project</b></p> <p><i>Mangrove Reforestation for Carbon Sequestration in Chanthaburi Province, Thailand</i></p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>

CDM 03-36	<b>Target Group: G</b>  Map showing land use in 2009 over a wetland area. The map is color-coded according to a legend on the right. A scale bar indicates 1:100,000 and a north arrow is present.	<b>Reference and Additional Information</b>  <b>Key Points</b> -
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CDM 03-35	<b>Target Group: G</b>  Map showing land use in 1999 over a wetland area. The map is color-coded according to a legend on the right. A scale bar indicates 1:100,000 and a north arrow is present.	<b>Reference and Additional Information</b>  <b>Key Points</b> -
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CDM 03-38	Target Group: G	
 <b>THANKS!</b>	<b>Key Points</b>  <b>Reference and Additional Information</b>	

CDM 03-35	Target Group: G	
 <b>Pilot Project Status</b>	<b>Key Points</b>  <b>Reference and Additional Information</b>	

**Target Groups**

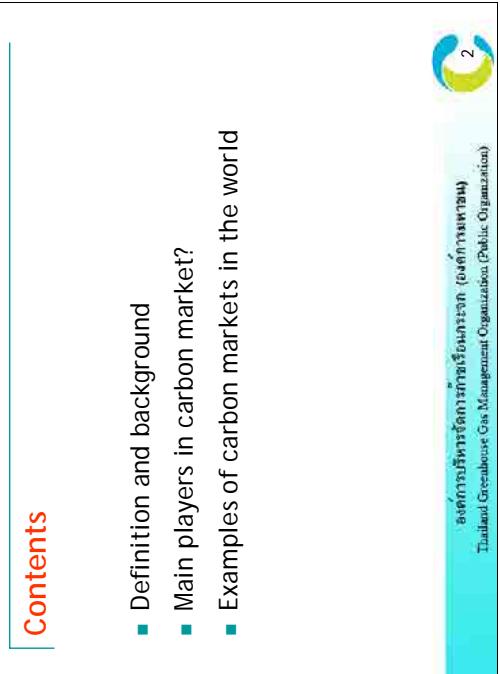
<b>Code</b>	<b>Target group</b>
G	General audience and potential project proponent
PP	Project proponent and Consultant

## Carbon Trading

**Update History**

<b>Version</b>	<b>Date</b>	<b>Update Contents</b>
01	29/07/2010	Initial adoption



CT01-02	<h3 style="color: red; border: 1px solid red; padding: 2px;">Contents</h3> <ul style="list-style-type: none"> <li>■ Definition and background</li> <li>■ Main players in carbon market?</li> <li>■ Examples of carbon markets in the world</li> </ul>  <p style="text-align: right;">Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <p>Contents</p> <ul style="list-style-type: none"> <li>- What is 'Emission Trading'?</li> <li>- What is 'Carbon Credit'?</li> <li>- Who are the main players in carbon market?</li> <li>- Example of Carbon Emission Trading in the world</li> </ul>
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CT01-01	<h3 style="color: red; border: 1px solid red; padding: 2px;">Background and Overview of Carbon Markets in the World</h3> <p>Sumon Sumetchoengprachya</p>  <p style="text-align: right;">Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Objectives of the presentation:</b></p> <ul style="list-style-type: none"> <li>- To understand <b>history</b> of 'emissions trading'</li> <li>- To confirm the <b>importance and anticipated roles</b> of 'carbon trading'</li> </ul>
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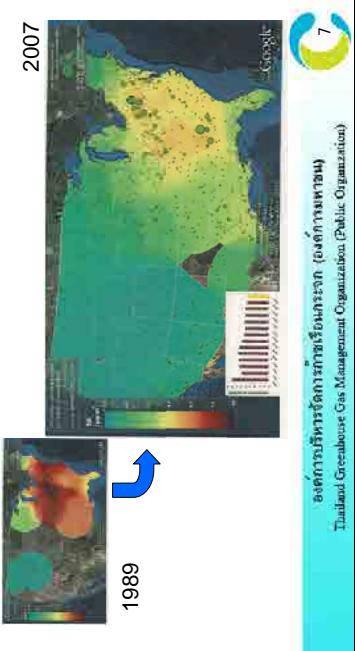
CT01-03	Target Group: G	<h2>What is 'Emissions Trading'?</h2> <ul style="list-style-type: none"> <li>▪ Canadian scientist proposed 'tradable or marketable discharge permits' in 1968.</li> <li>▪ In general, the ownership right of 'environment' is difficult to set because 'environment' is considered as 'public goods/services'.</li> <li>▪ Emissions trading system can be considered to <b>trade 'control responsibility'</b> in order to mitigate environmental pollution.</li> </ul> <p></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The <b>concept of carbon trading</b> originally comes from "emission trading", which was firstly proposed by Canadian scientist in 1968.</li> <li>- In general, the ownership right of 'environment' is difficult to set because 'environment' is considered as 'public goods and services'.</li> <li>- Emissions trading system allows targeted entities to trade "<b>control responsibility</b>" among themselves. In this way, entities who could control relatively cheaply would voluntarily control more, and <b>selling the excess control</b> to those wanted to control less due to economic reasons.</li> </ul> <p><b>Reference and Additional Information</b></p> <p>(Source: <b>Emissions trading: principles and practice</b> By Thomas H. Tietenberg)</p>
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CT01-04	Target Group: G	<h2>Definition of 'Emission Trading'?</h2> <ul style="list-style-type: none"> <li>▪ 'Emissions trading' is one of the economic approaches to mitigate environmental pollutants</li> <li>▪ <b>Role of emission trading:</b> to control total emissions of environmental pollutants by trading <b>'emission credit'</b> between the entities who go <b>over</b> their <b>assigned amount</b> of the pollutants and the entities who under-run their assigned amount of the pollutants.</li> <li>▪ To operate emissions trading system effectively, organizer of the system has to <b>allocate 'emission credit'</b> to entities by rational way in advance.</li> </ul> <p></p>
		<p><b>Key Points</b></p> <p>Definition of "Emission Trading"</p> <ul style="list-style-type: none"> <li>- 'Emissions trading' is one of the economic approaches to mitigate environmental pollutants such as SO<sub>2</sub>, CO<sub>2</sub></li> <li>- The role of this approach is to <b>control total emissions of environmental pollutants by trading 'emission credit'</b> between the entities who go over their assigned amount of the pollutants and the entities who under-run their assigned amount of the pollutants.</li> <li>- In order to operate emissions trading system effectively, organizer of the system has to allocate 'emission credit' to entities by rational way in advance.</li> <li>- This concept of "Emission Trading" also apply to "<b>Carbon Trading</b>", which was proposed to be a flexible mechanism under the <b>Kyoto Protocol</b> in order to mitigate Climate Change by the most effective way.</li> </ul> <p><b>Reference and Additional Information</b></p>

