Findings of New Mechanism Feasibility Studies 2011

— based on MOEJ/GEC BOCM FS Programme —

Ministry of the Environment, Japan

Global Environment Centre Foundation

May 2012

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Introduction

The Ministry of the Environment, Japan (MOEJ) and Global Environment Centre Foundation (GEC) have launched Feasibility Study (FS) Programme on New Mechanisms since 2010, in order to solicit GHG mitigation projects/activities supposed to be implemented under New Mechanisms in the post-2012 framework. In 2011, the Programme implemented 29 FSs to investigate feasibility of project/activity to be implemented under New Mechanisms, in particular the Bilateral Offset Credit Mechanism (BOCM) proposed by the Government of Japan.
Each FS is aimed at studying and giving outcomes on following items:

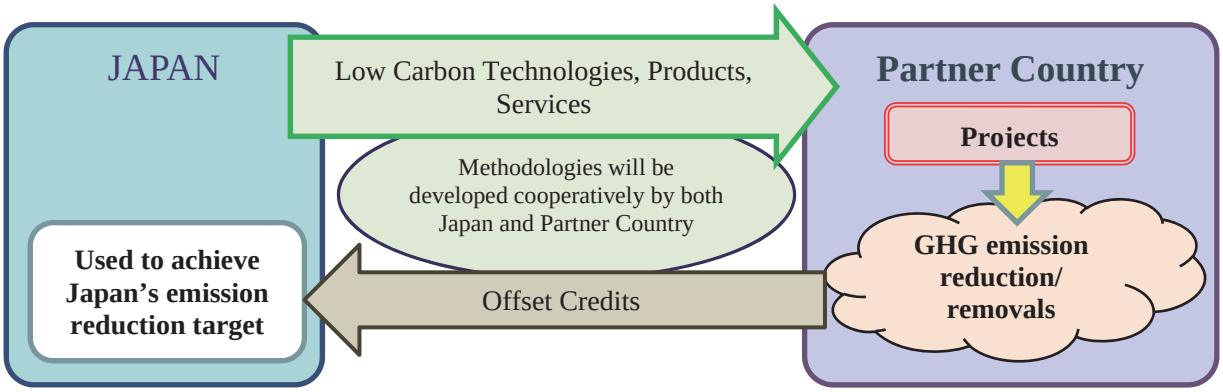
- Identification of reference scenario related to the project/activity,
- Establishment of reasonable and credible monitoring methods and plan,
- Estimation of GHG emission reductions from a target sector/project,
- Proposed "Measurement, Reporting, and Verification (MRV)" System for GHG reduction under BOCM, and
- Evaluation of the project/activity's contribution to sustainable development in the host country, with securing environmental integrity.

This booklet compiles the summarised results of 29 FSs undertaken in 2011, in order to share information about image of BOCM and GHG emission reduction potentials of projects/activities under BOCM through various case studies over the world. We believe that those efforts through the FS programme will lead to a pathway to the contribution to promote mitigation actions bearing in mind different circumstances of developed and developing countries.

Bilateral Offset Credit Mechanism (BOCM)

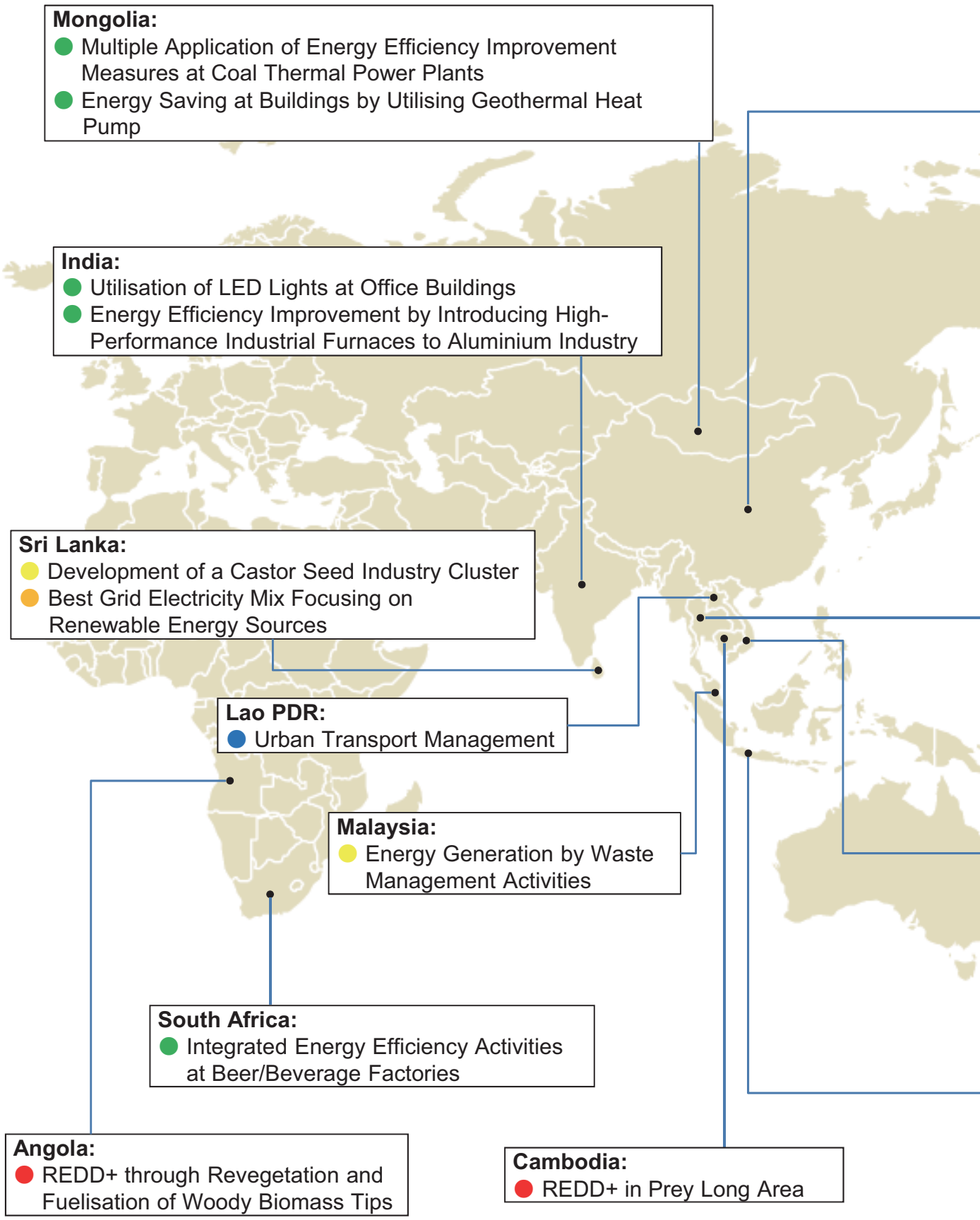
The BOCM is a new scheme to promote the transfer of advanced low-carbon technologies, products and services to developing countries for achieving net reductions of global GHG emissions. The purposes of the BOCM are:

- To contribute to the ultimate objective of the UNFCCC through promotion of mitigation activities globally.
- To facilitate the bilateral cooperation in the field of climate change in such a way that best suits each country's national circumstances.
- To contribute to the sustainable development of developing countries.
- To appropriately evaluate the contribution to GHG emission reductions or removals.
- To facilitate diffusion of low carbon technologies, products and services and enhance capabilities to utilise them.



The BOCM should complement the existing Kyoto Mechanisms, such as CDM. The BOCM is expected to realise the projects/activities which may not be eligible under the CDM or which are difficult to implement due to strict applicability conditions and/or impossibility of financial or other additionality demonstration.

New Mechanism Feasib



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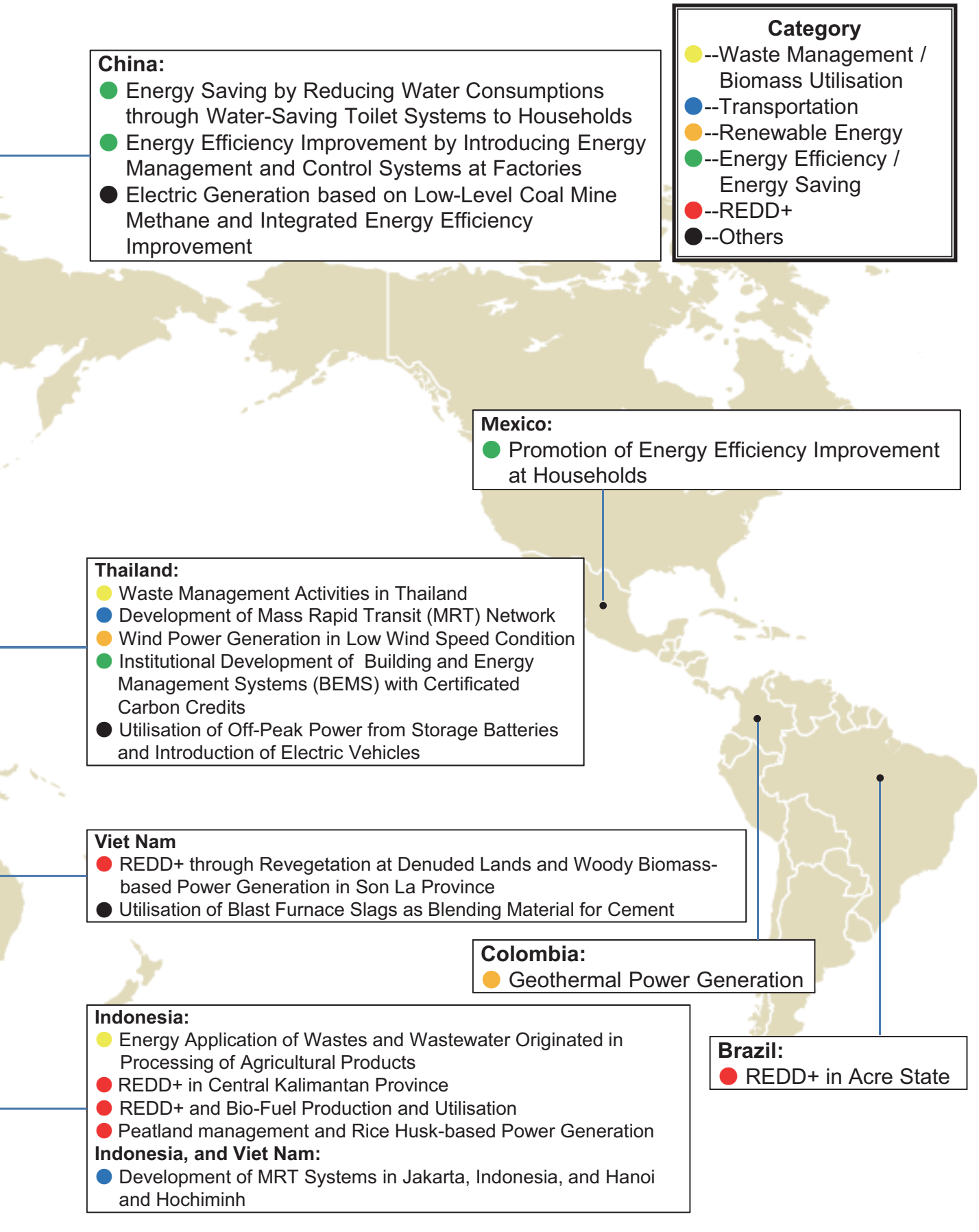


New Mechanism Feasibility Study for Waste Management Activities in Thailand

By Pacific Consultants Co., Ltd

(1) Description of Project / Activity

Table 1 summarizes the projects covered by this study.

Table 1: Summary of Projects

Technology to be Introduced		Cases Considered		GHG Emissions to be Reduced		Methodologies Referenced
				CO_2	CH_4	
A	Semi-aerobic (passive) landfill aeration	a	Introduction of semi-aerobic aeration in landfill expansion plans in Rayong		AA Reduction at landfill	Refer to AM0093 based on waste (FOD model) of IPCC2006 Guidelines
		b	Introduction of semi-aerobic aeration at multiple landfill sites (of similar scale) around the Bangkok area (treated as one project)		AA Reduction at landfill	Same
B	Composting using YM aerobes	a	Composting using YM aerobes, for sewage sludge and night soil sludge treatment facilities in Nong Khaem	AA Substitute for chemical fertilizer		Based on AMSIII.A
		b	Composting using YM aerobes, for sludge from night soil treatment facilities in On-Nuch	AA Substitute for chemical fertilizer		Same
		c	Composting using YM aerobes, for organic waste from transfer station in On-Nuch	AA Substitute for chemical fertilizer	AA Reduction at landfill	Based on AMSIII.A, reductions at landfill site are same as in (a)
		d	Introduction of YM aerobes for organic waste treatment facilities (composting) plan in Rayong	AA Substitute for chemical fertilizer	AA Reduction at landfill	Same
C	Incineration and electricity generation	a	Introduction of 300 t/day incineration facilities for Bangkok City's municipal solid waste (Nong Khaem)	AA Reduction of emissions from power generation, by substituting electricity	AA Reduction at landfill	Based on AM0025 and IPCC Guidelines (Incinerators), and referring to J-MRV003A, reductions at landfill site are same as in (a)

AA indicates applicable items.

