



CDM TYPOLOGY PART II

CDM training program

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JICA expert team

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OBJECTIVES

The main objective of this lecture is for you to understand different CDM project types, such that from a basic description of a given project, you will be able to understand its emission reduction or carbon sink mechanism, and its appropriate CDM methodology.

Content:

- I. PROFILE OF THE CURRENT CDM PROJECTS*
- II. EMISSION REDUCTION/CARBON SINK MECHANISMS*
- III. CDM METHODOLOGIES*
- IV. EXERCISE: IDENTIFYING CDM PROJECTS*

PROFILE OF THE CURRENT CDM PROJECTS

CDM TYPOLOGY (PROJECT TYPE)

Types of CDM projects by status Type (rejected projects excluded)	Registered		
	Number	kCERs	2012 kCERs
Afforestation	2	21	137
Agriculture	0	0	0
Biomass energy	286	16602	98170
Cement	19	3214	21502
CO2 capture	2	24	139
Coal bed/mine methane	26	13819	62626
Energy distribution	2	67	739
EE households	8	315	1029
EE industry	57	1668	9582
EE own generation	138	23297	113143
EE service	5	59	330
EE supply side	20	3684	10862
Fossil fuel switch	45	25817	110288
Fugitive	12	8713	44332
Geothermal	9	1835	10101
HFCs	21	81696	476448
Hydro	622	58932	230037
Landfill gas	160	28065	154809
Methane avoidance	323	12094	65536
N2O	62	47860	246917
PFCs and SF6	6	1115	3754
Reforestation	13	442	2312
Solar	20	444	1228
Tidal	1	315	1104
Transport	3	305	1978
Wind	359	35238	150544
Total	2221	365639	1817648

Source: CD4CDM

REGISTERED CDM PROJECTS IN SRI LANKA

Project Name	Project Type
Magal Ganga Small Hydropower Project (9,9 MW)	Hydro
Hapugastenne and Hulu Ganga Small Hydropower Projects	Hydro
Small Hydropower Projects at Alupola and Badulu Oya.	Hydro
Sanquhar and Delta Small Hydro Power Projects	Hydro
Coconut shell charcoaling and power generation at Badalgama, Sri Lanka	Biomass energy
10 MW Biomass Power Generation Project - Tokyo Cement, Trincomalee	Biomass energy

Currently only hydro and biomass projects are registered as CDM, but there may be other opportunities as well.

EMISSION REDUCTION/CARBON SINK MECHANISMS

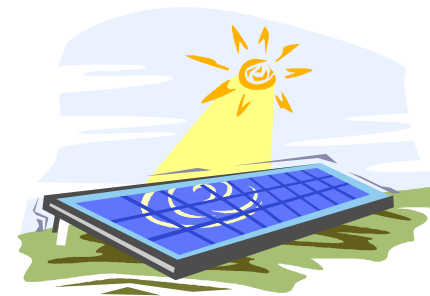
EMISSIONS REDUCTION AND CARBON SINK

- Main objective of the CDM is to prevent release of the anthropogenic GHG emissions to the atmosphere.
- Two possible options
 - Reduce the GHG emissions (Emissions Reduction)
 - Prevent GHG reaching the atmosphere (Carbon Sink)