CT01-06	<h2>SO<sub>2</sub> Trading</h2> <p>Governing law of SO<sub>2</sub> trading</p> <ul style="list-style-type: none"> <li>Revision of the Clean Air Act in 1990.</li> <li>EPA's Acid Rain Program based on the Act in 1995.</li> <li>Main characteristics of SO<sub>2</sub> trading</li> <li>Participants: <b>Thermal power plants</b> (easy to monitor)</li> <li>Purpose: to mitigate the impact of acid rain</li> <li>Present SO<sub>2</sub> trading (2007)</li> <li><b>Total value</b> of the SO<sub>2</sub> allowance market: 5.1 bil. US\$ mil. t-SO<sub>2</sub></li> <li>Average <b>price</b>: 325 US \$/t-SO<sub>2</sub>, Allowable emission: 15.8</li> </ul> <p>6</p>  <p>Thailand Greenhouse Gas Management Organization (องค์การจัดการกําลังไอน้ำเขียวประเทศไทย)</p>	<h3>Reference and Additional Information</h3> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>US established governing law of SO<sub>2</sub> trading and set up main characteristics of SO<sub>2</sub> trading under the EPA's <b>Acid Rain Program</b> to control SO<sub>2</sub> emission from thermal power plants.</li> </ul>
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CT01-05	<h2>History of 'Emissions Trading'</h2> <p>SO<sub>2</sub> Trading in the USA</p> <ul style="list-style-type: none"> <li>The main air pollutants in the USA were SO<sub>2</sub> and NO<sub>x</sub> in early 1980s.</li> <li>More than 2/3 of annual emission of SO<sub>2</sub>, were from coal-fired or oil-fired power plants.</li> </ul> <p>SO<sub>2</sub> concentration in 1989 →</p>  <p>5</p> <p>Thailand Greenhouse Gas Management Organization (องค์การจัดการกําลังไอน้ำเขียวประเทศไทย)</p>	<h3>Reference and Additional Information</h3> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>Example of success emission trading is the <b>SO<sub>2</sub> trading system in the USA</b>.</li> <li>In early 1980s, the main air pollutants and problems in USA were SO<sub>2</sub> and NO<sub>x</sub></li> <li>More than 2/3 of annual emission of SO<sub>2</sub> was from coal-fired or oil-fired power plants.</li> </ul> <p><b>Reference and Additional Information</b></p>
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CT01-08	<h2>Key Success Factors of SO<sub>2</sub> Trading</h2> <ul style="list-style-type: none"> <li>■ Direct relation between SO<sub>2</sub> and human health damage</li> <li>■ Environmental impacts of acid rain mainly induced by SO<sub>2</sub></li> <li>■ Ease to control emission sources (power plants) because of 'point sources'</li> </ul> <p>How about CO<sub>2</sub> trading?</p> 	<h3>Reference and Additional Information</h3> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Key success factors of effectiveness of SO<sub>2</sub> trading are       <ul style="list-style-type: none"> <li>• Direct relation was found between SO<sub>2</sub> and human health damage like Asthma.</li> <li>• Environmental impacts of acid rain mainly induced by SO<sub>2</sub></li> <li>• Easy to control emission from "point sources" (power plants), instead of mobile sources like cars</li> </ul> </li> </ul> <p>How about CO<sub>2</sub> trading?</p> <ul style="list-style-type: none"> <li>- Do you think carbon market today is success or not?</li> <li>- What are the key success factor of the market?</li> </ul>
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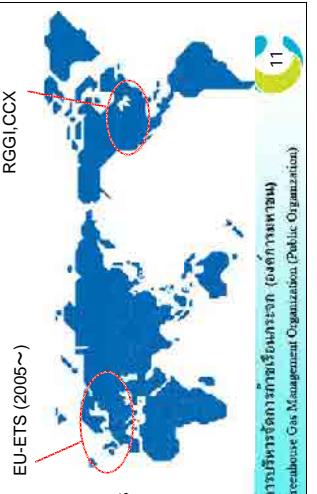
CT01-07	<h2>Result of SO<sub>2</sub> Trading</h2> <p>Mitigation effect</p>  <p>2007</p> <p>1989</p> <p>Thailand Greenhouse Gas Management Organization (องค์การจัดการกําลังไอน้ำและกําลังตู้เย็นประเทศไทย)</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<h3>Reference and Additional Information</h3> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- This SO<sub>2</sub> trading system successfully mitigated SO<sub>2</sub> within the country.</li> </ul>
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CT01-09	Target Group: G	<p><b>Carbon Trading</b></p> <ul style="list-style-type: none"> <li>■ <b>Carbon Credit</b> = The amount of reduced GHG emission generated from GHG emission reduction projects</li> <li>■ There are several types of carbon credit from <b>different origin</b> and trade in <b>different markets</b></li> </ul> <p>The diagram illustrates the structure of the carbon market under Kyoto Protocol. It shows three main categories: Compliance Market, Voluntary Market, and Project-based Mechanism.</p> <ul style="list-style-type: none"> <li><b>Compliance Market:</b> Represented by a green border. It includes:       <ul style="list-style-type: none"> <li><b>Allowance:</b> Assigned Amount Units (AAUs)</li> <li><b>Emission Reduction Units (ERUs):</b> Certified Emission Units (CEUs) and Verified Emission Reductions (VERs)</li> </ul> </li> <li><b>Voluntary Basis:</b> Represented by a blue border. It includes:       <ul style="list-style-type: none"> <li><b>Project-based Mechanism:</b> Kyoto Protocol</li> <li><b>Voluntary Market:</b> Thailand Greenhouse Gas Management Organization (温室効果ガス管理組織)</li> </ul> </li> <li><b>Project-based Mechanism:</b> Represented by a purple border. It includes:       <ul style="list-style-type: none"> <li><b>Assigned Amount Units (AAUs)</b></li> <li><b>Emission Reduction Units (ERUs)</b></li> <li><b>Certified Emission Units (CEUs)</b></li> <li><b>Verified Emission Reductions (VERs)</b></li> </ul> </li> </ul>
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CT01-10	Target Group: G	<p>The diagram shows the hierarchy of carbon market players:</p> <ul style="list-style-type: none"> <li><b>Suppliers:</b> <ul style="list-style-type: none"> <li>Project developers</li> <li>Mandated installations</li> <li>Financial Institution</li> <li>Consultants</li> </ul> </li> <li><b>Intermediaries:</b> <ul style="list-style-type: none"> <li>Brokers</li> <li>Traders</li> <li>Exchanges</li> <li>Consultant</li> <li>Finance</li> <li>Buyer</li> </ul> </li> <li><b>End Users:</b> <ul style="list-style-type: none"> <li>Compliance Buyers</li> <li>Secondary CERS</li> <li>Buyers : Private companies, government, government, NGO</li> </ul> </li> </ul> <p>Arrows indicate the flow of "Primary CERS" from Suppliers to Intermediaries, and "Secondary CERS" from Intermediaries to End Users. A bracket labeled "Others (services)" covers the bottom layer.</p> <p>Quality Control : DOE, NGOs ; Law Firm ; Data &amp; Analyze : Carbon Finance, Point Carbon, Reuters Etc., Capacity building : DNAs</p>
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	Target Group: G	<h2>Main Players in Carbon Market</h2> <p>The diagram highlights key points about the carbon market:</p> <ul style="list-style-type: none"> <li><b>Key Points:</b> <ul style="list-style-type: none"> <li>Who is the Main Players in the carbon market?</li> <li>Generally, main players in the carbon market can be divided into 3 categories, which are</li> <li>• <b>Suppliers</b> who supply carbon credit into the market. For example, Project developer, Financial Institution or Consultants and etc.,</li> <li>• <b>Intermediaries</b>, who buy credits for trading purpose, for example Brokers, Traders and Exchange</li> <li>• <b>End Users</b>, who buy credit in order to comply the law or for good image, example of entities in this group are compliance buyers or voluntary buyers, such as government agencies or private companies.</li> </ul> </li> <li><b>Reference and Additional Information:</b> <ul style="list-style-type: none"> <li>Beside these players, there are other players who provide supporting services to players in the market such as DOE, Law firm and DNA</li> </ul> </li> </ul>
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CT01-12	Target Group: G, PP	
	<p style="text-align: center;"><b>EU-ETS</b></p>  <p><b>History</b></p> <ul style="list-style-type: none"> <li>■ Kyoto Protocol was adopted in 1997</li> <li>■ Annex I countries target: average -5.2%</li> <li>■ EU Target (15): -8% by 2012</li> <li>■ European Union Emission Trading System (EU-ETS) was set up in 2005 to achieve the target.</li> </ul> <p style="text-align: right;">12</p> <p style="text-align: center;">စီမံခန့်ခွဲချက်အရေးအဝါဒနှင့် ဓလောက်အားလုံး (ဓလောက်အားလုံး)</p> <p style="text-align: center;">Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p style="text-align: center;"><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- In 1997, the <b>Kyoto Protocol</b> was adopted and industrialized countries (except USA) pledged to reduce their greenhouse gas (GHG) emissions around 5.2% compared to 1990 emissions levels within 2012 to stabilize the GHG concentration in the atmosphere.</li> <li>- The European Union (EU), which comprised 15 member states at that time, pledged to reduce its emissions as a group by 8%.</li> <li>- As a result, EU started the <b>European Union Emission Trading System (EU ETS)</b> in 2005 to achieve this Kyoto target.</li> </ul>