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

- For the reference scenario of waste management, the current situation is assumed to continue, with "open dumping or sanitary landfills" for 10 years. The boundary will be delineated to include everything from the hauling of waste to GHG emissions from disposal at the landfill.
- For the reference scenario of night soil sludge management, the current situation is assumed to continue, with "composting (sun drying)" for 10 years. The boundary will be delineated to include everything from the hauling of waste to the manufacture of fertilizer at composting facilities.
- The emissions from transport will be excluded from calculations in all cases.

(ii) Monitoring Methods and Plan

- A: Semi-aerobic landfill; the waste quantity (t) and composition (%), and methane emissions and

CO_2 emissions about twice a year.
- B: Composting using YM aerobes; the waste quantity (t) and composition (%), the weight of compost (t), the consumption of electricity (kWh) in the facility about twice a year.
- C: Incineration and electricity generation; the waste quantity (t) and composition (%), the consumption of electricity in the facility and generation of electricity (kWh) about twice a year.

(iii) GHG Emissions and Reductions

Table 2: GHG Emissions and Reductions

Case	GHG Emission Reductions (tCO_2)
Case A-a	504,014
Case A-b	1,408,538
Case B-a	190
Case B-b	130
Case B-c	11,127,570
Case B-d	287,918
Case C-a	795,597

(iv) MRV System for GHG Reduction

In Thailand, it is common for waste treatment and disposal services to be subcontracted outright to the private sector; therefore it would be difficult to manage MRV. Thus, it is desirable to create an effective system for generating BOCM credits. The figure below shows the functions and workflows expected of auditing and verification bodies involved in MRV.

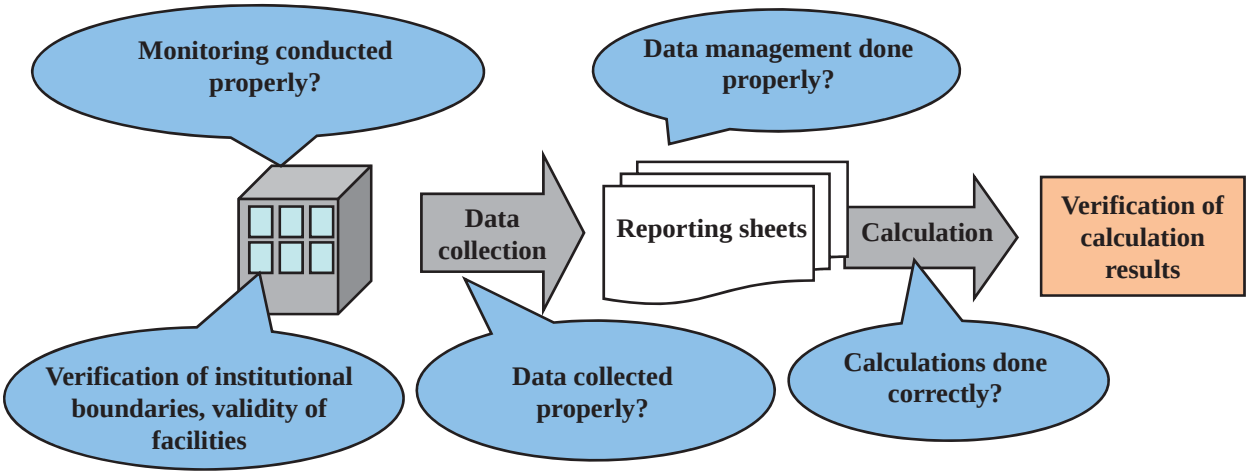


Figure 1: Functions and Workflows of Auditing and Verification Bodies

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

New environmental problems that might arise from implementation of projects using semi-aerobic landfill technology or YM aerobe composting technology can be avoided by careful consideration and design when developing the systems. Meanwhile, for incineration facilities, it is essential to make efforts to prevent air pollution and other negative impacts.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

We calculated the following items in consideration of the domestic situation in Thailand and based on the "Manual for Quantitative Evaluation of Co-Benefits" (Ver. 1.9, June 2009).

(vii) Contribution to Sustainable Development in Host Country

The BOCM project candidates under this study would have positive benefits if evaluated based on the above indicators for evaluating contribution to sustainable development in Thailand.

New Mechanism Feasibility Study for Energy Application of Wastes and Wastewater Originated in Processing of Agricultural Products in Indonesia

By Chugai-Technos Corporation

(1) Description of Project / Activity

- Our feasibility study is producing renewable energy from agricultural wastes and wastewater.
- Recovered methane gas from agricultural wastewater is used for renewable energy source.
- Agricultural solid wastes are used for biomass solid fuel product.
- We estimated the potential reduction of GHG emission from palm oil, rubber and sugar mills operated by PTPN-7, our Indonesian counterpart, and studied the feasibility of the project.
- We studied mills located in Lampung, Bengkulu and South Sumatera provinces.
- Because our project involves a number of mills in wide area, we developed a simple and feasible MRV method.

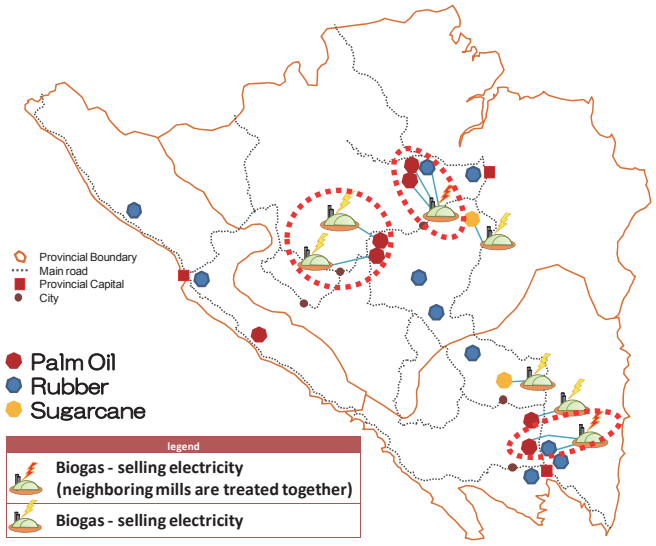


Figure 1: Project Image (Case-2)

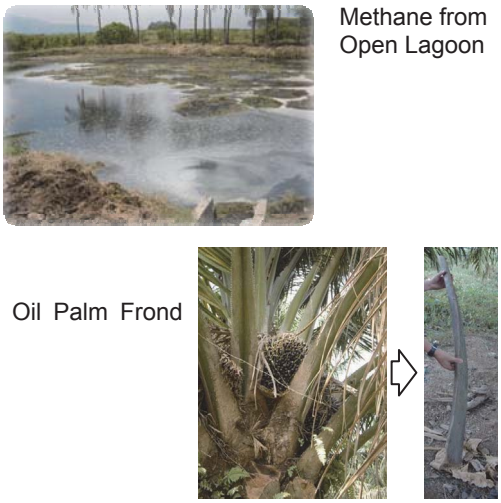


Figure 2: Renewable energy Resources

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

- We determined the reference scenario is equivalent to BAU.
- The project boundary includes mills, plantations and renewable energy users.

(ii) Monitoring Methods and Plan

From the feasibility study results, we proposed the following two methods:

Method A is based on CDM methodology and uses the equations provided in the methodology, but applies abbreviated and automatic monitoring

Method B is even simpler than Method A. Amounts of recovered methane gas and produced biomass pellets and chips are monitored, and GHG emission reduction is calculated based on the production volumes.

(iii) GHG Emissions and Reductions

We estimated GHG emission reduction for the following three model cases about PTPN-7's mills and for the case where our project is implemented throughout the host country:

<1> Model cases of mills owned by PTPN-7

Case-1: Each mill makes GHG reduction efforts. In this case wastewater from rubber mills cannot be used for generating electricity because its COD concentration is not enough for methane gas

production. Estimated reduction: 127,600tCO_2/y
Case-2: Composite wastewater treatment system is devised to recover methane gas from mixed wastewaters of nearby mills. The wastewater of rubber mills is mixed with neighboring palm oil mills for electricity generation. Thus, wastewater from rubber mills, whose COD concentration is too low, can be used for electricity generation. Estimated reduction: 131,400tCO_2/y
Case-3: We estimate the potential reduction of GHG emission in the case where EFBs which are now used for land application and fronds which are not collected, are used for energy source.
Estimated reduction: 167,300tCO_2/y
<2> GHG emission reduction potential of whole host country
Wastewater treatment is conducted at each mill. For solid wastes, the use of only oil palm fronds are considered at mills owned by PTPN, and the use of EFBs are also considered at other mills where EFBs are not considered to be used for soil application.
Estimated reduction - Use of wastewater: 14,992,000tCO_2/y
-Use of solid wastes: 4,145,000tCO_2/y

(iv) MRV System for GHG Reduction
-Indonesia is promoting a spread of Indonesian Sustainable Palm Oil (ISPO) system for a sustainable development of palm oil industry.
Beside the enhancement of competitiveness of Indonesian palm oil industry in the international market, the objectives of this system include the promotion of GHG emission reduction.
-If we add the following two items, we can establish a BOCM's MRV system required for the project:
<1> Monitoring of COD of inflow to lagoons, which is not legally required but necessary to estimate the methane gas yield. At present COD of outflow from lagoons are monitored, so monitoring of COD of only inflow is needed.
<2> Compliance with ISO 14064 and 14065 concerning reporting and verification for GHG emission in addition to ISO9001 and ISO14001 which ISPO now complies with.
ISPO certificate is mandatory for all Indonesian palm oil mills. If the above items are included in ISPO, ISPO certified mills will systematically conduct from monitoring and verification. If the trials started at palm oil mills, which is an important industry in Indonesia, are spread to rubber and sugar mills through the state-owned agriculture enterprise, the MRV of our project will be implemented widely.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)
It is expected that bad odor and harmful insects from lagoons will be prevented.

(vi) Financial Planning
The profit and loss analysis and free cash flow analysis were conducted. Consequently, it is pointed out the necessity of carbon credit for this project.

(vii) Co-benefits (i.e. Improvement of Local Environmental Problems)
It is expected that the bad odor from lagoons will be prevented.

(viii) Contribution to Sustainable Development in Host Country
This project will promote the introduction of renewable energy in Indonesia. It will secure a stable renewable energy supply. It will contribute to the sustainable development of palm oil industry.

(3) Toward Implementation / Future prospects and issues
<1> Problems left to be solved for implementation of the project
- Integrate with ISPO system
- Determination of EFB amount which can be used for energy production

<2> Steps to be taken to solve the problems
- Proposal for ISPO system
- Check of amount of EFBs which can be used for energy production

New Mechanism Feasibility Study for Energy Generation by Waste Management Activities, through Anaerobic Digestion as Model Technology, in Malaysia

By Ichikawa Kankyo Engineering Co., Ltd.

(1) Description of Project / Activity

Separately collect organic wastes such as food wastes from waste dischargers located in and along the North-South Highway of Malaysia peninsula, produce electricity by generated bio-gas at the "Anaerobic Digestion (AD)" facility, and sell it to the national grid as "green electricity".

Entire project using the highway will be divided in three sections (north/center/south), and the first project is discussed to be located in north part of the peninsula. The minimum waste input capacity of the AD facility for the first project is 40 tons per day (tpd).

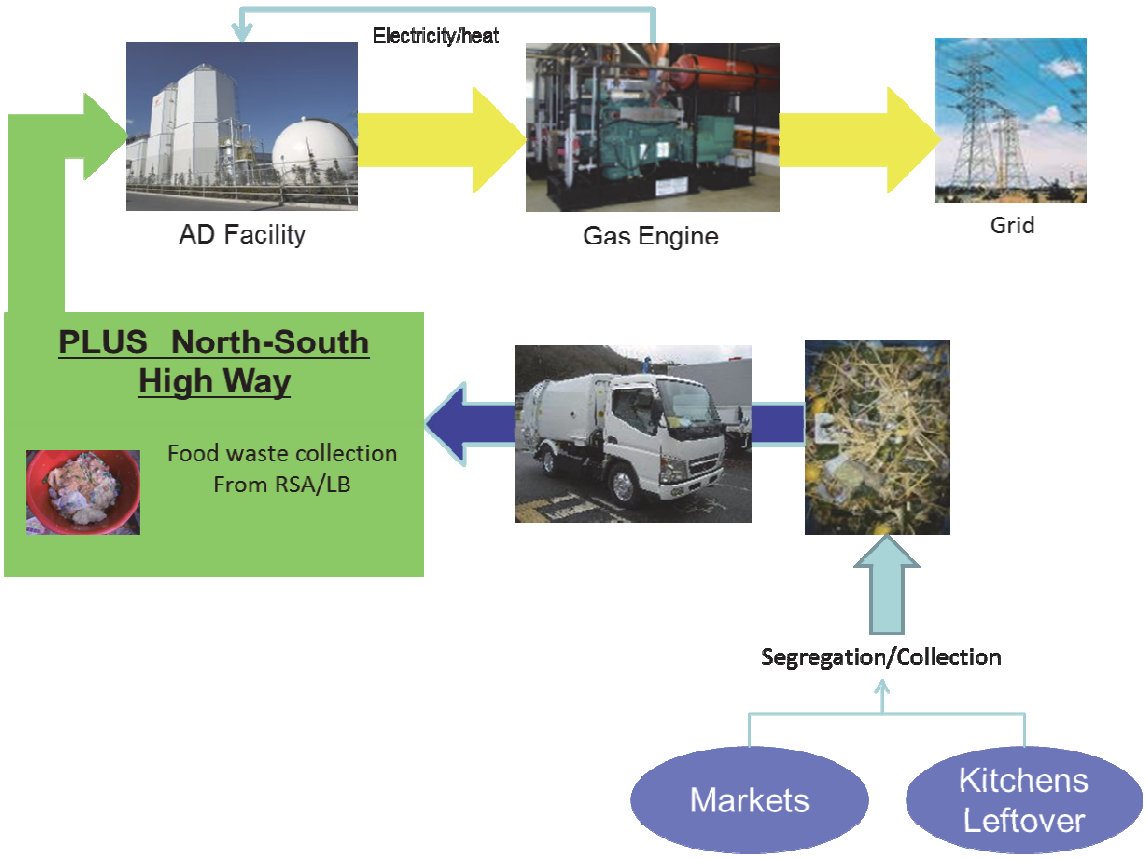


Figure 1: Project activity outline

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Current waste management system (collection, transportation, final disposal) will be continued as general action taken in the country.