Afforestation and Reforestation projects belong to carbon sink project type

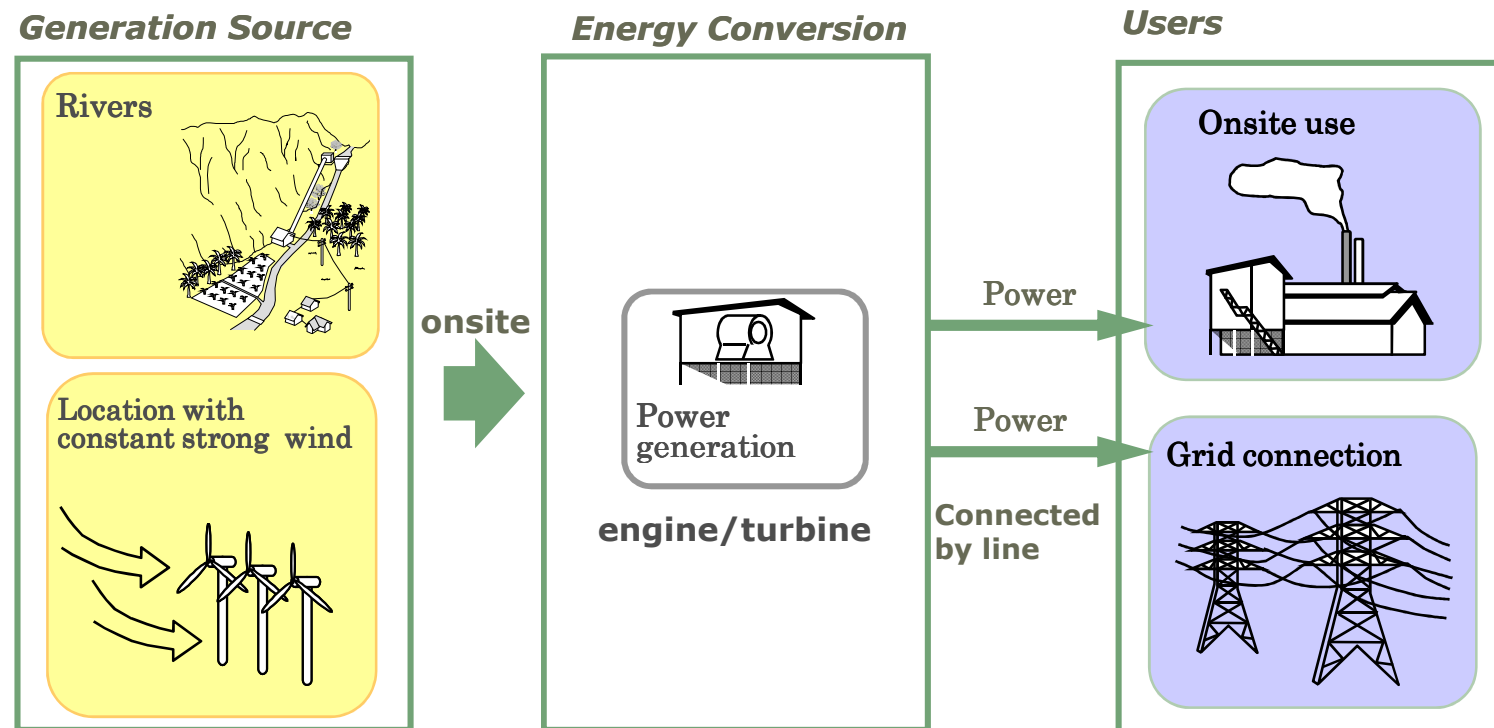


Rest of the CDM projects including renewable energy projects belong to GHG emissions reduction project type



RENEWABLE ENERGY

- Renewable Energy CDM projects reduce GHG emissions by reducing the use of fossil fuel.
- If the renewable energy is supplied to the grid, it would reduce the “emission factor” of the grid.
- Includes wind, hydro, solar, biomass, geothermal, tidal power projects, and etc.



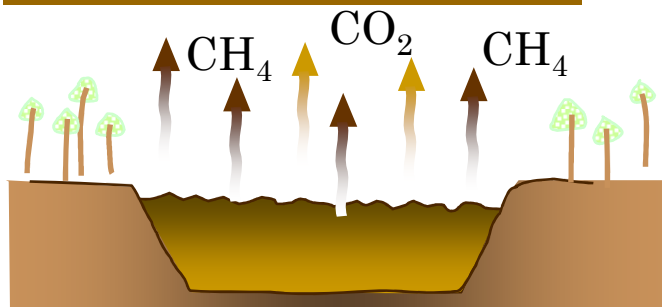
DESTRUCTION OF HIGH GLOBAL WARMING POTENTIAL GREENHOUSE GASES

- 1 ton of HFC, N₂O and CH₄ have higher global warming potential than 1 ton of CO₂
- Therefore destruction of these gases will result in GHG emissions reduction.
- Examples: HFC destruction, N₂O destruction, landfill gas flaring, composting, and etc.