CT01-11	Target Group: G, PP	
	<p style="text-align: center;"><b>Examples of Carbon Markets in the World</b></p>  <p><b>Compliance Market</b></p> <ul style="list-style-type: none"> <li>■ EU-ETS</li> <li>□ Voluntary Market</li> </ul> <p><b>Voluntary Market</b></p> <ul style="list-style-type: none"> <li>■ RGGI</li> <li>■ WCI</li> <li>■ MGGA</li> <li>■ CCX</li> <li>■ Japan VERS</li> <li>■ US ETS</li> </ul> <p style="text-align: right;">11</p> <p style="text-align: center;">စီမံခန့်ခွဲချက်အရေးအဝါဒနှင့် ဓလောက်အားလုံး (ဓလောက်အားလုံး)</p> <p style="text-align: center;">Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p style="text-align: center;"><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Current Carbon Emission Trading or Carbon Markets in the World.</li> </ul>

CT01-13	Target Group: G, PP	<h2>EU-ETS Concept</h2> <p>The diagram illustrates the evolution of the EU ETS:</p> <ul style="list-style-type: none"> <li><b>QUEIROs of KP (EU: -8%)</b></li> <li><b>EU Burden Sharing Agreement (1998)</b> (Germany: -2%; UK: -12%; Netherlands: -25%)       <ul style="list-style-type: none"> <li>European Commission (EC) draws up a set of common rules for allocation. Member countries make their National Allocation Plan (NAP) according to the rules, and allocates emissions quotas to targeted facilities.</li> </ul> </li> <li><b>EU-ETS Phase II (2008 - 2012)</b> <ul style="list-style-type: none"> <li>EC draw up a set of common rules for allocation</li> <li>Member countries make their NAPs</li> <li>allocate emissions quotas to targeted facilities</li> <li>evaluate and decide the NAPs</li> </ul> </li> </ul> <p>Source : Dr. Katsuhiro YAMADA, JICA expert team บริษัทวิเคราะห์นโยบายและยุทธศาสตร์ (เดลต้าโซลูชัน)</p> <p>Thailand Greenhouse Gas Management Organization. (Public Organization)</p>
Key Points / Additional Information	Phase I	Phase II

CT01-14	Target Group: G, PP	<h2>Scope of EU-ETS</h2> <table border="0"> <tr> <td data-bbox="234 354 266 862"><b>■ Phase I (2005-2007): +8.3% (2005) - Trial period</b></td><td data-bbox="266 354 668 862"> <ul style="list-style-type: none"> <li><input type="checkbox"/> 15 member states</li> <li><input type="checkbox"/> Coverage: <b>Limit CO<sub>2</sub></b> emission (Power sector, and energy-intensive Industrial sector - about 11,500 facilities)</li> <li><input type="checkbox"/> Penalty: 40 EURO/t-CO<sub>2</sub></li> </ul> </td></tr> <tr> <td data-bbox="393 489 425 862"><b>■ Phase II (2008-2012): -5.6% (2005)</b></td><td data-bbox="425 354 668 862"> <ul style="list-style-type: none"> <li><input type="checkbox"/> 27 member states and includes Iceland, Liechtenstein and Norway</li> <li><input type="checkbox"/> Coverage: <b>Limit CO<sub>2</sub></b> emission (Power sector, and energy-intensive Industrial sector - about 11,000 facilities)</li> <li><input type="checkbox"/> In 2012, incl. aviation sector into the scheme</li> <li><input type="checkbox"/> Penalty: 100 EURO/t-CO<sub>2</sub></li> </ul> </td></tr> </table> <p></p> <p></p>	<b>■ Phase I (2005-2007): +8.3% (2005) - Trial period</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 15 member states</li> <li><input type="checkbox"/> Coverage: <b>Limit CO<sub>2</sub></b> emission (Power sector, and energy-intensive Industrial sector - about 11,500 facilities)</li> <li><input type="checkbox"/> Penalty: 40 EURO/t-CO<sub>2</sub></li> </ul>	<b>■ Phase II (2008-2012): -5.6% (2005)</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> 27 member states and includes Iceland, Liechtenstein and Norway</li> <li><input type="checkbox"/> Coverage: <b>Limit CO<sub>2</sub></b> emission (Power sector, and energy-intensive Industrial sector - about 11,000 facilities)</li> <li><input type="checkbox"/> In 2012, incl. aviation sector into the scheme</li> <li><input type="checkbox"/> Penalty: 100 EURO/t-CO<sub>2</sub></li> </ul>
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Key Points / Additional Information	Phase I	Phase II				