(ii) Monitoring Methods and Plan

Basically follows AMS-III.AO. "*Methane recovery through controlled anaerobic digestion*" and AMS-I.D. "*Grid connected renewable electricity generation*", but simplify the procedure and items.

(iii) GHG Emissions and Reductions

The minimum size (40tpd) AD facility will reduce following GHGs:

i) GHG reduction from landfill site: 5,133tCO_2/y

ii) GHG reduction from grid: 499tCO_2/y

i)+ii)= 5,632tCO_2/y (average on first decade)

(iv) MRV System for GHG Reduction

The project activity (business) will be collecting the targeted waste from various waste dischargers (customers) who decided their waste to be treated and recycled at our AD facility, and they are located within 200-300km range of the highway. Therefore we can say that there are multiple "baselines" depending on combinations of waste source and landfill sites which the targeted wastes currently flow in if the project does not exist.

Moreover, absence of rules and regulations give waste dischargers (customers) more options besides choosing our AD facility and therefore "in and out" of the customers seem to happen frequently. Consideration of MRV system is required to cope with such activities which happen usually in business which is difficult to be reflected in current CDM scheme. The major requirement for this MRV system is to show the conservative GHG baseline emission (=Project GHG reduction amount) within above mentioned business circumstances.

In present idea, the baseline emission will be the amount calculated by FOD model developed as "Tools" in landfill related CDM projects. This is because AD facility surely has higher decomposition rate than landfill site given its suitable condition for decomposition. And following confirmation using default numbers and actual bio-gas measurement will be conducted to be sure that the baseline emission calculated by FOD model is conservative side:

Suitable waste type for AD technology can be categorized by waste source (Kitchen backyard waste, leftovers, market waste…). Default numbers can be set up by analyzing samples of each waste source, because the amount of bio-gas generation can be assumed by characteristics of organic contents. The potential CH_4 emissions can be assumed by the combination of default numbers and usual measured figures in order to calculate treatment fee to customers (Weighing discharged waste brought from each waste generator who is categorized by waste source type). Also actual generated amount of CH_4 can be calculated from bio-gas measurement at the AD facility.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

The project provides positive impact on: reduction of waste flowing into landfill, promoting recycling activities through promoting separation activities, reduction of fossil fuel consumption by utilizing unused energy, and prevention of leachate from landfill site.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

- Saving landfill life: volume of food waste transported to landfill will be 1/5 with the project.
- Leachate quality improvement effect: over 99% of COD will be treated through AD and waste water treatment procedure.

(vii) Contribution to Sustainable Development in Host Country

The project contributes to the effective use of unused food waste, which can also substitute the consumption of fossil fuel of the national electricity grid, meets to Malaysian renewable energy policy, produce employment and raise the awareness on environmental protection to the citizen through environmental education program.

(3) Toward Implementation/ Future prospects and issues

- Treatment fee collection policy/rule development supported by government
- Feasible MRV development
- Localization of AD technology and its cost minimization

New Mechanism Feasibility Study for Development of Castor Seed Industry Cluster in Sri Lanka

By PEAR Carbon Offset Initiative, Ltd.

(1) Description of Project / Activity

The project aims to cultivate castors in 13,000ha farmland in the northern part of Eastern State and Northern State, to produce 37,000t/y of biomass pellets.

Case 1 partially replaces coal by mixed-combustion with biomass pellets at Puttalam coal-fired power plant or Sampur coal-fired power plant now being under construction near Trincomalee (replacement of coal). Case 2 constructs a new biomass power plant adjacent to a caster seed oil mill, to supply clean electricity to the local grid (power source replacement with biomass fuels in the grid).

Castor Seeds Cultivation

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

The reference scenario for Case 1 is "business-as-usual", that is "the continuation of current practice", where electricity is generated from coal only. The reference scenario for Case 2 is power supply from the existing grid.

The project boundary is "biomass-derived electricity replacing fossil fuel-derived electricity". Therefore, the boundary covers only the electricity generation from biomass for Case 1, while it covers the whole plant for Case 2.

(ii) Monitoring Methods and Plan

The limited cover of boundary releases project participants from monitoring of fossil fuel consumptions in the project, minimizing monitoring requirement for emission reduction calculation. As for biomass consumptions (t/y), both cases require the measurement of fuel input using weight scales.

Monitoring of NCV for biomass fuels (TJ/t) and CO_2 emission factor of replaced fossil fuels is only required for Case 1, while that of the replaced power in the grid (MWh/y) and the grid CO_2 emission factor (tCO_2/MWh) is only required for Case 2. The replaced power in the grid in Case 2 is the "net power supply to the grid", calculated as the measured total power generation in the project plant minus the power use for auxiliary equipment.

In addition, Case 1 requires monitoring of vehicle type (t/vehicle), the number and the distance of round trips per year by vehicle type (times/y and km), fuel economy (km/liter), and NCV (TJ/liter) and CO_2 (tCO_2/TJ) emission factor of the vehicle fuel.

(iii) GHG Emissions and Reductions

Case 1: (Coal replacement by biomass)

Reference Emissions: CO_2 emissions from coal to be replaced by biomass fuels.

Leakage Emissions: CO_2 emissions from the use of grid electricity for pellet production and the vehicle fuel for transportation

$ER_y = RE_y - LE_y = 61,585 - (2,347 + 1,684) = 57,554\ tCO_2/y$

Case 2: (Power source replacement by biomass in the grid)

Reference Emissions: CO_2 emissions from the coal-fired power plant to be replaced by a 10MW biomass fired power plant.

$ER_y = RE_y - LE_y = 41,083 - 0 = 41,083\ tCO_2/y$

(iv) MRV System for GHG Reduction

Measurement: Implement the measurement of parameters and data management to calculate emission reductions. The monitoring requirement is simplified compared with that of CDM methodologies for the relevant project.

Reporting: Like PDD and monitoring report for CDM, ex-ante and ex-post reporting is required. The content of ex-ante report is expected to be equivalent to that of CDM-PDDs, which should include the estimates of the parameters and the estimated emission reductions.

Verification: Verification of monitoring report is required. However, it should not be too strict and time and cost consuming like that for CDM.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

The project utilizes wasted castor seed residues as biomass fuels to be combusted in a coal-power plant that is well addressing environmental problems or in a newly constructed power plant fueled 100% by biomass. Therefore, it will not increase, or rather decrease, the emission of soot, NOx, and SOx, contributing to the air quality improvement.

(vi) Financial Planning

Support fund from the Japanese government for climate change mitigation for developing countries provided through BOCM, such as yen loans or overseas loans and investment by JICA, can be utilized for micro-finance for castor cultivation, the construction of the oil mill, and the formation of the coordinating company.

(vii) Introduction of Japanese Technology

Mixed-combustion technology of coal and biomass
Production technology of sebacic acid

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

Case 1: (Coal replacement by biomass)

- SOx emission reduction potential : High Score: 5
- NOx emission reduction potential : High Score: 3
- Soot emission reduction potential : High Score: 3

Case 2: (Power source replacement by biomass in the grid)

- SOx emission reduction potential : High Score: 5
- NOx emission reduction potential : High Score: 3
- Soot emission reduction potential : High Score: 3

(ix) Contribution to Sustainable Development in Host Country

- Provide jobs for internally displaced people belonging to BOP500, increasing their farming income as well as promoting re-settlement;
- Provide brick houses, medical services, child education and electricity;
- Decrease dependence on coal import, enhance energy security of the non coal-producing country, decrease current account deficit, and mitigate air pollution, and
- Contribute to the increase of electrified population.

(3) Toward Implementation / Future prospects and issues

- Making up a BOP business model for castor plantation, in which Green Material entrusts castor cultivation to repatriated refugees as cultivators through the coordination of community based organizations (CBO), and buys all castor seeds produced;
- Generating carbon credits from the utilization of solid biomass fuels under the BOCM scheme and expanding the business of Green Materials with additional income of the credits, and
- Realizing the project by making use of Japanese governmental scheme such as JICA's Yen loan, grant aid and overseas investment under Japanese government programmes for supporting developing countries to mitigate climate change.

New Mechanism Feasibility Study for Development of Mass Rapid Transit (MRT) Network in Bangkok, Thailand

By Japan Weather Association

(1) Description of Project / Activity

Table 1: Contents of Project

Item	Description
Host country	Thailand
Targeted area of the project and activity	Bangkok Metropolitan Area (1 capital and 5 prefectures)
Content of the project and activity and Scale of the facility	MRT Network Development plan in the Bangkok metropolitan area
Technology employing on the project and activity	Railway Technology
Envisioned counterpart and owner of the project and activity	Counterpart: OTP, Ministry of Transport, Thailand Owner: MRTA, SRT and/or BMA which is a candidate of the operator of planned MRT
Brief summary of the project and activity	MRT network development has never been targeted on CDM approach because of problems on boundary setting. Since MRT network development, however, used to create an improvement effect on local traffic conditions and an effect of modal sift according to increment of subway riders, it has already been recognized as the efficient measure to realize emission reduction in developed countries. On this project and activity, MRT network development is expected to help to reduce emission in the targeted area by reduction of amount of fuel consumption according to modal sift from existing road traffic to newly constructed MRT network and improvement of fuel economy according to smoothness traffic flow which is the traffic congestion improvement effect on neighboring area.

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

- Reference scenario: BaU scenario (a MRT project does not exist)
- Project scenario: CM scenario (state which undertook the MRT project in the BaU scenario)

(ii) Monitoring Methods and Plan

Table 2: Monitoring Methods and Plan for 2 approaches

Approach	Monitoring Methods and Plan
Network approach (Traffic demand estimation)	Monitoring items are a PT survey, a traffic count survey, and a traffic speed survey. It is desirable to carry out these surveys within 1 year after start operating. After first survey, it is desirable to carry out them every 7 or 10 years.
ACM0016 improvement	Monitoring items are a questionnaire survey to MRT passengers, a traffic speed survey, a traffic count survey, and electricity consumption by MRT operation. It is desirable to carry out these items except electricity consumption by MRT operation in year 1 and 5 of the crediting period. Electricity consumption data is collected annually. Limiting modal type can simplify a questionnaire survey.

(iii) GHG Emissions and Reductions

[Network approach (Traffic demand estimation)]

Table 3: The annual CO_2 emission reductions by road users (Unit: tCO_2/y)

Item	2020	2030
Reference scenario emissions	18,251,177	25,279,356
Project emissions	12,959,482	17,877,889
Emission reductions	5,291,695	7,401,467

[ACM0016 improvement]

Table 4: Emissions and reductions in Case1 (Basis case) (Unit: tCO_2/y)

Item	Average
Reference scenario emissions	669,792
Project emissions	240,062
Emission reductions	429,730

(iv) MRV System for GHG Reduction

Table 5: MRV System for GHG Reduction

Item	Network approach (Traffic demand estimation)	ACM0016 improvement
Measure	Following monitoring methodology	Following monitoring methodology
Report	It is expected to report before and after the project.	It is expected to report before and after the project.
Verification	It is expected that the result of traffic demand estimation will be verified with a process of traffic demand estimation and monitoring parameters. In order to simplify verification cost, it is expected to carry out verifications with existing the urban transport master plan or PT survey.	It is required to verify a preliminary report such as PDD and monitoring report after operating the project. It is examined in ex-ante verification if the monitoring has been practiced along the methodology based on monitoring report.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

In Thailand, for construction of railroad the ex ante environmental impact assessment is required, in accordance with terms 46 and 47 of the National Environment Conservation Law. The environmental impact assessment for each MRT line which is subjected to concerned project had already carried out, so the environmental integrity is ensured by reflecting the output of the assessment in the project scheme.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

Table 6: Amount of Reduction for Air Pollution from Passenger Car and Bus (Unit: t/y)

Item	2020	2030
NOx	32,161	37,946
CO	129,179	173,288
PM	76	59
HC	56,463	83,436

(vii) Contribution to Sustainable Development in Host Country

Table 7: Social and Economic Benefits which come from MRT Project in Bangkok (Unit: million Baht/y)

Item	2020	2030
Travel time saving	303,568	599,656
Vehicle operating cost reduction	95,296	115,180
Traffic safety	3,799	4,619

(3) Toward Implementation/ Future prospects and issues

In this study, we confirmed that the development of MRT network based on M-MAP is generally proceeding on schedule, by observing the construction progress on a field survey and communicating counterparts in Thailand.