Greenhouse Gas GWP	
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	21
Nitrous oxide (N ₂ O)	310
Hydro-fluorocarbons (HFCs)	150–11,700
Perfluorocarbons (PFCs)	6,500–9,200
Sulphur hexafluoride (SF ₆)	23,900

Baseline Scenario (Landfill site)

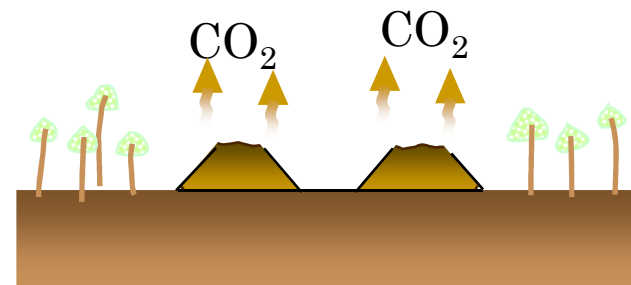
Anaerobic condition



Fermentation induced by anaerobic condition
Methane(CH₄) and carbon dioxide (CO₂) to be generated

Project Scenario (Composting)

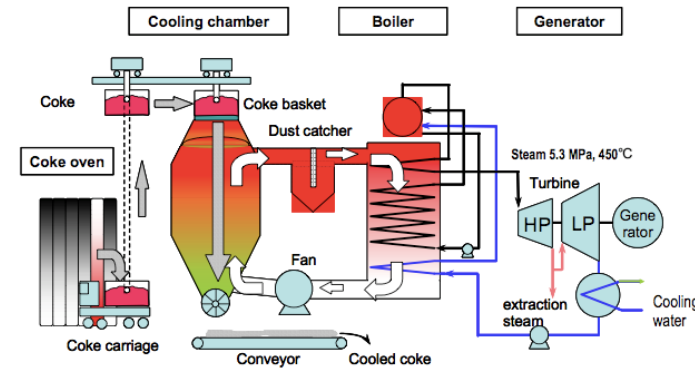
Aerobic condition



Fermentation inhibited due to aerobic condition
Only carbon dioxide (CO₂) to be generated

EFFICIENT USE OF FOSSIL FUEL

- Energy Efficiency:
 - If less fuel is required to travel the same distance, energy efficiency is achieved.
 - If less electricity is used to light the room (with same brightness), energy efficiency is achieved
 - If heat is recovered to generate electricity, energy efficiency is achieved.
- Example of energy efficiency projects include: cogeneration projects, Compact Fluorescent Lamps (CFL) installation projects, combined cycle power plant projects, steel mill waste heat recovery projects, and etc.



SWITCH TO LOW CARBON INTENSITY FOSSIL FUEL

- Coal emits more CO₂ than natural gas to produce equivalent amount of energy.
- Fuel switch from coal to natural gas will reduce CO₂ emissions.
- Example includes fuel switch from diesel powered boiler to natural gas boiler.



Coal



Diesel oil



Petroleum



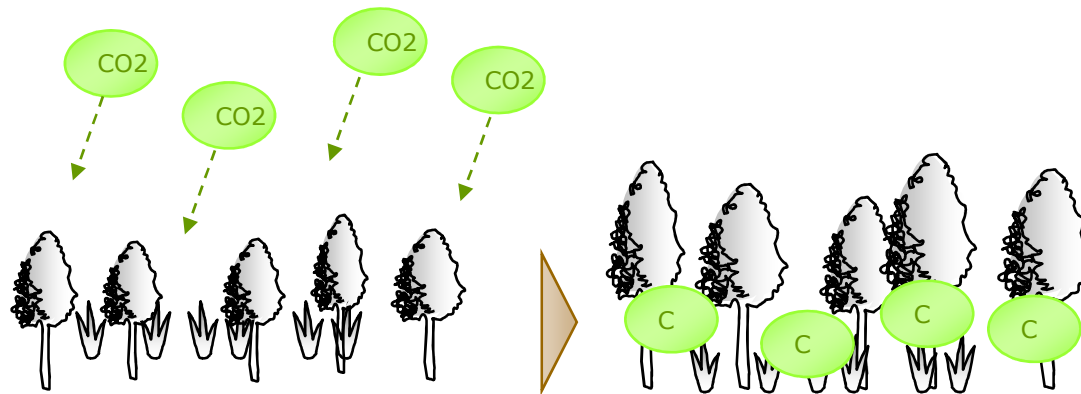
Natural Gas

IPCC Default CO₂ emission factor for combustion

Fuel type	kgC/GJ	tCO ₂ /GJ
Lignite (Coal)	27.6	0.0755
Diesel Oil	20.2	0.0741
Motor Gasoline	18.9	0.0693
Liquefied Petroleum Gas	17.2	0.0631
Natural Gas	15.3	0.0561