Key Points / Additional Information	Phase I	Phase II
<p><b>Key Points / Additional Information</b></p> <ul style="list-style-type: none"> <li>In carbon market, European Union Emission Trading Scheme or <b>EU ETS</b> is the largest carbon emission trading system in the World</li> <li>It is also the world's first international company-level cap-and-trade system of allowances for emitting carbon dioxide (CO<sub>2</sub>) and other greenhouse gases</li> <li>This mandatory cap-and-trade system sets a limit (<b>a cap</b>) of total emissions for all targeted industries. The cap is translated into <b>emissions allowances</b> (so-called EU Emissions Allowances, or EUAs) and one allowance equals one ton of carbon dioxide equivalent (CO<sub>2e</sub>). The allowances are issued to the factories free of charge or are sold at auctions.</li> <li>Before starting each trading period, European commission will draw up a set of common rules for allocation of EUA.</li> </ul>	<p><b>Key Points / Additional Information</b></p> <ul style="list-style-type: none"> <li>Then each EU member state will develop a <b>National Allocation Plan (NAP)</b> and submit it to the European Commission for assessment. After EC evaluate and decide the NAP, each member countries will determine the total quantity of allowances to the factories in targeted industries.</li> <li>Thus, the overall cap of the EU ETS is the sum of the national caps. The national cap of each member state has to ensure that the member state is able to reach its Kyoto target. After receiving EUAs, the operators of the factories have to surrender one allowance for every ton CO<sub>2e</sub> emitted.</li> <li>Operators which do not have enough allowances to compensate the emissions of their factories can reduce their emissions or buy allowances or offset credits from CDM projects (CERs) and JI projects (ERUs).</li> </ul>	<p><b>Key Points / Additional Information</b></p> <ul style="list-style-type: none"> <li>In the first trading period, from 2005 to 2007, the scheme covered CO<sub>2</sub> emissions from <b>high-emitting factories in the power and heat generation industry and in selected energy-intensive industrial sectors:</b> <ul style="list-style-type: none"> <li>combustion plants, oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp and paper.</li> </ul> </li> <li>It is also called the 'trial period' or 'pilot phase' since the main intention was to establish an infrastructure for the cap-and-trade system (reporting and monitoring) and to gain experience ('learning by doing') for the following periods.</li> <li>At present some <b>11,000 installations in the EU</b> are included, accounting for <b>around 50 % of the EU's total CO<sub>2</sub> emission</b> and about 40% of its overall greenhouse gas emissions.</li> <li>From 2012, the EU ETS will also include CO<sub>2</sub> emissions from civil aviation. This means airlines of all nationalities will need allowances to cover the emissions from their flights to, from or within the EU.</li> </ul>

CT01-15	<h3>EU-Ets Allowance Allocation</h3> <ul style="list-style-type: none"> <li>■ Targets of industrial sector of EU-Ets (Phase II) are set by moderate policy, considering their           <ul style="list-style-type: none"> <li>□ competitive power in the international market</li> <li>□ limited data availability of past activities of targeted facilities,</li> </ul> </li> <li>■ Basic concept of the allocation to targeted facilities = ('emissions in base year' * 'allocation factor')</li> </ul> <p> 15 Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Targets of <b>industrial sector</b> are set by moderate policy, regarding to their competitiveness in the international market, and data availability of past activities of targeted facilities.</li> <li>- Basic concept of the <b>allocation to targeted facilities</b> = ('emissions in base year' * 'allocation factor')</li> </ul>	<p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- Targets of EU-Ets are set by <b>moderate policy</b>, regarding to their competitiveness in the international market, and data availability of past activities of targeted facilities.</li> <li>- Basic concept of the <b>allocation to targeted facilities</b> = ('emissions in base year' * 'allocation factor')</li> </ul>
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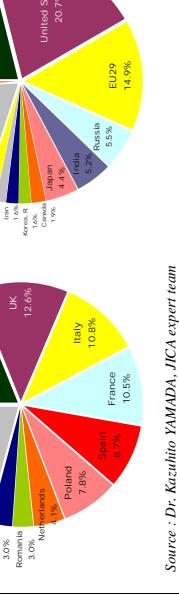
CT01-16	<h3>Trading System in EU-Ets</h3> <ul style="list-style-type: none"> <li>■ Credit unit of EU-Ets : European Union Allowances (EUAs)</li> <li>■ EU-Ets Phase II:           <ul style="list-style-type: none"> <li>■ 1 EUAs = 1 tCO<sub>2</sub>-eq</li> <li>■ Acceptable offsetting credits:               <ul style="list-style-type: none"> <li>□ All credits from JI (ERUs) and CDM (CERs) projects (1 EUA = 1 CER = 1 ERU)</li> <li>□ Open to link with compatible mandatory cap-and-trade systems in third countries that have ratified the Kyoto Protocol</li> <li>□ Not accept credits from nuclear facilities and from land use, land-use change and forestry projects</li> </ul> </li> </ul> </li> </ul> <p> 16 Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Credit unit of EU-Ets is called <b>European Union Allowances (EUAs)</b></li> <li>- In Phase II: 1 EUAs = 1 tCO<sub>2</sub>-eq</li> <li>- EU Ets accepts offset credits from emission-saving projects carried out under the Kyoto Protocol's such as Clean Development Mechanism (CDM) and Joint Implementation instrument (JI).</li> <li>- It is also open to establishing formal links with compatible mandatory cap-and-trade systems in third countries that have ratified the Kyoto Protocol.</li> </ul>	<p><b>Reference and Additional Information</b></p> <ul style="list-style-type: none"> <li>- Credit unit of EU-Ets is called <b>European Union Allowances (EUAs)</b></li> <li>- In Phase II: 1 EUAs = 1 tCO<sub>2</sub>-eq</li> <li>- EU Ets accepts offset credits from emission-saving projects carried out under the Kyoto Protocol's such as Clean Development Mechanism (CDM) and Joint Implementation instrument (JI).</li> <li>- It is also open to establishing formal links with compatible mandatory cap-and-trade systems in third countries that have ratified the Kyoto Protocol.</li> <li>- During Phase II, Businesses can buy offsetting credits around 1.4 billion tonnes of CO<sub>2</sub> – a yearly average of 280 million tonnes – to help offset their emissions.</li> <li>- Alternatively, operators are allowed to use CERs or ERUs at least 11% of their allocation during 2008-2012</li> <li>- However, EU-Ets does not accept credits from <b>nuclear facilities and from land use, land-use change and forestry projects</b></li> </ul>
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<p><b>CT01-18</b></p>	<p><b>Target Group: G, PP</b></p>
<p><b>Where are Main Exchanges of EU-ETS?</b></p> <p>■ ECX: EUA/CER (mainly futures deal) ■ Bluenext: EUA (mainly spot deal)</p> <p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- The main exchanges of EU-ETS is European Climate Exchange, located in UK and trading mainly on future credits</li> <li>- Bluenext, which is located in Paris, trades mainly on spot deal</li> </ul>	