Influences of the regime change in Thailand and the large scale flood in 2011 seem to be limited, so the start time of project will almost follow the start-up year of each line planned in M-MAP.

Unfortunately, we couldn't verify the result of estimated emission reduction calculated by traffic demand estimation approach and simplified ACM0016 approach because of lack of time. So in this chapter, we clarify challenges for the future by considering plans of verifying the result of estimated emission reduction and listing tasks for spreading the MRV method to other countries.

New Mechanism Feasibility Study for Urban Transport Management in Vientiane, Lao PDR

By Katahira&Engineers International

(1) Description of Project / Activity

Host Country:	Lao PDR
Project Area:	Center of Vientiane Capital
Contents of the Project and Activity:	The Master Plan on Comprehensive Urban Transport in Vientiane Capital in Lao PDR
Technologies introduced through the Project and Activity:	Public Transport Development and Traffic Management Plan included in the Master Plan
Possible Counter Parts on the Project:	Ministry of Public Works and Transport Ministry of Natural Resource and Environment, Climate Change Office
Outline of the Project:	The Master Plan on Comprehensive Urban Traffic in Vientiane Capital in Lao PDR

Objective of the Master Plan

The study has formulated the "Master Plan on Comprehensive Urban Transport in Vientiane Capital in Lao PDR" with the assistance of JICA, aimed at "To deal with issues emerging from future traffic congestion", "To formulate the EST tactics".

Contents of the Master Plan

The Master plan consists of three basic plans: 1)Road Network Development Plan, 2)Public Transport Development Plan, 3)Traffic Management Plan. Each plan includes subordinate projects.

The study Area

The study area covers total area of 38,190ha and almost 10% of Vientiane Capital.

Figure1: Study Area

The GHG reduction by the Master Plan

Implementation of the Master Plan projects will reduce GHG emissions by future VKT reductions and ease the traffic congestion on existing roads.

Project Period of the Master Plan

The Master Plan is to be implemented in three terms: Short-term (2008～2013), Mid-term (2014～2018), Long-term (2019～2025).

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

The Study Team set up the Reference Scenario which reflected the past traffic trend and included the Road Network Plan of the Master Plan in the Reference Scenario. As subjects of the boundary, all the area of 2 districts and a part of 4 districts in Vientiane Capital were set up, according to the Master Plan survey.

(ii) Monitoring Methods and Plan

The monitoring includes correction of the Reference emission and the Project emission. The survey of the socio-economic data, the traffic and the emission factors are hoped to be implemented periodically. A part of these surveys includes techniques that the host country does not have. Assistance of donor countries will help the development of the monitoring method, monitoring organization and capacity development.

(iii) GHG Emissions and Reductions

Estimations of GHG Emissions and reductions are shown on below table.

Table 1: Estimation of GHG Emission and Reduction Volume (approximately)

Reference Scenario (2025)	590,000 tCO_2
Project Scenario (2025)	380,000 tCO_2
Reduction volume (2025)	210,000 tCO_2
The amount of the GHG reduction on the project term (2013 to 2025)	1380,000 tCO_2

(iv) MRV System for GHG Reduction

Measurement (M)

The emission of the Reference Scenario and the Project Scenario are quantified by the traffic activities and the emission factors.

The traffic volumes of the Reference Scenario and the Project Scenario are calculated by the traffic demand forecast, and are corrected by the results of the monitoring after the implementation of the project. Traffic survey and review or measure for the emission factors are hoped as the monitoring of the Project emission. The assistance of donor countries is needed for the implementation of monitoring.

Report (R)

It is appropriate that it is reported “before” and “during” implementation of the projects. The work plan (report before implementation) includes following items: outline of the project, setting up the Reference Scenario, Calculation of the GHG emission and reduction, monitoring method and organization. The monitoring report includes the results of the traffic survey, the calculation of the GHG emission and so on.

Verification and Validation (V)

Two processes, which are “before” and “during” implementing the project, are needed for the verification and the validation by independent organization. The pre-process is hoped to be simple one for only confirming the adequacy. The post-process is verification for results of the monitoring, and an objective review by an expert is hoped.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

On formulating the Master Plan, initial environmental had been implemented to evaluate the projects on the environment and examine the mitigation. The procedures of IEA are going to be implemented for the projects such as road construction and widening in respect to environmental and social considerations.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

The implementation of the Master Plan will increase the efficiency of the traffic activities and improve the air quality. The Study Team estimated the reduction volume of NOx with the Master Plan implementing. As the results, implementation of the Project Scenario will reduce NOx emitted from Vientiane transportation approximately 880 ton against the Reference Scenario.

(vii) Contribution to Sustainable Development in Host Country

Lao PDR is going to improve the urban environment arising from the traffic activities under “Environmentally Sustainable Transport”(EST) Strategy. The Master Plan is an upper plan of Lao PDR, and one of the plans which realize EST strategy of Lao PDR. The Master Plan is the comprehensive plan of the urban traffic. And implementation of the Master Plan will improve the economic utilization, air quality and prevent traffic accidents

(3) Toward Implementation / Future prospects and issues

On this study, MRV methodologies for the urban traffic master plan were examined and proposed, based on the results of traffic survey and traffic analysis (traffic demand forecast). Toward implementation, a trial run of MRV methodologies, targeting at expected actual projects, is hoped. The trial run will clarify the issues on the implementation of proposed MRV methodologies.

New Mechanism Feasibility Study for Development of Mass Rapid Transit (MRT) Systems in Jakarta, Indonesia, and Hanoi and Ho Chi Minh, Viet Nam

By Mitsubishi Research Institute, Inc.

(1) Description of Project / Activity

The project will introduce mass rapid transit (MRT) systems in the three cities of Jakarta, Hanoi and Ho Chi Minh City, which have relied on motorbikes, automobiles, and buses for their urban transport. By promoting a modal shift, the project is expected to contribute to the reduction of GHG emissions from existing travel modes.

	Hanoi		Ho Chi Minh City	Jakarta
Project	Hanoi Urban Railway (Line 1)	Hanoi Urban Railway (Line 2)	Ho Chi Minh City Urban Railway (Line 1)	Jakarta Mass Rapid Transport (North-South Line)
Executing Entity	Viet Nam Railways (RPMU)	Hanoi People's Committee Hanoi Metropolitan Rail Transport Project Board (HRB)	Ho Chi Minh City People's Committee Ho Chi Minh City Management Authority for Urban Railways (MAUR)	Special Region of Yogyakarta (PT. MRT JAKARTA established as the executing entity)
Construction Phase	2013-2017 (the second phase completed in 2020)	2013-2017	2012-end of 2016	2013-end of 2016 (the second phase completed in 2018)
Summary	Length: 28 km Total 16 stations	Length: 27.7 km (of which 14.5 km underground) Total 16 stations	Length:19.7 km (of which 2.6 km underground) Total 14 stations	Length: 23.2 km (of which 6 km underground) Total 21 stations

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

BAU is considered as reference scenario for the following reasons: a) Introduction of MRT requires huge amount of initial investment while profitability is generally low; b) as MRT is founded on advanced technology, it is difficult for the host country alone to introduce MRT.

As for the boundary, the three options are considered, as follows: (1)MRT, (2) MRT + access/egress traffic, (3) MRT + access/egress traffic + traffic volume on nearby roads.

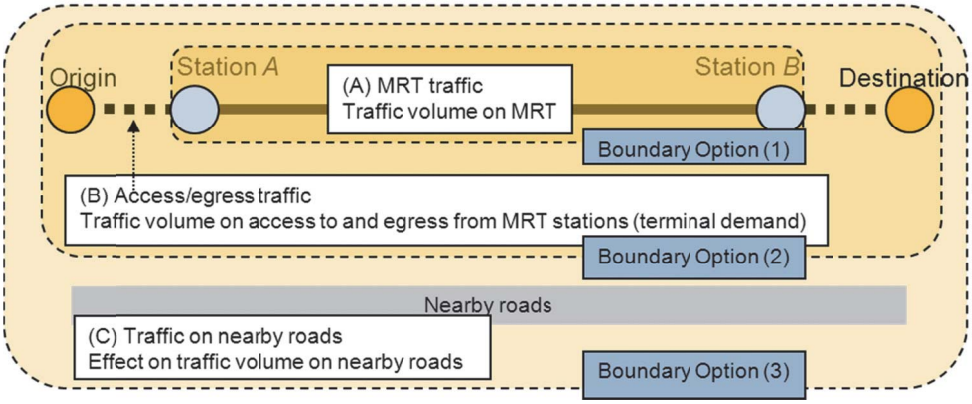


Figure 1: Conceptual Diagram of Boundary Options

(ii) Monitoring Methods and Plan

The key parameters to estimate emissions reduction are traffic volume (PKM) and modal share of reference scenario. As for traffic volume, three options have been proposed: (1) OD table between MRT stations, (2) Passenger survey, (3) Estimation from existing PT surveys. As for modal share, three options have been proposed: (1) Estimation from existing PT surveys, (2) Passenger survey, (3) Traffic volume surveys. The choice of options depends on a ticket system employed in the project and/or the availability of existing surveys.

(iii) GHG Emissions and Reductions

The GHG emissions and reductions for each MRT line in this study are estimated under the conditions of Boundary Option (1).

Table 1: GHG Emissions and Reductions

(Unit: tCO_2/y)	Reference	Project	Reduction
Hanoi Line1	144,138	30,473	113,664
Hanoi Line2	135,016	30,147	104,869
HCMC Line1	135,925	21,440	114,485
Jakarta North-South Line	175,535	59,967	115,569

(iv) MRV System for GHG Reduction

In principle, an MRV system should ideally minimize burden on the host country while simultaneously guaranteeing a required level of reliability.

Measurement: Since the estimation of traffic volume of reference scenario has a major impact on the amount of emissions reduction, the accuracy of estimation should be carefully reviewed whichever option -- (1) OD table between MRT stations, (2) Passenger survey, (3) Estimation from existing PT surveys -- is selected.

Reporting: Periodic reporting may be required by both governments of host country and Japan. Relevant procedures, including a reporting format, should be prepared.

Verification: Pre-project evaluation will, in accordance with the methodology adopted, check the project's eligibility under the BOCM and the validity of the monitoring methods. Post-project evaluation will confirm that monitoring and calculations conform to the approved methodology. Assuming local institution within the host country will conduct verification, Japan would need to provide assistance in terms of capacity building.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

The project's environmental positive impacts would be reduction in air pollutants (NOx, CO, HC, PM). On the other hand, the project's environmental negative impacts are emissions of smoke and noise from the construction works, or vibration arising from MRT operation. Countermeasures have been implemented so that no major concerns exist in implementing the project in terms of environmental integrity.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

The emissions reduction of NOx from each MRT line was calculated by multiplying distance traveled by mode of transport [km] by NOx emission factor by mode of transport [gNOx/km].and estimated to be approx. 503 - 667 tNO_2/year.

(vii) Contribution to Sustainable Development in Host Country

The benefits of introduction of MRT may include reduction in economic loss by reducing the time required for travel, reduction in traffic accidents, reduction in vehicle operating costs by reducing traffic congestion, countermeasures against the increasing traffic demand, and reduction in air pollutants

(3) Toward Implementation / Future prospects and issues

The issues of eminent domain, securing budget, and design risks are common issues faced by this type of project; however, the project has no major problem at this time. As a result of our consideration this year, we believe there are three issues to be addressed, as already mentioned, as we consider the methodology for bilateral credits and as we move towards the Bilateral Offset Credit Mechanism, as follows:

- Development of continued collaboration with entities executing the MRT project (towards Bilateral Offset Credit Mechanism)
- Consideration on the details of the methodology (consideration on the methodology)
- Approach to credit distribution (consideration on the methodology)

New Mechanism Feasibility Study for Renewable Energy Development by Wind Power Generation in Low Wind Speed Conditions in Thailand

By Yonden Engineering Co., Inc.

(1) Description of Project / Activity

The bilateral offset credit mechanism project for which this Study is meant covers the entire wind power generation activities in Thailand. CO_2 emission reduction shall be attained by way of replacing fossil fuel generated electricity through wind power generation. Through this Study the optimal plant plan for this Project shall be implemented and the economic viability of such plant shall be assessed. Model projects in low wind velocity regions & areas throughout Thailand shall be verified and agendas for wind power generation projects in Thailand shall be analyzed. By way of introducing Japanese wind power generation technology, effective frameworks for a new mechanism shall be explored for wind power generation business in Thailand where no project has been implemented within the framework of CDM and wind power generation projects shall be promoted and diffused under a new and effective financing mechanism.

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

➢ Determination of reference scenarios

The reference scenario shall be based on the continuation of the status quo.

➢ Determination of boundary:

・ Geographical boundary:

The boundary shall cover the wind power generation plant facilities throughout Thailand, which are eligible for assistance under the bilateral offset credit mechanism and the electric power systems supplying electricity from wind power plants.

・ Boundary of technologies and capacity of facilities eligible:

The boundary shall cover large size wind turbines of 2-3 MW with a performance power of cut-in wind velocity of less than 3.5m/s.

(ii) Monitoring Methods and Plan

What is going to be monitored in this Project are 2 items, namely the quantity of electricity to be sold by the wind power generation project entity to the grid and the grid emission factor. The methodology for monitoring these parameters shall correspond to CDM methodology ACM0002.