CARBON SINK

- CO₂ is absorbed by the trees
- Trees fix the carbon during its growth, thus prevent emission of CO₂ to the atmosphere.
- Once the tree is combusted, CO₂ is released to the atmosphere. (permanence issue)
- Sustainable long term management of the forest is necessary for the carbon sink project.



CDM CATEGORY (SUMMARY)

	Main Category	Subcategory	Registered projects	%of total
Emissions Reduction	Renewable energy (to replace fossil fuel)	Hydro	622	28.01%
		Biomass	307	13.82%
		Wind Power	359	16.16%
		Other renewable energy	30	1.35%
	Destruction of high global warming potential GHG	Methane gas destruction	509	22.92%
		N ₂ O destruction	62	2.79%
		HFC/PFC/SF ₆ destruction	27	1.22%
	Efficient use of fossil fuel	Heat Recovery	70	3.15%
		Energy Efficiency	172	7.74%
		Transportation	3	0.14%
Switch to low carbon intensive fossil fuel	Fuel Switch	45	2.03%	
	Carbon sink	Afforestation / Reforestation	15	0.68%

Carbon Sink

OTHER EMISSIONS REDUCTION PROJECTS THAT ARE NOT RECOGNISED AS CDM

- Nuclear power plant project
 - CO₂ emission is close to zero
 - But pose environmental issues such as radioactive waste
- Carbon Capture and Storage (CCS) project
 - CO₂ will be stored underground
 - Carbon sink project
 - Unproven technology (especially its long-term effects)
 - It may be approved as a CDM project in the future
- Waste plastics as a fuel
 - Use plastic waste to make fuel pellets or even convert it into oil
 - Plastic waste is not considered as renewable energy
 - It actually does not contribute towards GHG emissions reduction
 - However, if it is a fuel switch project that result in lower carbon intensity it could be considered as a CDM project.

CDM METHODOLOGIES

METHODOLOGIES

- Some methodologies could be applied for various project types.
- For example, AMSI.D. could be applied for wind, solar, hydro, geothermal, tidal/wave, and renewable biomass power projects.
- Other methodologies are rather specific for a particular project.
- For example, AMS-III.G. is applicable only for land fill methane recovery projects.

Please refer to the “CDM/JI Manual for Project Developers and Policy Makers 2009”
(Approved methodologies, page119~127)