<p><b>CT01-17</b></p>	<p><b>Target Group: G, PP</b></p>																																																											
<p><b>Trading Volumes and Values in 2008-2009</b></p> <p><i>Source: Point Carbon &amp; Tiseco Securities Co., Ltd.</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">2008 figures</th> <th colspan="2">2009 figures</th> <th rowspan="2">Change 2008-09 [Mt]</th> <th rowspan="2">Average prices [€/Mt]</th> </tr> <tr> <th>[Mt]</th> <th>[€/mil.]</th> <th>[Mt]</th> <th>[€/mil.]</th> </tr> </thead> <tbody> <tr> <td>EU ETS</td> <td>3,091</td> <td>66,993</td> <td>5,646</td> <td>72,787</td> <td>83%</td> <td>9% 12.89</td> </tr> <tr> <td>CDM</td> <td>1,609</td> <td>24,172</td> <td>1,590</td> <td>17,520</td> <td>-1%</td> <td>-28% 11.02</td> </tr> <tr> <td>JI</td> <td>72</td> <td>720</td> <td>44</td> <td>399</td> <td>-38%</td> <td>-45% 9.00</td> </tr> <tr> <td>AAU</td> <td>43</td> <td>330</td> <td>138</td> <td>1,379</td> <td>221%</td> <td>318% 9.99</td> </tr> <tr> <td>RGGI</td> <td>71</td> <td>178</td> <td>765</td> <td>1,773</td> <td>979%</td> <td>897% 2.32</td> </tr> <tr> <td>Other</td> <td>34</td> <td>119</td> <td>75</td> <td>284</td> <td>118%</td> <td>139% 3.80</td> </tr> <tr> <td>Total</td> <td>4,920</td> <td>92,511</td> <td>8,258</td> <td>94,143</td> <td>68%</td> <td>2% 11.40</td> </tr> </tbody> </table> <p><b>Reference and Additional Information</b></p> <p><b>Key Points</b></p> <ul style="list-style-type: none"> <li>- Trading volumes and values of EU ETS and other markets in the World</li> <li>- EU-ETS is the largest segment covering 68% and 77% of global trading volume and value, respectively</li> <li>- Whereas CDM is the 2nd largest market in the world</li> </ul>		2008 figures		2009 figures		Change 2008-09 [Mt]	Average prices [€/Mt]	[Mt]	[€/mil.]	[Mt]	[€/mil.]	EU ETS	3,091	66,993	5,646	72,787	83%	9% 12.89	CDM	1,609	24,172	1,590	17,520	-1%	-28% 11.02	JI	72	720	44	399	-38%	-45% 9.00	AAU	43	330	138	1,379	221%	318% 9.99	RGGI	71	178	765	1,773	979%	897% 2.32	Other	34	119	75	284	118%	139% 3.80	Total	4,920	92,511	8,258	94,143	68%	2% 11.40
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CT01-20  
Target Group: G, PP

CT01-19  
Target Group: G, PP

Important Buyers in EU-ETS	
<b>EU-ETS (29) GHG (2007)</b>	<b>World (212) CO<sub>2</sub> (2006)</b>
	

Source : Dr. Kazuhito YAMADA, JICA expert team

Thailand Greenhouse Gas Management Organization (Public Organization)

CT01-20	Target Group: G, PP
<h2 style="color: red;">Future of EU-ETS</h2> <ul style="list-style-type: none"> <li>■ Phase III (2013-2020): -21% (2005)           <ul style="list-style-type: none"> <li>□ Cap CO<sub>2</sub>, N<sub>2</sub>O, and PFCs</li> <li>□ Power sector, Industrial sector (incl. aluminum, ammonia), Aviation</li> <li>□ Penalty: Index to Consumer Price (dynamic pricing)</li> </ul> </li> <li>■ Acceptable offsetting credits:           <ul style="list-style-type: none"> <li>□ CERs issued before 1 Jan 2013 from CDM projects registered before 1 Jan 2013 can be used until 31 Mar 2015</li> </ul> </li> </ul> <p style="text-align: right; margin-top: -20px;"> 2013</p> <p style="text-align: center; font-size: small;">Source: Directive 2008/87/EC (OJ L 275, 25.10.2008, p. 32) ສະຕິການເປົ້າຫວັດລົງທະບຽນຂອງສະມາຊັກ (ສະຄາກພາກພາຍ)</p> <p style="text-align: center; font-size: small;">Thailand Greenhouse Gas Management Organization (Public Organization)</p>	

Reference and Additional Information	
<b>Key Points</b>	<ul style="list-style-type: none"> <li>- Important buyers in EU-ETS</li> <li>- EU (29 countries) is ranked No. 4 of GHG emitter in the World.</li> <li>- Germany, UK, and France are the main emitter among EU member states.</li> <li>- There is a number of EU governments plan to buy credits totalling around 550 million tonnes of CO<sub>2</sub> to meet their Kyoto committed targets.</li> <li>- For example Department for Environment, Food And Rural Affairs from UK, GTZ from Germany, and Ministry of Foreign Affairs of Denmark.</li> </ul>
<b>Reference and Additional Information</b>	<p>Source: Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 – establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32)</p>

<p><b>CT01-22</b></p>	<p><b>Target Group: G, PP</b></p>	<p><b>Regional Greenhouse Gas Initiative (RGGI)</b></p> <ul style="list-style-type: none"> <li>■ CERs, emission reduction achieved <b>after</b> 31 Dec 2012 from CDM projects <b>registered before</b> 1 Jan 2013 can be <b>used until</b> 2020</li> <li>□ CERs, emission reduction achieved <b>after</b> 31 Dec 2012 from CDM project <b>registered after</b> 31 Dec 2012 can be used <b>only</b> if the CERs are from <b>LDCs</b></li> <li>□ <b>Not accept</b> credits from land use, land-use change and forestry projects</li> </ul> <p>Proposed in Directive 2003/87/EC. However, the rule can be revised in accordance with the outcome of int'l climate negotiation and will not be known until the end of EU legislation process.</p> <p><small>Source: Directive 2003/87/EC (OJ L 275, 25.10.2003, p. 32) Tailand Greenhouse Gas Management Organization. (Public Organization)</small></p>  <p><b>22</b></p>	<p><b>Key Points / Additional Information</b></p> <ul style="list-style-type: none"> <li>- RGGI or Regional Greenhouse Gas Initiative is the first mandatory, market-based CO<sub>2</sub> emissions reduction program in the USA.</li> <li>■ a cooperative effort by <b>ten Northeast states to limit greenhouse gas emissions</b></li> <li>■ Members of RGGI consisting of the states who are signatory states to the RGGI agreement. <ul style="list-style-type: none"> <li>• Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont</li> </ul> </li> <li>- Scope or target entities of RGGI is <b>Fossil fuel-fired electric power plants</b> (25 MW or greater in size), which covers approximately <b>225 facilities</b> region-wide.</li> </ul>
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<p><b>CT01-21</b></p>	<p><b>Target Group: G, PP</b></p>	<p><b>Future of EU-ETS (2)</b></p> <ul style="list-style-type: none"> <li>□ CERs, emission reduction achieved <b>after</b> 31 Dec 2012 from CDM projects <b>registered before</b> 1 Jan 2013 can be <b>used until</b> 2020</li> <li>□ CERs, emission reduction achieved <b>after</b> 31 Dec 2012 from CDM project <b>registered after</b> 31 Dec 2012 can be used <b>only</b> if the CERs are from <b>LDCs</b></li> <li>□ <b>Not accept</b> credits from land use, land-use change and forestry projects</li> </ul> <p>Proposed in Directive 2003/87/EC. However, the rule can be revised in accordance with the outcome of int'l climate negotiation and will not be known until the end of EU legislation process.</p> <p><small>Source: Directive 2003/87/EC (OJ L 275, 25.10.2003, p. 32) Tailand Greenhouse Gas Management Organization. (Public Organization)</small></p>  <p><b>21</b></p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p> <p>Source: Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 – establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32)</p>
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CT01-23	Target Group: G, PP	<h2>RGGI Concept</h2> <ul style="list-style-type: none"> <li>Establishing a multi-state CO<sub>2</sub> emissions budget (cap) that will decrease gradually until it is 10 percent lower than at the start</li> <li>Requiring electric power generator to hold allowances over a three-year control period</li> <li>Providing a market-based emissions auction and trading system</li> <li>Using the proceeds of allowance auctions to support low-carbon-intensity solutions,</li> <li>Employing offsets (greenhouse gas emissions reduction or sequestration projects outside the electricity sector) to help companies meet their compliance obligations</li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>
CT01-24	Target Group: G, PP	<h2>Scope of RGGI</h2> <ul style="list-style-type: none"> <li>Target entities: Fossil fuel-fired electric power plants 25 Megawatts or greater in size (approximately 225 facilities region-wide)</li> <li>Regional CO<sub>2</sub> Cap: 188 million tons for the ten states</li> <li>CO<sub>2</sub> Allowance Auctions: Quarterly, beginning with pre-compliance auctions in September and December 2008</li> <li>Timing of CO<sub>2</sub> Reductions: 2009-2014, cap stabilizes emissions; 2015-2018, cap reduces by 2.5 percent each year</li> <li>Total Reduction in CO<sub>2</sub> Emissions Cap: 10 percent below 2009 levels</li> <li>Compliance Period: Three years, first compliance period 2009 – 2011</li> <li>CO<sub>2</sub> Emission Offsets: Greenhouse gas reduction projects outside the electricity generation sector will enable power plants to meet part of their compliance obligation.</li> </ul> <p> Thailand Greenhouse Gas Management Organization (Public Organization)</p>