(iii) GHG Emissions and Reductions

Table 1: Emissions reduction potential based on *ex* ante CM emission factor published by TGO

Compared with target value (Capacity to be introduced by 2022)	Electricity generation (GWh) by 2022	Reduction potential (thousand tCO_2)
10% (80MW) : Case A	704	391
30% (240MW) : Case B	2,416	1,342
50% (400MW) : Case C	4,127	2,292
100% (800MW) : Case D	8,405	4,668

(iv) MRV System for GHG Reduction

As regards measurement methodology [M], refer to the Monitoring Methods and Plan. Reporting [R] shall be made by way of producing receipts etc. from power companies. In verifying [V] the net power generation amount, the amount of power sales shall be checked against power generation certificates and invoices. This method is in line with the existing meter reading system in Thailand.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Construction sites must be fully examined and selected to avoid problems of noise, landscape spoiling and bird strikes by carrying out investigation on conditions so f residential areas, spots of scenic beauty and flight routes of migratory birds, etc. around the proposed construction site.

(vi) Financial Planning

When financial institutions are looked for that may provide funds for wind power generation projects, the Revolving Fund or ESCO Fund may be thought of. It would be difficult for wind power generation projects characterized by high initial cost to apply for funding from these Funds because of the low funding ceiling per project and the short repayment period. Funding from private financial institutions means high interest payment and severe terms. BOI tax incentives such as exemption or reduction of corporate tax and import duties have proved to be insufficient so far for the promotion and expansion of wind power generation business. Viewed in this light, financial assistance for funding initial cost is considered to be an effective tool under the new mechanism.

(vii) Co-benefits (i.e. Improvement of Local Environmental Problems)

Table 2: Amounts of reduction of air pollution substances per studied case as the result of introduction of wind power generation under the new mechanism (unit=ton)

Studied case	CO_2	NOx	SOx	Particulate matter
A	318,442	571	19	24
B	1,092,128	1,959	63	82
C	1,865,814	3,347	108	140
D	3,800,028	6,817	220	285

(viii) Contribution to Sustainable Development in Host Country

➢ Funding

It is recommended that funds shall be transferred to DESD (management organ of the ENCON Fund) for the existing ENCON Fund.

➢ Technology

The best use of Low Wind Velocity Oriented Wind Power Generation technology is considered to be the best solution.

➢ Know-how

Right from the Planning stage, supervisors should be dispatched from Japan and local training &education should be organized. Assistance in providing construction know-how and operation & management know-how such as O&M accumulated and stocked in Japan will contribute to the promotion of introduction of wind power generation

(3) Toward Implementation / Future prospects and issues

➢ Issues

- What is required is providing direct financial assistance through the best use of BOCM as well as creating a suitable mechanism that can provide up-front financial assistance.
- Policy measures must be introduced to provide direct assistance for wind power generation.
- In the event that BOCM credits have market floatability as CDM-CER, the economic viability of projects become unclear due to price fluctuations

➢ Proposed policy measures

- A mechanism shall be created to enable direct financial assistance, especially up-front financial assistance to be provided.
- It is proposed that a Fund should be created within ESCO Fund or within Revolving Fund to enable direct assistance for wind power generation projects.
- Credits should be traded at a fixed price to ensure clear revenue & profitability perspectives.

New Mechanism Feasibility Study for Development of Best Grid Electricity Mix Focusing on Renewable Energy Sources in Sri Lanka

By EX Research Institute Ltd.

(1) Description of Project / Activity

This project activity aims at promoting the introduction of renewable energies and realization of the best grid mix based on load equalization and also greenhouse gases (GHG) emission reduction under the bilateral mechanism. Concerning the introduction and promotion of renewable energy, grid optimization technology will be introduced in order to accelerate and promote the introduction of renewable power derived from biomass, wind power, solar power and hydropower, etc. as well as the introduction and utilization of renewable energy technology being vigorously promoted by the Democratic Socialist Republic of Sri Lanka (Sri Lanka). Furthermore, technologies will be introduced concerning the load equalization of pumped-storage power generation and secondary batteries, etc. as storage equipment for limiting power losses at off-peak times and supplementing power supply at peak times. Also, this study discussed possible Nationally Appropriate Mitigation Actions (NAMAs) for the power sector in Sri Lanka and assumed technical and financial support to be provided with a view to achieving them and thereby acquiring emission reductions as NAMA credits.

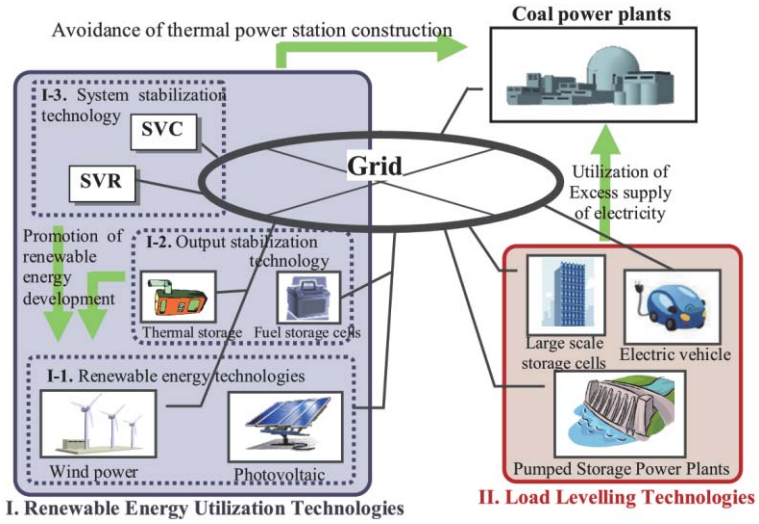


Figure 1: Diagram of the Proposed Project Activities

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Reference scenario is identified based on the "Long-term Generation Expansion Plan" which is basically annually updated. However, for the power generation plans that are clearly mentioned to be implemented utilizing carbon mechanism such as CDM or BOCM are excluded from reference scenario.

(ii) Monitoring Methods and Plan

<Renewable energy utilization technologies>	
Reference emissions	・ Amount of electricity supplied to the national grid (MWh/y)
Project emissions	・ Amount of fossil fuel or electricity used by the project activities (t/y or MWh/y)
Leakage emissions	-
<Renewable energy utilization technologies>	
Reference emissions	・ Amount of electricity supplied to the national grid (MWh/y)
Project emissions	・ Amount of electricity used by applied load leveling technology (MWh/y) ・ Amount of electricity generated by the renewable energy generation units that are operated as a set of load leveling technology (MWh/y) ・ Efficiency of applied load leveling technology (%) ・ Amount of fossil fuel used by the project activities (t/y)
Leakage emissions	Where pump-up storage power plants are installed at existing hydro power sites, the amount of electricity which would have been generated by these plants need to be counted as leakage emissions sources (MWh/y)

(iii) GHG Emissions and Reductions

Expected GHG emission reduction amount by project activities are as follows:

Item	Unit	Hydro	Wind	Biomass	Solar	Load Levelling	Remarks
a)Introduction target by proposed NAMA by 2020	MW	500	750	150	50	1,000	
b) Emission reduction per MW	ktCO2/y	3.5	2.7	6.0	1.3	1.5	f)/a)
c) Reference emissions	ktCO2/y	1,742	1,991	995	66	1,452	a)*b)*c)*d)
d) Project emissions	ktCO2/y	0	0	100	0	0	Biomass (assumption) Reference emissions * 10%
e) Leakage emissions	ktCO2/y	0	0	0	0	0	
f) Emission Reduction	ktCO2/y	1,742	1,991	995	66	1,452	c)-d)-e)
Total	ktCO2/y					6,147	

(iv) MRV System for GHG Reduction

For renewable energy utilization technologies & load leveling technologies with facilities at generation side: Modified CDM AMS-I.D.
For load leveling with facilities at grid side (PSPP etc): A new MRV was developed.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

<Beneficial impacts>

- Mitigation of air pollutants emissions due to reduction of fossil fuel consumption

<Security measures for potential negative impacts>

Potential negative impacts need to be averted by security measures such as, implementation of EIA and using biomass assessment guideline which was developed under this FS to avoid competition with existing land and biomass resource uses.

(vi) Financial Planning

As fundraising sources, in addition to conventional yen loans based on the framework of the BOCM, it is envisaged that grant and loan funding mechanisms associate with climate change countermeasures will be utilized.

(vii) Introduction of Japanese Technology

Technology introduction sheet of Japanese technologies, which may be applicable as project activities under the proposed BOCM, was developed under this FS. Also 12 Sri Lankan policy makers and engineers in power sector attended technical assessment tour to Japan to visit some sites where those potential technologies were applied.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

Replacement of the grid electricity by renewable energy sources will have co-benefits by mitigation of SOx and NOx emissions due to reduction of fossil fuel combustions and GHG emission reductions.

(ix) Contribution to Sustainable Development in Host Country

1) Contribution to reliable electricity supply (electricity supply will become more stable by load leveling technologies)
2) The following contribution through promotion of renewable energy:
   - Energy security enhancement by increasing the proportion of indigenous energy sources
   - Reduction of outflow of foreign currency due to reduction of imported fossil fuel
   - Economy vitalization and job creation
3) Income generation of rural farmers by promotion of biomass cultivation
4) Mitigation of air pollutants emission reduction due to reduction of fossil fuel combustion

(3) Toward Implementation / Future prospects and issues

More detail feasibility study and further communication between Sri Lankan project developers and Japanese technology providers will be required for project implementation.

New Mechanism Feasibility Study for Renewable Energy Development Focusing on Geothermal Power Generation in Colombia

By Mitsubishi Research Institute, Inc.

(1) Description of Project / Activity

This project is Colombia's first geothermal power project, and is planned for the Nevado del Ruiz area. The facility scale is 50 MW capacity. Hydropower makes up the majority of the country's energy mix; during El Nino periods, owing to droughts, there is a risk of the electricity supply becoming unstable. Introduction of geothermal, with its stable supply even in El Nino periods and limited GHG emissions, is expected. Japanese manufactures have a competitive advantage in the geothermal market.

Viewing the project electricity generation as otherwise coming from the grid, the emission reduction amount is calculated.

☐ **Host Country**: Colombia
☐ **Region**: the area near Nevado del Ruiz, an active volcano on the outskirts of Manizales city
☐ **Facility scale**: geothermal power plant (50 MW capacity)
☐ **Technology**: Flash cycle type (planned)
☐ **Counterpart & owner**: ISAGEN S.A.E.S.P. (public corporation; 57.66% of stock owned by govt)
☐ **Project Summary**: Colombia's first geothermal power project. Hydropower makes up the majority of the country's energy mix; during El Nino periods, owing to droughts, there is a risk of the electricity supply becoming unstable. Introduction of geothermal, with its stable supply even in El Nino periods and limited GHG emissions, is expected.
☐ **Emission reduction method**: Viewing the project electricity generation as otherwise coming from the grid, the emission reduction amount is calculated.

Figure 1: Project Summary

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

In concrete terms, in the case of a country with an insufficient electric power supply (even allowing for latent demand), where the nation-wide capacity of hydropower - which is affected by weather - is greater than or equal to 50% of total capacity of all power sources, then it was proposed that a method be established with reference to the "Tool to calculate the emission factor for an electricity system" where individual power station data exists, and with reference to the "Guidelines for the establishment of sector specific standardized baseline" whereby such data does not exist.

Energy sources seen as contributing to the stabilization of the power supply in Colombia are natural gas and diesel (off-grid) in the short term and coal in the intermediate term. These energy sources are assessed with the same quality levels as the project in order to find out the extent to which they would fulfill the minimum service level.

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system or grid that the project power plant is connected to. In addition, it includes any off-grid plants that are replaced by the project as per the established reference scenario.

(ii) Monitoring Methods and Plan

Monitoring of the quantity of electrical power generation and steam are carried out under normal operating conditions. Non-condensable gases (CO_2 and CO_4) contained in the produced steam are considered using established default values for CO_2 and CO_4, in order to decrease the added burden on operators. However, as a consequence, it is exceedingly difficult to set an applicable default value that would be uniformly employable across all projects because of a great deal of variation in the mass fraction in steam. Among monitoring methods, the ASTM standard is used as if it were the de facto standard of a sampling method. However, it requires more work than the method applied in Japan. Thus, it is preferable for the BOCM to choose methods which do not impose additional burdens on operators and to establish its own standard of monitoring. Since any monitoring method requires sufficient experience and know-how, capacity building in cooperation with Japanese companies is important for a developing country where geothermal power is newly introduced.

(iii) GHG Emissions and Reductions

231,625 tCO_2

(iv) MRV System for GHG Reduction

The execution of MRV is relatively simple for projects in the electricity sector. That is because data that is used for the calculation of emissions reductions can be measured within the power plant and because standard operating procedures commonly require the plant to measure, report and verify parameters - for instance the quantity of electricity produced. Furthermore, it is because the methods used for measurement adhere to what are, to all intents and purposes, globally-established standards. With regard to grid emissions factors, the optimum situation is one in which the project proponent is able to tangibly utilize actual emissions factors calculated and released by the government which itself collects data from the individual power plants. Looking toward the future, it is hoped that with the necessary support from Japan, third parties in developing countries will not only be able to implement Measurement and Reporting, but also carry out the required Verification step in the MRV process.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

As harmful effects that accompany geothermal development from an environmental standpoint, the following among others are cited: noise pollution, ground subsidence, residual heat effects, release of airborne pollutants. A license has already been acquired for test well drilling. This appears to be progressing while making reference to the mining development division’s environmental impact assessment; it is surmised that in reality project development is taking place simultaneous with the government’s legal preparations.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

It is expected that the introduction of a geothermal plant could serve to reduce air pollutants. Due to the lack of available data, calculating co-benefits are based only on SOx. Quantified co-benefits are 8,940 t/y.