EXERCISE: IDENTIFYING CDM PROJECTS

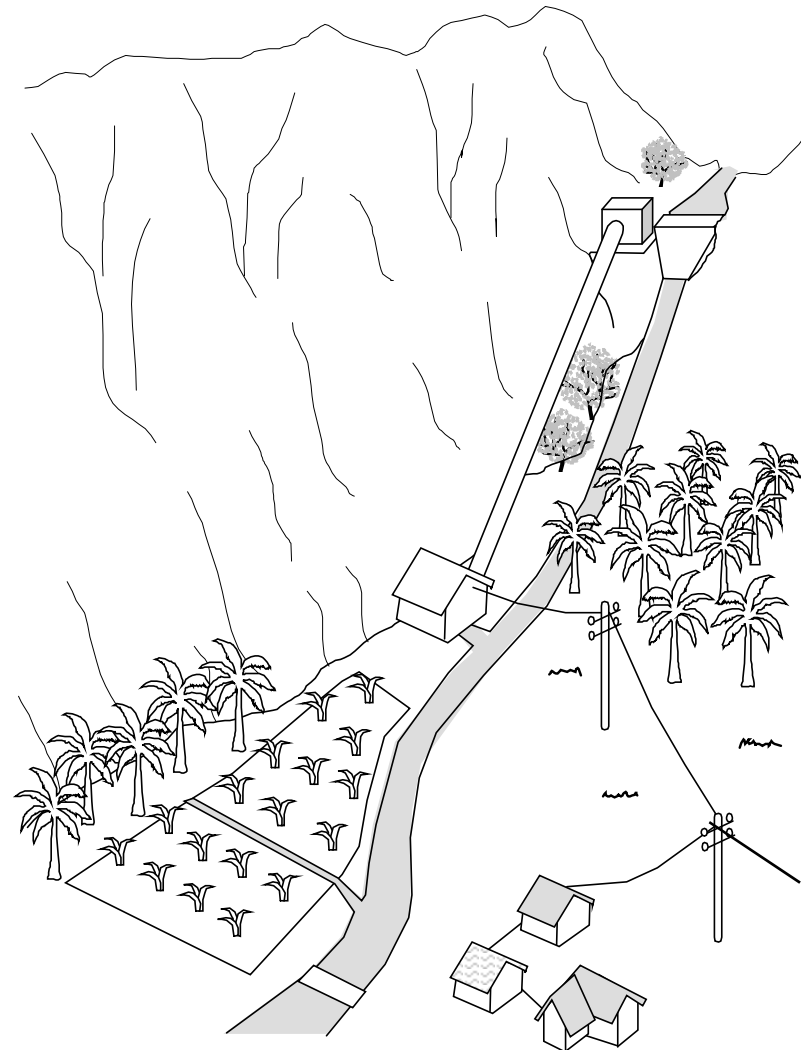
EXAMPLE 1

Project description:

- 5MW hydro dam project
- The electricity will be sold to the grid

Questions:

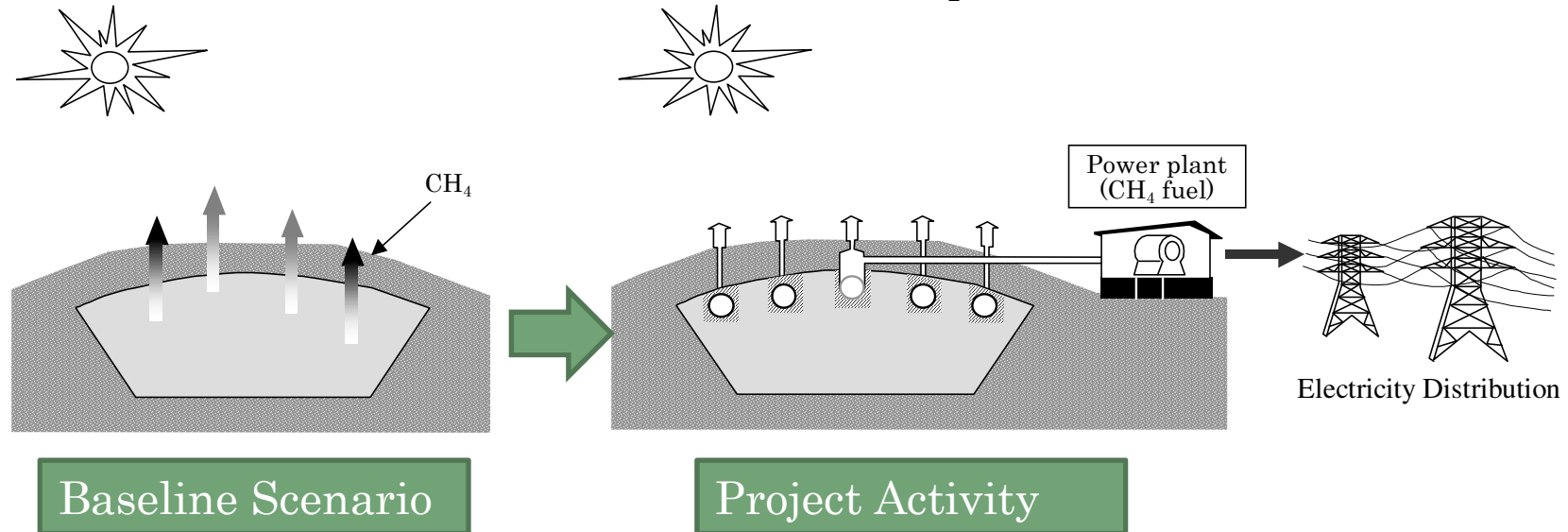
1. What type of project is this?
2. What methodology could be used?
3. If the size of the hydro dam is 20MW, what methodology could be used?