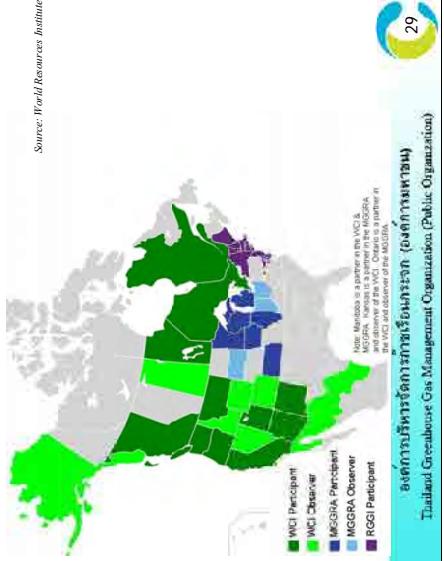
		<h2>Key Points / Additional Information</h2> <ul style="list-style-type: none"> <li>RGGI is composed of individual CO<sub>2</sub> Budget Trading Programs in each of the ten participating states. This Budget means certain/maximun emission level.</li> <li>These programs are implemented through state regulations, based on a RGGI Model Rule, and are linked through CO<sub>2</sub> allowance reciprocity</li> <li>Total Regional CO<sub>2</sub> Cap is 188 million tons for the ten states</li> <li>There is timeline for CO<sub>2</sub> Reductions: <ul style="list-style-type: none"> <li>2009-2014, cap stabilizes emissions;</li> <li>2015-2018, cap reduces by 2.5 percent each year</li> </ul> </li> <li>Total Reduction in CO<sub>2</sub> Emissions Cap: 10 percent below 2009 levels by 2018</li> <li>Compliance Period: Three years, first compliance period 2009 – 2011</li> </ul>
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CT01-25	Target Group: G, PP	<h2>Western Climate Initiative (WCI)</h2> <ul style="list-style-type: none"> <li>Regional cap-and-trade program released on September 23, 2008.</li> <li><b>WCI Members:</b> <ul style="list-style-type: none"> <li><b>USA:</b> Washington, Oregon, California, Arizona, New Mexico, Utah, Montana</li> <li><b>Canada:</b> British Columbia, Manitoba, Ontario, Quebec</li> </ul> </li> <li>Common Commitment: to build a green economy and reduce GHG emissions that are leading to climate change.</li> <li>When fully implemented in 2015, it will <b>cover nearly 90 percent of the GHG emissions in WCI states and provinces and will reduce those emissions to 15% below 2005 levels by 2020.</b></li> </ul> <p style="text-align: right;">Source: <a href="http://www.westernclimateinitiative.org/">http://www.westernclimateinitiative.org/</a></p>  <p>ไทยกรอบการทำงานร่วมกันด้านกําจัดเรือนกระจก (องค์กรภาคเอกชน) Thailand Greenhouse Gas Management Organization (Public Organization)</p>
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CT01-26	Target Group: G, PP	<h2>WCI Regional Plan</h2> <ul style="list-style-type: none"> <li><b>Carbon emissions limits:</b> market-based cap-and-trade system</li> <li><b>Offset credits:</b> limited number of emissions offset credits for projects in industries <b>outside the capped sectors (forestry, agriculture)</b></li> <li><b>Complementary policies:</b> exploring policies that work in concert with cap-and-trade to lower carbon emissions and reduce the cost of transitioning to a green economy. (EE, Clean car std., renewable energy, low-carbon fuel std.)</li> </ul> <p>Source: <a href="http://www.westernclimateinitiative.org/">http://www.westernclimateinitiative.org/</a></p>  <p>ไทยกรอบการทำงานร่วมกันด้านกําจัดเรือนกระจก (องค์กรภาคเอกชน) Thailand Greenhouse Gas Management Organization (Public Organization)</p>
		<p><b>Key Points / Additional Information</b></p> <p>WCI jurisdictions' regional plan to reduce GHG emission and build green economy by including following elements</p> <ul style="list-style-type: none"> <li><b>Carbon emissions limits.</b> Or use a market-based cap-and-trade system to provide incentives for companies and inventors to seek out new technologies that increase energy efficiency, promote greater use of renewable or lower-polluting fuels, and foster process improvements that reduce dependence on fossil fuels.</li> <li><b>Offset credits.</b> To reduce abatement costs for emitters, a limited number of emissions offset credits will be allowed for projects in industries outside the capped sectors—such as forestry and agriculture.</li> <li><b>Complementary policies.</b> To achieve the regional GHG emissions reduction goal and encourage investments in low-carbon technologies, complementary policies that work in concert with cap-and-trade are essential.</li> </ul>

CT01-28	<h3>Midwestern Greenhouse Gas Reduction Accord (MGGRA)</h3> <p><b>Key Points / Additional Information</b></p> <ul style="list-style-type: none"> <li>- First agreed in November 2007 in Milwaukee, Wisconsin by six Midwestern governors and one Canadian premier.</li> <li>- Purpose: To institute Midwestern on global warming by <ul style="list-style-type: none"> <li>□ Establish a Midwestern greenhouse gas reduction program to reduce greenhouse gas emissions in their states</li> <li>□ Establish a working group to provide recommendations on implementation of the Accord.</li> <li>▪ The Midwest area environment: <ul style="list-style-type: none"> <li>□ <b>intensive manufacturing and agriculture sectors</b>, making it the most coal-dependent region in North America.</li> <li>□ <b>world-class renewable energy resources</b> and opportunities to take a lead role in solving the effects of climate change.</li> </ul> </li> </ul> </li> </ul>
<h3>MGGRA Scope and Plan</h3> <p><b>Key Points / Additional Information</b></p> <ul style="list-style-type: none"> <li>- <b>Members:</b> Iowa, Illinois, Kansas, Manitoba, Michigan, Minnesota, Wisconsin</li> <li>- <b>Observers:</b> Indiana, Ohio, Ontario, South Dakota</li> <li>- Regional greenhouse gas reduction targets: <b>long-term target of 60% to 80% below current emissions levels</b></li> <li>- <b>Plan</b> <ul style="list-style-type: none"> <li>□ Develop a multi-sector cap-and-trade system to help meet the targets</li> <li>□ Establish a greenhouse gas emissions reductions tracking system</li> <li>□ Implement other policies, such as low-carbon fuel standards, to aid in reducing emissions.</li> </ul> </li> <li>- The Accord represents the third regional agreement among U.S. states to collectively reduce greenhouse gas emissions, and will be fully implemented within 30 months.</li> </ul>	