(vii) Contribution to Sustainable Development in Host Country

The project would contribute to the country’s sustainable development by stabilizing electricity supply, and assisting with climate change countermeasures and capacity building for geothermal resource development.

(3) Toward Implementation / Future prospects and issues

Finance: At this time the Phase 2 technical evaluation has ended, and the selection of winzes in the test well drilling of Phase 3 is ongoing. Regarding construction financing, at this time lenders are being considered. It is expected that JBIC will also be a possibility.

Technology: There is a good chance that Japanese technology will be introduced as it is a global market leader in delivering geothermal energy solutions.

New Mechanism Feasibility Study for Energy Saving by Reducing Water Consumptions through Diffusion of Water-Saving Toilet Systems to Households in Dalian, China

By Mitsubishi UFJ Morgan Stanley Co., Ltd.

(1) Description of Project / Activity

As water scarcity have become commonplace worldwide, global efforts for its conservation are activating. Introduction of water-efficient toilets leads to a reduction of electricity and fuel consumption for the operation of water/wastewater systems, and thus contributes to the reduction of GHG emissions. In this study, the city of Dalian, China, is selected as a case study target and the water-saving effects of introducing super-water-efficient toilets in general households are discussed. The super-water-efficient toilets considered in this study are newly developed by TOTO, a world's leading toilet manufacturer based in Japan, and have a design flush volume of 3.8 liters for large and 3 liters for small flush.

Figure 1: Liaoning Province and the City of Dalian

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Reference scenario is set at 5 liters for large flush and 3.5 liters for small flush. The reference scenario was set more conservatively for this study at the recommended water volumes for toilet flush (i.e. 5 liters for large flush and 3.5 liters for small flush) which was newly stipulated by the government of China in 2010.

(ii) Monitoring Methods and Plan

Number of installed super-water-efficient toilets is the only parameter requires monitoring. Actual usage of installed super-water-efficient toilet will be monitored using random sampling procedures.

(iii) GHG Emissions and Reductions

The annual reductions in GHG emissions are calculated as follows.

$$ER_y = WS_y \times EF_{water,y} \times N_y$$

ER_y	Annually reduced emissions (tCO_2)
WS_y	Annually saved water volume (L /toilet)
EF_y	Emission factor associated with water (tCO_2/L)
N_y	Number of installed toilets

Based on the anticipated annually saved water volume and the emission factor associated with water for Dalian derived from this study, GHG emissions reductions expected to be achieved by implementation of super-water-efficient toilet in Dalian are calculated as follows:

Table 1: Anticipated GHG Emissions Reductions

Reduction per super-water-efficient toilet	7.71 $kgCO_2/y$
Total reduction potential in Dalian[1]	15,622 tCO_2/y

[1] Calculated assuming population of 5,864,000 people

(iv) MRV System for GHG Reduction

Measurement (M)

Measurement for this GHG reduction activity requires monitoring of the number of installed super-water-efficient toilets. A default value based on physiological model will be applied for the number of flush per person. Actual usage of installed super-water-efficient toilet will be monitored using random sampling procedures.

Reporting (R)

Reporting will be conducted in two stages: a project plan document showing the plan of the project before implementation, and a project completion report detailing results of monitoring (measurement) and estimation of GHG emission reductions.

Verification (V)

Verification will be conducted in two stages. For verification before project implementation, the validity of the selected information documented in the project plan document shall be confirmed. The assesment should be kept simple to avoid unnecesary burden to the activity proponent. For verification after project implementaion, validity of the content in the project completion report will be evaluated. A general guidelines and rules for verification may be desired to be established for BOCM, and it is suggested that certain degree of discretion is granted to the verifying entity in order to speed up the assessment process. Approaches adopted by Joint Implementation (JI) and/or ISO certification procss may serve as examples.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

North Eastern region of China including Liaoyang (Dalian) are now facing serious water shortage. Introduction of super-water-efficient toilets will contribute not only to GHG emission reductions, but also to water resource conservation, as well as to energy efficiency improvement due to the reduced load to water/wastewater related facilities in the region.

(vi) Financial Planning

While no solid financial planning is decided, to promote diffusion of super-water-efficient toilet, it is necessary to reduce the initial cost difference between the super-water-efficient toilet and the conventional toilet.

(vii) Introduction of Japanese Technology

Flush performance/power and water consumption are the major toilet evaluation criteria. Japanese toilet manufacturers, including TOTO, produce the most advanced water-efficient toilets and have been recognized worldwide for its excellence of flush performance.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

The project will lead to water resource conservation by introducing super-water-efficient toilet in private households. The project also will lead to energy conservation by achieving reduced load to water supply/wastewater related facilities. Establishment of applicable co-benefit evaluation criteria, such as “preservation of natural resources” and “water supply/hygiene”, is currently underway.

(ix) Contribution to Sustainable Development in Host Country

By diffusing the super-water-efficient toilets and reducing the water demand, the Project allows improvement of water use efficiency in China. Operation of wastewater treatment facilities in Dalian are reaching to the designed treatment capacity and have only little margin to spare. By diffusing the super-water-efficient toilets, discharge from toilets may be reduced and alleviate the burden on the sewage infrastructure. As a result, the project contributes to sustainable development in China.

(3) Toward Implementation/ Future prospects and issues

In this study, GHG emission reduction achieved by water-saving was illustrated through the case study in Dalian for water-saving toilet distribution. As for the future prospect of the study, it is expected that the scope of the study is extended to include other water-saving equipment, such as water-saving shower-heads, and to include various geographical area with GHG emissions reduction potential.

New Mechanism Feasibility Study for Energy Efficiency Improvement by Introducing Energy Management and Control Systems at Factories in Shaanxi Province, China

By YASKAWA Electric Corporation

(1) Description of Project / Activity

This project assumes the implementation of efforts to reduce GHG emissions through the introduction of an Energy Management and Control System (EMCS). The project sites are an iron and steel manufacturing company and a nonferrous metals company. Both companies are included in the "1,000 companies with particularly high energy utilization in national level" and listed as target sites of the "Energy Visualization" model project designated by the National Development and Reform Commission and the Ministry of Industry and Information Technology for FY 2011. With the introduction of EMCS, load-following becomes feasible for the electricity consumption of the targeted facilities, while standby electricity requirements are also reduced, resulting in an anticipated electricity savings for each factory of about 10%.

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Referring to data from the National Development and Reform Commission, the reference scenario applicable to projects and activities is that China will improve its energy efficiency by 1% every three years over the 45-year period stretching from 2005 to 2050. Based on the reference scenario, the BaU scenario is set as follows: "With regards to plants that power and operate infrastructure facilities by means of inputs of electricity, the efficiency standards/status of all applicable facilities involves the continued use of the existing applicable facilities without the introduction of EMCS."
Project/ Activity Boundary consist of infrastructure facilities powered by electricity.

(ii) Monitoring Methods and Plan

It is important to carry out monitoring for electricity consumption of facilities and production volume (prior to and after EMSC introduction), operations hours, and carbon emissions factors of electricity. Relevant data of the electricity consumption of infrastructure facilities and production volume prior to EMCS introduction are to be collected in existing data or calculated as theoretical value. Relevant data of the electricity consumption of infrastructure facilities and production volume after EMCS introduction are to be collected by power meter in EMCS.

(iii) GHG Emissions and Reductions

GHG Emissions and Reductions in this project are as follows:

<iron and steel company >

Baseline power consumption calculation formula	y = 0.053x + 136.256 x: Crude steel production (1000t) y: targeted power consumption (1000MWh)
Project-crude steel production	6,016.623*1000t
Baseline- power consumption	455.137*1000MWh
Baseline-GHG emission	466,333t (Grid coefficient: 1.0246)
Project-power consumption	376.850*1000MWh
Project-GHG emission	386,120t (Grid coefficient: 1.0246)
GHG reduction	80,213t

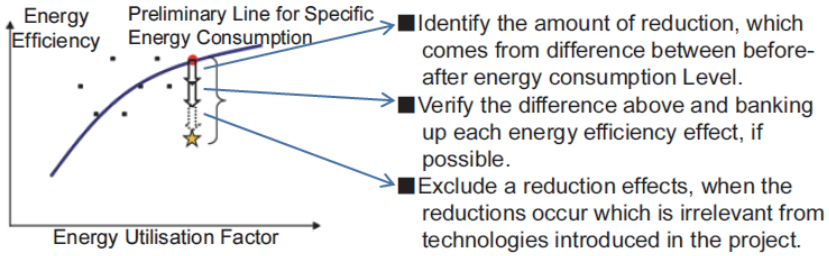
<nonferrous metals company>

Baseline power consumption calculation formula	y = 143.5x + 12,177 x: raw materials input (1000t) y: targeted power consumption (MWh)
Project-raw materials input	241.8t
Baseline- power consumption	46,875MWh
Baseline-GHG emission	48,028t (Grid coefficient: 1.0246)
Project-power consumption	37,437MWh
Project-GHG emission	38,357t (Grid coefficient: 1.0246)
GHG reduction	9,671t

(iv) MRV System for GHG Reduction

MRV is created based on efficiency differences before and after the introduction of the project. Efficiency is taken to be the removal of the amount of power consumed in the applicable category from the applicable factory's production volume. At the project site, the production volume of the ironworks is measured in terms of annual production of crude steel, and the production volume of the chemical fertilizer plant is the total weight of all manufactured product. The reduced emissions volumes that are sought based on improved efficiencies after the introduction of the project are indicated in the diagram below.

<Reduced emissions volumes called for by the project>



(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

It is understood that the social impacts (such as labor and employment) and economic impacts (rise in production and intensification of global economic competition) are factors that will influence popularization in the future. The project is not anticipated to bring about any specific negative environmental impacts, but the operation patterns for plant facilities will change with the introduction of controls, and that could conceivably generate noise and vibration.

(vi) Introduction of Japanese Technology

Control equipment and measuring instruments are Japanese technologies central to this project. Retaining quality in local energy conservation projects and strategic system solutions are important to maintaining and popularizing the competitiveness of these technologies in energy conservation.

(vii) Co-benefits (i.e. Improvement of Local Environmental Problems)

In regard to the effects the implementation of this project will have on anti-pollution measures, in China the reduction of SOx and NOx emissions by curbing coal-derived thermal power generation is a serious issue, and a decrease in these types of air pollutant emissions through conservation of electricity appears promising.

(viii) Contribution to Sustainable Development in Host Country

Through the introduction of control technologies and by switching from batch processing to a continuous automatic control process, it makes possible to contribute to the cultivation of comprehensive sustainable manufacturing that includes energy and resources. This kind of resource efficiency is a crucial policy pillar in China. Future studies will analyze the working environment and employment, and the position and efficiency of the global market for this country and industry, which are thought to be factors impacting their popularization.

(3) Toward Implementation / Future prospects and issues

Since the primary implementation bodies in this system will maintain technological standards and ensure the spread of Japanese technologies, Japanese corporations must be established as the core SI control, and the affiliated control equipment manufacturers and measuring instrument manufacturers. On the other hand, since IT vendors and construction vendors make up the principal expenditure element for labor costs, Japanese vendors are not plausible since they lack economic competitiveness. The cooperation of local resources should be secured.

New Mechanism Feasibility Study for Multiple Application of Energy Efficiency Improvement Measures at Coal Thermal Power Plants in Mongolia

By Suuri-Keikaku Co., Ltd.

(1) Description of Project / Activity

With introduction of the Japanese low carbon technologies in a comprehensive and composite manner to the combined heat and power coal-fired thermal power plants (CHPs), operated in the central power system in Mongolia, the coal-derived CO_2 emissions will be reduced as well as other air pollutants, and be aware of the co-benefits of measures against global warming and air pollution.

The project introduces the introduction of energy-saving technology, such as highly efficient turbines and combustion systems in the facility aspect, and adopts of the equipment management technology in the operational aspect. These activities will increase the energy efficiency of the CHPs while reducing the coal consumption, and contributing to the CO_2 emission reductions.

Figure 1: Thermal Power Plant in Mongolia

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

The reference scenario (“Reference”) can be classified into “introduction of technology to CHP” and “operation method of CHP” by having implemented the on-site interviews for CHP. The “Reference” of “introduction of technology” assumes that “the different (low level) new technology will be introduced”. The “Reference” of “operation method of CHP” assumes “(1) Continuation of current practice (before the operation start of CHP No.5, which will be the largest capacity in Mongolia)” and “(2) Introduction of new operation methods (after the operation start of CHP No.5)”. Additionally, the physical boundary of this project/activity is “within a power plant”.

(ii) Monitoring Methods and Plan

Regarding monitoring methods and plan, the existing monitoring items of each CHP are fully utilized, and there are no introduction of new monitoring equipment and no additional monitoring items. Monitoring items can be classified into the direct monitoring items and indirect monitoring items which are calculated from monitoring data and various parameters. The items like “coal consumption due to electricity supply to the grid and to heat distribution”, etc. should be recorded monthly. Other items should be recorded daily, since these items are continuously monitored.