EXAMPLE 2

Project description:

- Landfill gas collection and flare CDM project
- Part of the landfill gas will be used to generate electricity using 1MW gas turbine
- Emissions reduction is expected to be 20,000 tons CO₂e/year



Questions:

1. What type of project is this?
2. What methodologies could be used?
3. What happens if emissions reduction is expected to be 200,000 tons CO₂e/year?

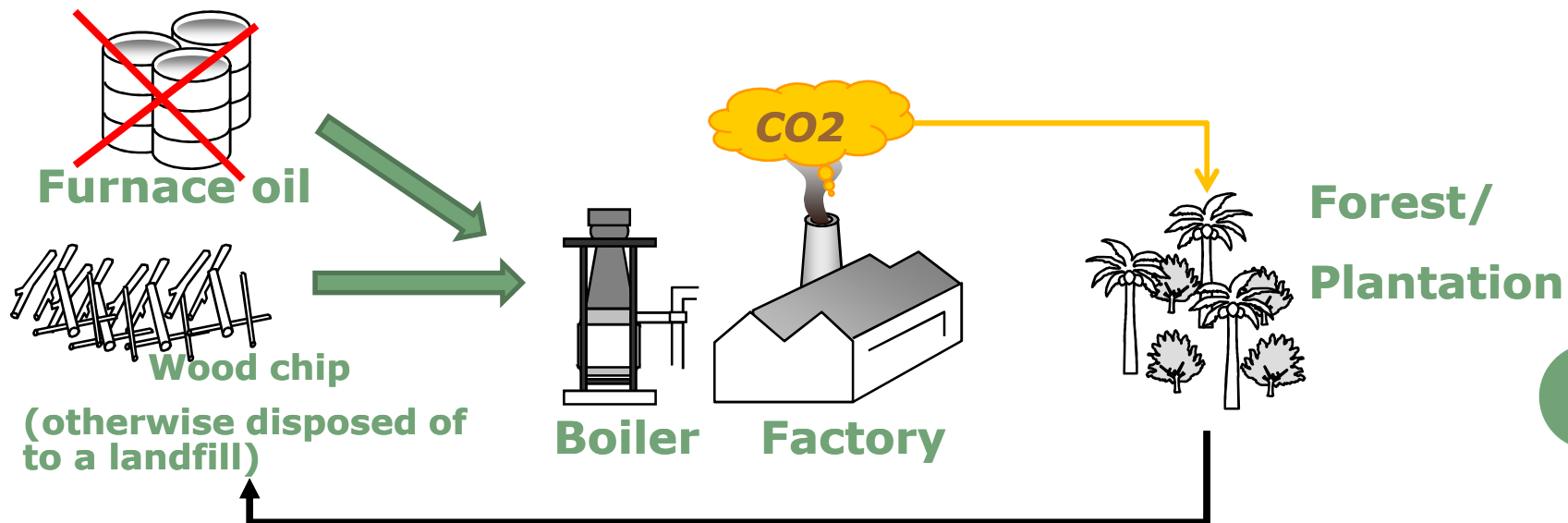
EXAMPLE 3

Project Description

- Fuel switch from furnace oil to wood chip
- Biomass boiler will replace the furnace oil boiler
- Steam generated from the boiler will be used in-house
- Wood chip will be collected from the saw mill. (other wise disposed of to a landfill)

Questions:

1. How is GHG emissions reduction achieved in this project activity?
2. Which CDM methodologies are applicable for this project activity?
3. Would it make a difference if the wood chip is produced by cutting trees from the nature reserve instead of it being residual waste collected from a saw mill?



USEFUL LINKS

- CD4CDM (<http://www.cd4cdm.org/>)
 - CDM database is available from the “CDM pipeline”
- UNFCCC methodologies section (<http://cdm.unfccc.int/methodologies/index.html>)
 - Have all the available methodologies
- Kyoto Mechanisms Information Platform (<http://www.kyomecha.org/e/index.html>)
 - Japanese CDM information website
 - “CDM in Charts” is particularly useful document for CDM developers