CT01-30	<p><b>Chicago Climate Exchange (CCX)</b></p> <ul style="list-style-type: none"> <li>■ Operates North America's only cap and trade system for all <b>six greenhouse gases</b>, with global affiliates and projects worldwide.</li> <li>■ CCX emitting Members make a <b>voluntary but legally binding commitment</b> to meet annual GHG emission reduction targets.</li> <li>■ Credit Unit : Carbon Financial Instrument® (CFI®) contracts.</li> </ul>  <p>Source: World Resources Institute</p> <p>Thailand Greenhouse Gas Management Organization (ประเทศไทยจัดการกําazi เก่า)</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>
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CT01-29	<p><b>Map of RGGI/WCI/MGGA Member States</b></p>  <p>Source: World Resources Institute</p> <p>Note: Maine is a partner in the WCI &amp; MGGA, but not a member of either organization. It is also a member of the RGGI.</p> <p>RGGI Participant</p> <p>WCI Participant</p> <p>WCI Observer</p> <p>MGGA Participant</p> <p>MGGA Observer</p> <p>RGGI Participant</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p> <p>Thailand Greenhouse Gas Management Organization (Thailand Greenhouse Gas Management Organization)</p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>
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CT01-32	<p><b>Target Group: G, PP</b></p> <h3>Benefits of Membership of CCX</h3> <ul style="list-style-type: none"> <li>▪ Be prepared : mitigate financial, operational and reputational risks</li> <li>▪ Reduce emissions using the highest compliance standards with third party verification</li> <li>▪ Prove concrete action on climate change to shareholders, rating agencies, customers and citizens</li> <li>▪ Establish a cost-effective, turnkey emissions management system</li> <li>▪ Drive policy developments based on practical, hands-on experience</li> <li>▪ Gain leadership recognition for taking early, credible and binding action to address climate change</li> <li>▪ Establish early track record in reductions and experience with growing carbon and GHG market</li> </ul>  <p>32 Thailand Greenhouse Gas Management Organization (องค์การจัดการกําลังไอน้ำเขียวประเทศไทย)</p>	<p><b>Reference and Additional Information</b></p>
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CT01-31	<p><b>Target Group: G, PP</b></p> <h3>CCX Concept</h3> <ul style="list-style-type: none"> <li>▪ Those who reduce below the targets have <b>surplus allowances</b> to <b>sell or bank</b>; those who emit <b>above</b> the targets comply by purchasing CCX Carbon Financial Instrument® (CFI®) contracts.</li> <li>▪ The Financial Industry Regulatory Authority (FINRA, formerly NASD) provides <b>independent, third party verification</b></li> </ul>  <p>31 Thailand Greenhouse Gas Management Organization (องค์การจัดการกําลังไอน้ำเขียวประเทศไทย) Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p><b>Key Points</b></p> <p><b>Reference and Additional Information</b></p>
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<p><b>CT01-34</b></p>	<p><b>Target Group: G, PP</b></p>																																			
<p><b>Tokyo Cap-and-Trade (T-CAT)</b></p> <p><b>Tokyo:</b></p> <ul style="list-style-type: none"> <li>Population: 13 million, GDP (2006): 815 billion US\$</li> <li>Rapid increase of CO<sub>2</sub> emission from Commercial sector</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>1990 (Mt-CO<sub>2</sub>)</th> <th>2000 (Mt-CO<sub>2</sub>)</th> <th>2006 (Mt-CO<sub>2</sub>)</th> <th>% change from 1990</th> </tr> </thead> <tbody> <tr> <td>Industry</td> <td>9.8</td> <td>6.8</td> <td>5.2</td> <td>-47.0%</td> </tr> <tr> <td>Commercial</td> <td>15.7</td> <td>18.9</td> <td>20.6</td> <td>+31.1%</td> </tr> <tr> <td>Household</td> <td>13.0</td> <td>14.3</td> <td>14.4</td> <td>+11.0%</td> </tr> <tr> <td>Transport</td> <td>14.8</td> <td>17.6</td> <td>14.7</td> <td>-1.1%</td> </tr> <tr> <td>Others</td> <td>1.0</td> <td>1.2</td> <td>1.0</td> <td>-0.5%</td> </tr> <tr> <td>Total</td> <td>54.4</td> <td>58.8</td> <td>55.9</td> <td>+2.8%</td> </tr> </tbody> </table> <p style="text-align: right;">33</p> <p style="text-align: right;">Thailand Greenhouse Gas Management Organization. (Public Organization)</p>		1990 (Mt-CO <sub>2</sub> )	2000 (Mt-CO <sub>2</sub> )	2006 (Mt-CO <sub>2</sub> )	% change from 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%	<p><b>Concept and Scope of T-CAT</b></p> <ul style="list-style-type: none"> <li><b>Start:</b> 1<sup>st</sup> April 2010</li> <li><b>Target Gas:</b> energy-related CO<sub>2</sub></li> <li><b>Cap coverage:</b> 1,400 installations (including 1,100 business facilities and 300 industrial facilities)</li> <li><b>Targeted facilities:</b> consumption of fuels, heat and electricity &gt;1,500 kJ/year (crude oil equivalent)</li> <li><b>Compliance period:</b> 5 years             <ul style="list-style-type: none"> <li>1<sup>st</sup>: 2010 to 2014</li> <li>2<sup>nd</sup>: 2015 to 2019</li> </ul> </li> </ul> <p style="text-align: right;">34</p> <p style="text-align: right;">Thailand Greenhouse Gas Management Organization. (Public Organization)</p>
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CT01-35	Target Group: G, PP	<h2>Concept and Scope of T-CAT (2)</h2> <ul style="list-style-type: none"> <li><b>Compliance factor:</b> <ul style="list-style-type: none"> <li>1st Compliance Period: 6% or 8%</li> <li>* 6% for factories (and buildings receiving energy from district heating and cooling plants)</li> <li>* 8% for rest of the buildings</li> </ul> </li> <li>2nd Compliance Period: 17% (planned)</li> <li>Monitoring and Reporting: every year</li> <li><b>Penalty:</b> <ul style="list-style-type: none"> <li>Non-compliance is required to reduce 1.3 times in the next period</li> </ul> </li> </ul> <p style="text-align: right;">Source: Thailand Greenhouse Gas Management Organization (Public Organization) Thailand Greenhouse Gas Management Organization (Public Organization)</p>
Key Points	Reference and Additional Information	