(iii) GHG Emissions and Reductions

The summations of GHG Emissions and Reductions from 2014 to 2023 are as Table 1;

Table 1: GHG Emission and Reductions

	Emissions of Project	Emissions of “Reference”	Emission Reductions
Total	About 58 million tCO_2	About 61 million tCO_2	About 3 million tCO_2

(iv) MRV System for GHG Reduction

Each CHP in Mongolia has very complex processes. Therefore, the MRV system was established by fully utilizing the current operational processes of CHP, as follows.

Regarding Measurement (M), in order to implement monitoring plan steadily in accordance with projects/activities, persons and organizations related to the monitoring activities are identified, and

their roles and responsibilities are clarified. In addition, the monitoring organizations, which could certainly acquire GHG emission reduction credits, are proposed. For Reporting (R), in order to secure GHG emission reduction credits, the procedure and items for checking the records of monitoring data are proposed. Records of monitoring data are implemented now for the operation of CHP. However, since the data is usually kept for only short-term, the new systems for long-term data storage are proposed. For Verification (V), the rules in CHP corresponding to verification are proposed. Making the organization which can respond to the verification process including the establishment of the internal audit team is proposed.
In this FS survey, the scheme of expert judgment was implemented. The experts know the local conditions and the related industry in detail. As a result, the experts judged that these were reasonable. In addition, there are issues on the expert requirements. These issues are that the expert committee, which consists of several experts, should be established; and so on.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

This project/activity will have favorable impacts including reduction of the local impact of air pollution caused by use of coal by improving the efficiency of the CHP. Adverse impacts to the environment upon the operation are not specified at the present moment. The impact caused by the construction work for refurbishment of equipment, including noise to the surrounding environment, will be minimal since it is carried out within the plant site.

(vi) Financial Planning

The results of a trial calculation of the initial investment and operation cost and income that are required for the implementation of the projects/activities were estimated by assuming 1 USD = 80 JPY (Japanese Yen). The business, may be able to stand alone if the exchange rates are at the level such that 1USD = 100 JPY and the emission credit 20 USD/tCO_2, or 1 USD = 120 JPY and the emission credit of 10 USD/tCO_2.

(vii) Introduction of Japanese Technology

It is desirable to enhance the competitive advantage of Japanese industrial firms by establishing the criteria such as the cost effective menu, the menu with a higher CO_2 emission reduction effect and the menu with the Japanese technologies that meet the needs of Mongolia. Also, package multiple measures by including the implementation of the measures with hardware as well as the software support that is required for the operation of the hardware, and introducing the technologies in Mongolia by utilizing the STEP (Special Terms for Economic Partnership; Japanese ODA).

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

The reduction effect of air pollutants is estimated for not only emission reductions but also reductions of the ambient air concentration. In addition, the monetary value of the benefits of improved health effect was estimated and project potential was estimated by using both this monetary value and GHG emission reduction credit.

(ix) Contribution to Sustainable Development in Host Country

In Mongolia, the criteria of “sustainable development” are classified as “impact on environment”, “impact on society” and “impact on economy and technology”. The comments on former “impact on environment” and “impact on society” have been explained in (v) and (viii). The components of the criteria on “impact on economy and technology” are “efficient resource utilization”, “transfer of technology and expert knowledge” and “creation of infrastructure”. The implementation of this project/activity is assumed to contribute to these criteria.

(3) Toward Implementation / Future prospects and issues

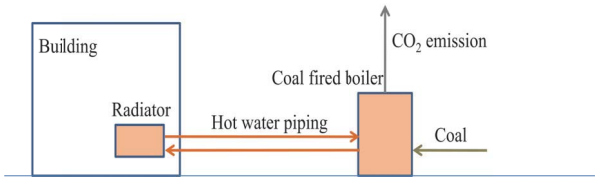
The JICA “Study on the Fourth Thermal Power Plant Rehabilitation Project in Ulaanbaatar, Mongolia” is carried out from March 2012 to June 2012. Additionally, there will be some renovation plans in CHPs by other countries’ donors. The estimation method of GHG emission reduction by this FS can be used for evaluations in these projects.

New Mechanism Feasibility Study for Energy Saving at Buildings by Utilising Geothermal Heat Pump and Other Technologies in Mongolia

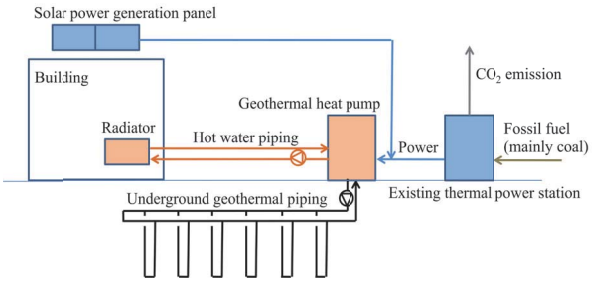
By Shimizu Corporation

(1) Description of Project / Activity

This project aims at energy saving at public buildings of local cities in Mongolia. To be specific, introduction of geothermal heat pump is envisaged (as option 1). In addition to option 1, for the purpose of offsetting emissions from electric power consumed by the heat pump, introduction of solar power generation plant is also envisaged (as option 2).



Before project



After Project (Option 2)

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Reference scenario is determined through scenario analysis. To be specific, the reference scenario is continuing usage of present low efficient (efficiency is 40%) coal fired boilers. Project boundary includes emissions from each public building and emissions from thermal power plants of the grid. No leakage is envisaged.

(ii) Monitoring Methods and Plan

There will be so many project sites that it is necessary to simplify monitoring plan. 4 monitoring plans, including one that is as strict as that for CDM and other simplified three plans, are proposed. Simplified ones can dramatically reduce time and effort of monitoring by applying degree-day theory.

(iii) GHG Emissions and Reductions

If this project is applied to all the local public buildings in Mongolia, emissions of 113,000 tCO_2/y can be reduced in case of option 1, and emissions of 242,000 tCO_2/y can be reduced in case of option 2.

(iv) MRV System for GHG Reduction

Internationally standardized ISO is the most appropriate MRV system to be applied to BOCM. To be specific, PDD that describes reference scenario, monitoring plan, and calculation formula for emission reduction shall be validated by an auditor and the project shall be registered. After implementing the project, monitoring shall be conducted based on the PDD, monitoring report shall be verified by an auditor, and then credits will be issued. An independent entity organized by Mongolia and Japan will register projects and issue credits. The independent entity will approve methodologies, provide a positive list, provide a validation/verification protocol in collaboration with auditors, and be responsible for preventing issuing credit that results in double counting.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Noise, vibration, leakage of refrigerant, and leakage of antifreeze liquids are envisaged as negative environmental impacts. Those impacts can be minimized when planning a project.

(vi) Financial Planning

Even in case of option 2, payback period for the initial investment cost will be over one hundred years according to the analysis based on the current economic situation. Therefore, it is difficult to finance this project by commercial loan. This is because coal price in Mongolia is very low compared with international price. This means that virtual subsidy is granted in energy sector. Therefore subsidization by the Government of Mongolia is crucial for implementation of this project. Soft loan such as Yen Loan financed by JICA and Asian Clean Energy Fund financed by ADB will be available as the finance source of this project.

(vii)Introduction of Japanese Technology

Japanese technologies such as heat pump, solar power panel, and power conditioner for grid connection are likely to be introduced. In particular, a Japanese affiliated company named Sankou Solar Mongolia has a factory that produces solar power modules, which is expected to contribute to this project.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

Emission reduction of air pollutants is envisaged as a co-benefit effect of this project. Based on emission factor published by World Bank, emission reduction of PM2.5, PM10, SO_2 is quantified.

(ix) Contribution to Sustainable Development in Host Country

It is stipulated to gradually implement goal in increasing percentage share of renewable energy production and reach 3-5 percent share in the national energy by the year 2010, 20-25 percent share by 2020 in National Renewable Energy Program. Also it is stipulated to exploit solar, geothermal energies in heating of houses and hot water supply in National Action Program on Climate Change. This Project will contribute to achieve the above mentioned goal and implement the program.

(3) Toward Implementation/ Future prospects and issues

Towards implementation of this project, the simplified monitoring methodologies should be tested at real pilot project's sites. Shimizu is planning to test it and would like to prove that the methodologies can work practically.

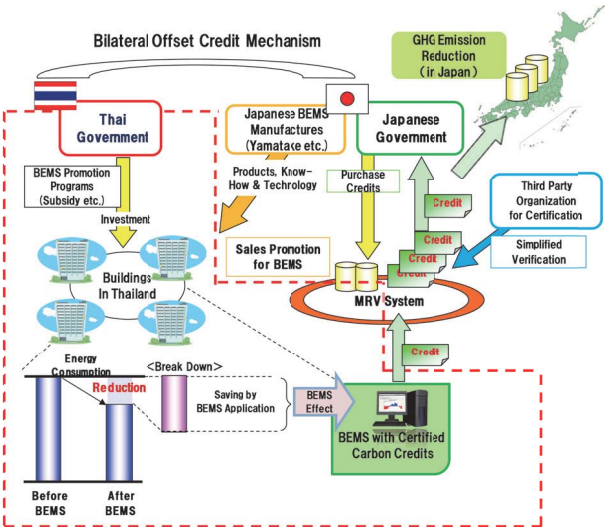
New Mechanism Feasibility Study for Promotion of Energy Efficiency Improvement through Institutional Development of Building and Energy Management Systems (BEMS) with Certificated Carbon Credits in Thailand

By Azbil Corporation

(1) Description of Project / Activity

Important points to reduce energy of the buildings will be to manage facilities more efficiently according to visualization and analysis of the energy use and facility's operation. BEMS, “Building and Energy Management System”, brings us to the optimum control and operation for buildings to reduce energy. In Japan, introduction of BEMS has been promoted, resulting in accumulation of much energy saving, operation technologies and know-how due to visualization of energy consumption.

In this study, we investigated about transfer of energy saving technologies / know-how based on BEMS introduction to buildings of commercial sector in Thailand, the energy saving level by improving efficiency of operating systems by active use of the BEMS, and the MRV approach for quantification of CO_2 emission reduction.

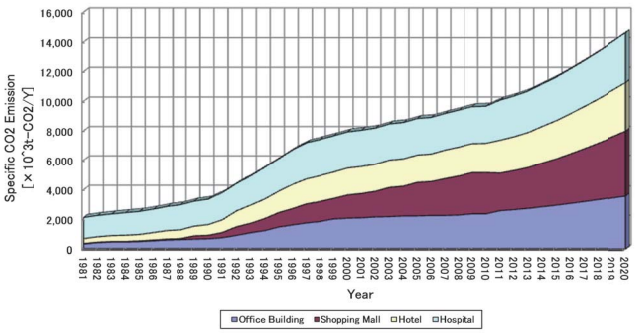


(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Reference scenario is shown based on the estimated trends of emitted CO_2 by energy consumption of the buildings, supposing that BEMS have not been introduced in the commercial sector buildings in Thailand (office buildings, commercial facilities, hotels, and hospitals) and the energy-saving control and operation of facilities have not been conducted.

The boundary is the entire building. By focusing on energy consumption in the entire building, large emission reductions are attained including not only automatic control by BEMS but also energy-saving amount obtained by operation improvement.



land

(ii) Monitoring Methods and Plan

The monitoring approach uses all the consumption of electric power, fuel and heat in the building, which will be measured on the basis of invoices issued from the electricity and fuel suppliers. With regard to the monitoring system, consumption data are monitored at least every six months in the internal verification process.

(iii) GHG Emissions and Reductions

As the estimated impact of CO_2 reduction by promoting BEMS in Thailand, the average reduction rate of 12 buildings to which we had done the field survey was 15.9%. Therefore, two scenarios were considered for estimation of CO_2 emission reduction.

Table 1: CO_2 Emission Reduction by introducing BEMS in Thailand

Controlled Bldg.s all over Thailand (～ 2010)		Office	Shopping Mall	Hotel	Hospital	Total
Total Floor Area [x 1,000m2]	①Presumed number of Bldg.s [2,000 Bldg.s]	23,245	16,694	16,983	15,542	72,464
Specific CO2 Emission [kg-CO2/Y･m2]	②Average of Specific CO2 Emission in Bangkok area	101	168	117	162	
CO2 Emission [k t-CO2/Y]	③＝①×②	2,348	2,805	1,987	2,518	9,657
Impact of CO2 Emission Reduction [k t-CO2/Y]	Scenario 1(④＝③×10%)	235	280	199	252	966
	Scenario 2(④＝③×20%)	470	561	397	504	1,931

(iv) MRV System for GHG Reduction

It is considered that BEMS will be one of the tools to ensure energy saving through the various activities related to energy reduction, and MRV procedure will be executed by using energy data of the entire building based on invoices issued from the electricity and fuel suppliers.

M (Measuring): Measurement will be proceeded by confirming CO_2 emission reduction which will be calculated by energy saving between before and after BEMS introduction.

R (Reporting): Reporting of all the values calculated in M procedure will be required on a yearly basis during project period.