CT01-36	Target Group: G, PP	<h2>T-CAT Allowance Allocation</h2> <ul style="list-style-type: none"> <li>Allowance allocation:</li> <li>Base year emission* × Compliance factor × Compliance period (5 years)</li> </ul> <p>*Base year emission: Average emission of past 3 years</p> <p>Total 5 years Average = 46,300 ton (15,096ton/5 years) × 5 years</p> <p>Mathematical Expression: <math>\text{Allowance} = \text{Base year emission} \times \text{Compliance factor} \times \text{Compliance period}</math></p> <p>Source: Tokyo Metropolitan Government (東京都環境省)</p> <p>Reference and Additional Information</p> <p><b>Key Points</b></p> <p>Allowance allocation for each facility can be calculated by:</p> <ul style="list-style-type: none"> <li>Base year emission * × Compliance factor (or reduction target) × Compliance period (5 years), where</li> <li>*Base year emission is equal to Average emission of past 3 years, which is selected by facilities</li> </ul> <p>Example,</p> <ul style="list-style-type: none"> <li>One facility selects base year emission from 2004 to 2006, which has average emission equal to 10,000 ton CO2</li> <li>While its Compliance factor for 1st compliance period is 8% reduction</li> <li>As a result, allowance for this facility is calculated: 10,000 ton of base year emission × reduction target 8% × 5 years of the 1st compliance period. = 46,000 tonCO2 allowance</li> </ul>
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	<h2>US Climate Bill may not pass within 2010</h2> <ul style="list-style-type: none"> <li>Depend on the votes. (There are 100 senators and 60 votes are needed)           <ul style="list-style-type: none"> <li>There are 100 senators and <b>60 votes are needed</b> to pass legislation.</li> </ul> </li> <li><b>Opponents concerns:</b> The bill may lead to <b>unemployment</b> and <b>increase energy price</b>, which affects to US economic growth           <ul style="list-style-type: none"> <li>There are <b>only over 40 legislative days left</b> in the calendar and there is much for the senate to deal with.</li> <li>The <b>Gulf oil spill</b> may have killed the climate change bill.</li> </ul> </li> <li>If the Climate Bill passes the Senate, <b>market mechanism for US GHG emission reduction will be Cap-and-Trade System.</b></li> </ul> <p style="text-align: right;">38</p> <p style="text-align: center;"><small>บริษัทฯ ขอสงวนสิทธิ์การเปลี่ยนแปลงข้อมูลโดยทางการ Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>	<p><b>Key Points/ Additional Information</b></p> <ul style="list-style-type: none"> <li>From current situation, many analysts said that US Climate Bill may not pass within 2010.</li> <li>Lindsay Graham (Republican Senator) withdrew from the bill so it is now depending on the votes.           <ul style="list-style-type: none"> <li>There are 100 senators in US now and 60 votes are needed to ensure passage of any legislation.</li> <li>According to interviews conducted by Greenwire, the current vote count is this yes - 26; probably yes - 11; no - 22; probably no - 10; fence sitters - 31.</li> </ul> </li> <li>Opponents of the bill say that the bill may lead to unemployment and increase energy price, which affects to US economic growth           <ul style="list-style-type: none"> <li>Mindful of the accident in the Gulf, the bill would allow coastal states to opt-out of drilling up to 75 miles from their shores. In addition, a nearby state would have the right to veto any drilling if it stood to suffer significant adverse impacts in the event of an accident. States that do pursue drilling would receive 37.5 percent of revenues to help protect their coastlines and coastal ecosystems.</li> </ul> </li> <li>Given the limited days before the mid term elections in November and the strong opposition against a cap-and-trade system, the already low probability for passing climate change legislation has got lower.</li> <li>However, if the bill passes the senate, the US market mechanism for GHG emission reduction will be cap-and-trade system.</li> </ul>
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	<h2>US-ETS</h2> <p>American Power Act (Kerry-Lieberman Bill)</p> <ul style="list-style-type: none"> <li>Proposed in May 2010</li> <li>Purposes: Reduce carbon emission <b>17%</b> from 2005 emission levels by 2020 and over <b>80% in 2050</b> by Cap-and-Trade System.</li> <li>Targeted entities:           <ul style="list-style-type: none"> <li>Only the <b>largest polluters</b> -- emit <b>25 000 tons of carbon each year</b> -- have to comply with reduction targets.</li> <li>Power plants will face the first restrictions</li> <li>Energy-intensive manufacturers will be followed six years later (2016).</li> <li>Federal regulations would trump state regulations</li> <li>Set upper and lower limits on the price of pollution permits.</li> <li>The bill would <b>allow coastal states to opt-out of drilling up to 75 miles from their shores</b>. In addition, a nearby state would have the right to veto any drilling if it stood to suffer significant adverse impacts in the event of an accident. States that do pursue drilling would receive 37.5 percent of revenues to help protect their coastlines and coastal ecosystems.</li> </ul> </li> </ul> <p style="text-align: right;">37</p> <p style="text-align: center;"><small>บริษัทฯ ขอสงวนสิทธิ์การเปลี่ยนแปลงข้อมูลโดยทางการ Thailand Greenhouse Gas Management Organization (Public Organization)</small></p>	<p><b>Key Points/ Additional Information</b></p> <p><b>American Power Act (Kerry-Lieberman Bill)</b></p> <ul style="list-style-type: none"> <li>This bill was proposed in May 2010 aiming to reduce carbon pollution for 17% from 2005 emission levels by 2020, 42% by 2030; and 83% by 2050 by capping emissions in certain sectors and allowing for trading of pollution permits.</li> <li><b>Targeted entities</b> of this bill will cover:           <ul style="list-style-type: none"> <li>Only the largest polluters -- those that emit 25,000 tons of carbon each year -- have to comply with reduction targets. Power plants will face the first restrictions, followed six years later by energy-intensive manufacturers.</li> <li>The regulations <b>will cover only about 2 percent of America's businesses, or 7,500 factories and plants</b>. But that 2 percent accounts for 75 percent of America's greenhouse gas emissions.</li> </ul> </li> <li>The regulations <b>will cover only about 2 percent of America's businesses, or 7,500 factories and plants</b>. But that 2 percent accounts for 75 percent of America's greenhouse gas emissions.</li> <li>A small percentage of the greenhouse gas emission allowances under the proposed cap-and trade system would go to domestic wildlife and natural resource protection starting in 2019.</li> <li>The bill includes a hard "price collar," or upper and lower limits, on the price of pollution permits.</li> </ul>
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CT01-40	<p style="text-align: right;"><b>Thank you</b></p>  <p style="text-align: right;">39</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	Target Group: G, PP
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CT01-39	<p style="color: red; font-weight: bold;">Confirmation of the importance and anticipated roles of 'carbon trading'</p> <ul style="list-style-type: none"> <li>▪ 'Cap and trade' is the fundamental approach of carbon trading.</li> <li>▪ Carbon trading may be effective GHG mitigation measures if all GHG emitters in the world can be participated.           <ul style="list-style-type: none"> <li>▪ But, carbon trading is not versatile, one and only system to mitigate GHG emissions in the world.</li> <li>▪ We should consider appropriate institutional design of carbon trading in order to have no particular bit of 'losers' and 'winners' by it.</li> </ul> </li> </ul> <p style="text-align: right;">39</p> <p>Thailand Greenhouse Gas Management Organization (Public Organization)</p>	<p style="color: red; font-weight: bold;">Key Points</p> <p style="color: red; font-weight: bold;">Reference and Additional Information</p> <ul style="list-style-type: none"> <li>- 'Cap-and-trade' is the fundamental approach of market mechanism for GHG emission reduction.</li> <li>- However, carbon trading may be an effective GHG mitigation measure <b>if all GHG emitters in the world can be participated.</b> <ul style="list-style-type: none"> <li>- Carbon trading is not versatile, not the one and only system to mitigate GHG emissions in the world.</li> <li>- We should consider <b>appropriate institutional design of carbon trading</b> in order to have no particular bit of 'losers' and 'winners'.</li> </ul> </li> </ul>
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