V (Verification): With regard to the verification of calculation, the appropriateness of calculation result of the plan reported by R should be verified, and also the evidence data should be verified by using invoices issued from the electric utilities and fuel suppliers. With regard to the achievement report to establish the credits, the appropriateness of calculation result for emission after BEMS introduction and the baseline emission shall be verified.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

In introducing / operating the BEMS in the building facilities, there will be no risk of increasing CO_2 emission. Similarly, the risk of increasing hazardous chemical substance and emissions as well as the risk of causing environmental pollution or disaster are considered to be extremely low in the entire life cycle of the BEMS including its production, transport, installation, use, addition, expansion, modification and disposal.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

The reduction of power consumption through BEMS introduction contributes reduction of NOx and SO_2 emissions, which brought by reducing coal and LNG consumption required for power generation. The effect by reduction of power consumption through BEMS introduction was estimated as emission reduction of 3,023 t/y for NOx and 4,089 t/y for SO_2.

(vii) Contribution to Sustainable Development in Host Country

It seems difficult for Thai market that CO_2 emission reduction for buildings of commercial sector will be promoted by business as usual, though Thai government are conducting the various regulations & promotion programs regarding the energy management. BEMS contributes CO_2 emission reduction through energy saving for buildings of commercial sector in Thailand according to the following counter measures.

- Acceleration of the energy saving to the building sector by BEMS promotion.
- Contribution of reduction for electrical power demand and stable power supply in Thailand.
- Capacity building of the energy saving skill for the building's owners and operators through the energy saving activities by BEMS.

New Mechanism Feasibility Study for Energy Savings by Utilising LED Lights at Office Buildings in India

By Japan Research Institute, Ltd.

(1) Description of Project / Activity

The project consists of installing LED lighting in India while utilizing "Bilateral Offset Credit Mechanism" (BOCM), measuring reduction effects through demonstration testing of the LED lighting, and verifying eligibility as "BOCM" for achieving reduced power consumption and greenhouse gases.

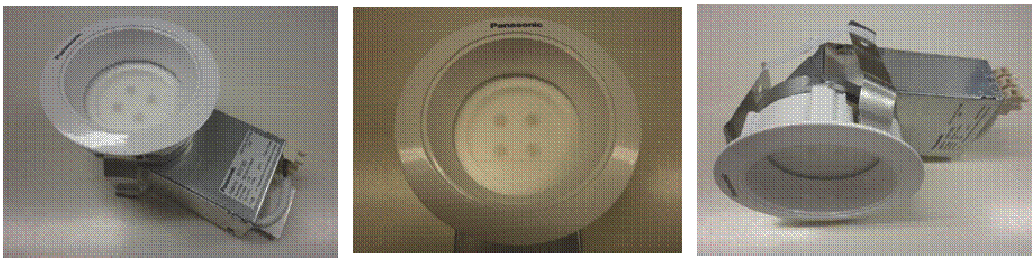


Figure 1: LED units

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Given the fact that LED lights have barely penetrated the Indian lighting market (0.1% on a volume basis), the reference scenario is a business-as-usual (BAU) scenario. However, LED penetration is expected to increase going forward, primarily driven by lower prices, so when LED market share comes to exceed 50% on a volume basis, the validity of this project will expire (new registration will not be conducted). Highly reliable data for ascertaining lighting penetration on a region-by-region basis does not exist in India, so the boundary of this project/activity is the whole of India.

(ii) Monitoring Methods and Plan

The method for measuring power consumption will either be 1) by directly measuring power consumption, or 2) deriving power consumption by calculating the product of lighting output (wattage) and operating time. Accordingly, if the first method is used, it will be necessary to monitor power consumption. If the second method is used, it will be necessary to monitor lighting output before and after the project is implemented. Also, for operating time, the project will adopt either 1) deemed lighting hours, which will be predetermined based on how each commercial building is used (e.g., office, hospital, hotel, etc.), or 2) conduct automated measurement using light sensors, heat sensors, etc. If the second method is used, it will be necessary to monitor lighting hours on a daily basis.

(iii) GHG Emissions and Reductions

Amount reduced during one year at the demonstration test site is 2.71 tCO_2. Potential annual reduction in the host country in 2015 is approximately 86 thousand tCO_2.

(iv) MRV System for GHG Reduction

MRV method (draft) created based on AMS-II.J, an existing CDM methodology. The following provides a summary.

*Application Conditions (excerpted)

▪ Replacing non-LED lighting with LED lighting at a commercial building in India

▪ Brightness of replacement LED lighting equivalent to (or more than) the total lumens of the lighting that was replaced

▪ LED lighting to be used consists of LED lights of more than a certain efficiency based on LED

energy efficiency standards scheduled to be released by India's Bureau of Energy Efficiency.
*Reduction Amount
▪ Derived by calculating (India's carbon emissions coefficient * (power consumption before project - power consumption after project implemented)) while taking into account the impact of annual transmission loss
▪ Power consumption derived by multiplying lighting output by operating time
▪ Operating time taken from 1) deemed lighting hours, or 2) automated measurement by sensors
*Credit period
The start of the credit period is the date the LED lighting is installed. The end of the credit period is the date LED lighting installed for the project reaches 50% or more of its operating life.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Some harmful substances are used in the LED production process, but given that LED production is generally handled by major electronics manufacturers based in developed countries, it is difficult to conclude that this will cause a negative impact on the environment. As for the positive impact, in developed countries, the progression of lighting has been from light bulbs to fluorescent lights to LED, but in the emerging country of India, it is possible that soil contamination, etc. by mercury, lead, etc. used in fluorescent lights can be avoided by accelerating widespread use of LED lights

(vi) Financial Planning

The agent that will conduct sales, installation, service and maintenance for the LED lighting will play an extremely important role in this scheme, so it will be particularly important to contract a reliable agent with a track record that is capable of performing these duties. If financing is in a hard currency other than rupees, such as US dollars, there will be differences between rental income in rupees and this currency, so as reflected in the above-mentioned barrier to entry for foreign banks in India, swap contracts that hedge risk associated with currency and interest rate fluctuations will be essential.

(vii) Introduction of Japanese Technology

If LED lighting manufactured by Panasonic Corporation, a partner in this project, penetrates offices throughout India, greenhouse gas reductions of 256,000 tCO_2 annually are projected. To facilitate the popularization of LED lighting, conducting the same service for the purpose of reducing initial costs has the potential to provide momentum for installation and widespread adoption.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

Reduction of SOx/NOx from power generation associated with reduced power consumption caused by utilization of LED lighting has been estimated quantitatively. The result is SO_2 emissions reduction (2015) of 713 tons and NOx emissions reduction (2015) of 771 tons.

(ix) Contribution to Sustainable Development in Host Country

As of 2010, India has an overall power shortage of 92,848 GWh. By 2021, the power shortage will grow to 1,914,508 GWh. India's current level of primary energy consumption per unit of GDP is approximately five times that of Japan. India has already eclipsed Japan as the world's fourth largest emitter of greenhouse gases. The country's energy consumption efficiency has the potential to impede growth going forward. Improving energy consumption efficiency through this project will help limit large increases in greenhouse gas emissions while helping facilitate economic growth, meaning it will contribute to India's sustainable development.

(3) Toward Implementation / Future prospects and issues

LED lighting units can reduce energy consumption by 38% compared to the CFL and FPL lighting units. The effect of deduction of energy demand is grater but the cost of LED units is still high. The manufactures of the units have to try to reduce the produce and distribution cost, by the local production, for example.

New Mechanism Feasibility Study for Energy Efficiency Improvement by Introducing High-Performance Industrial Furnaces to Aluminium Industry in India

By Japan Industrial Furnace Manufacturers Association

(1) Description of Project / Activity

The feasibility of the new mechanism for introduction of high-performance industrial furnaces in the Indian aluminum industry is studied. High-performance industrial furnaces are industrial furnaces which are equipped with regenerative combustion devices and regenerative burners. By adopting a combustion technology using high temperature combustion air, in which the heat of the exhaust gas is recovered and used to preheat the combustion air, this technology makes it possible to realize large energy savings in combination with low NOx operation and uniform heating.

Aluminum Melting High-performance Industrial furnace

The possibility of introducing this high-performance industrial furnace technology in the aluminum industry in the host country (India) is studied, the amount of GHG reductions in the host country is estimated, and the potential for dissemination of this technology is examined.

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

At the present time, it cannot be thought that substantial incentives exist for introduction of high-performance industrial furnaces in either PAT object plants or non-PAT object plants.

However, as the Indian Government has suggested the possibility that the PAT system may be expanded in the future, the level of future GHG reduction regulations (benchmark) can be considered a reference scenario.

Accordingly, an emission reduction of 5.6% is set here as a reference scenario. In this case, the portion of emissions reduced by introduction of high-performance industrial furnaces exceeding 5.6% is recognized as credits.

Based on a basic study of the Indian aluminum industry and the results of local surveys, boundaries were set as follows. Virgin metal ingots: Melting & holding furnace, soaking pit; Secondary (remelt) ingots: Melting furnace; Wire & bar, sheets, and foils: Annealing furnace; Extrusions: Melting furnace, reheating furnace; Castings: Melting furnace; Forgings: Reheating furnace.

(ii) Monitoring Methods and Plan

Items specified in ISO/WD13579-3 (FDIS) are used.

All these items are set assuming use in detailed calculations on a level exceeding that of ordinary business transactions. Therefore, in this study, the essential items for MRV were set so as to enable construction of an implementation system and secure transparency and traceability. The essential items are 5.1.1 Volume, 5.3.1 Combustion air volume, 5.5.1 Combustion exhaust gas temperature, 5.5.2 Combustion exhaust gas volume, 5.6.1 Fixture/Mass.

(iii) GHG Emissions and Reductions

Present: 18.72 $\times 10^4$ tCO_2 (credit after deduction of 5.6%)

2020: 105.4 $\times$ 10^4 tCO_2 (credit after deduction of 5.6%)

Table 1: Forecast of GHG emission reduction in 2020

Production process	Annual production (10,000 t/y)		CO_2 emission reduction (credit framework after deduction of 5.6%) (10,000 t/y)	
	Present	2020 (max)	Present	2020 (max)
Virgin metal ingot	155	1,000	8.93	57.6
Secondary (remelt) ingot	33	180	1.37	7.5
Wire & bar/Sheets/Foil	112	618	6.12	33.8
Extrusions	25	48	1.09	2.1
Castings	20	72	1.21	4.4
Forgings	8	30	—	—
Total	—	—	18.72	105.4

(iv) MRV System for GHG Reduction

An international standard for energy efficiency of industrial furnaces is now under examination in ISO/TC 244 (Industrial furnaces and associated processing equipment), as proposed by Japan (Japan Industrial Furnace Manufacturers Association). A MRV system of a level which can be adopted as an international MRV guideline should follow the thinking in this international standard.

● Measurement

Measurement is performed in accordance with ISO/WD 13579-3, Chapter 5: Measurement method. In case it is not possible to measure all items, the essential items are measured. These are monitoring items which are measured by Japanese industrial furnace makers during site observation for establishing the specifications of high-performance industrial furnaces, and the results of energy saving, etc. calculated using those results are used in judgments for business transactions. Accordingly, MRV based on these simplified essential items is the basis for project/activity implementation. Measurements of these essential items can also be made by local industrial furnace users.

● Reporting

Reporting is performed in accordance with ISO/WD 13579-3, Chapter 6: Calculation.

As the concept of reporting based on the essential items in the above-mentioned measurement, the energy saving rate when a furnace is converted to a high-performance industrial furnace is calculated based on measurements of the combustion exhaust gas, and the reduction of fuel consumption is obtained by multiplying the energy saving rate by fuel consumption (fuel volume). The GHG emissions reduction is obtained in a similar manner.

● Verification

Verification is performed in accordance with the table in ISO/WD 13579-3, Chapter 7: Energy supplied for machineries and electrical equipment.

Verification can be performed by an organization with actual results of energy saving diagnosis, etc.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

No other social, cultural, and economic impacts, including environmental impacts, associated with the energy savings achieved by introduction of industrial furnaces or equipment (regenerative burners, etc.) were foreseen from the beginning of the study, and no such effects are considered likely at the present stage, when 3 local surveys have been completed.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

As co-benefits in case of dissemination of high-performance industrial furnaces in the Indian aluminum industry, the cost of environmental externalities can be evaluated by reduction of CO_2 and NOx.

Quantification of NOx emission reductions by introduction of high-performance industrial furnaces is difficult; however, emission reductions of 30% or more have been confirmed in cases where high-performance industrial furnaces were introduced in Japan.

(vii) Contribution to Sustainable Development in Host Country

Dissemination of high-performance industrial furnaces will contribute to sustainable development in India by substantially reducing consumption of natural gas, LPG, and heavy oil in the Indian aluminum industry. Because this technology is also applicable to iron and steel and other sectors, introduction with backing by policies of some type will have a large ripple effect in India industry in the future.

New Mechanism Feasibility Study for Promotion of Energy Efficiency Improvement at Households through Introduction of Low-CO_2 Houses and Diffusion of Energy-Efficient Appliances in Mexico

By The Japan Research Institute, Limited

(1) Description of Project / Activity

This study covers a local technology demonstration of the Low CO_2 House, which integrates energy-saving and energy-generating technologies, measurement of resulting energy savings, research on related regulations and policies, etc. at the federal and state levels, creation of an MRV methodology for improved energy efficiency of houses and home appliances, and policies for coordination with the federal government, state government and financial institutions. Drawing on the findings of this study, the aim is to clarify the feasibility of this greenhouse gas reduction project in the BOCM scheme and to promote more widespread use of Japan's outstanding energy-efficient home appliances through the BOCM scheme.

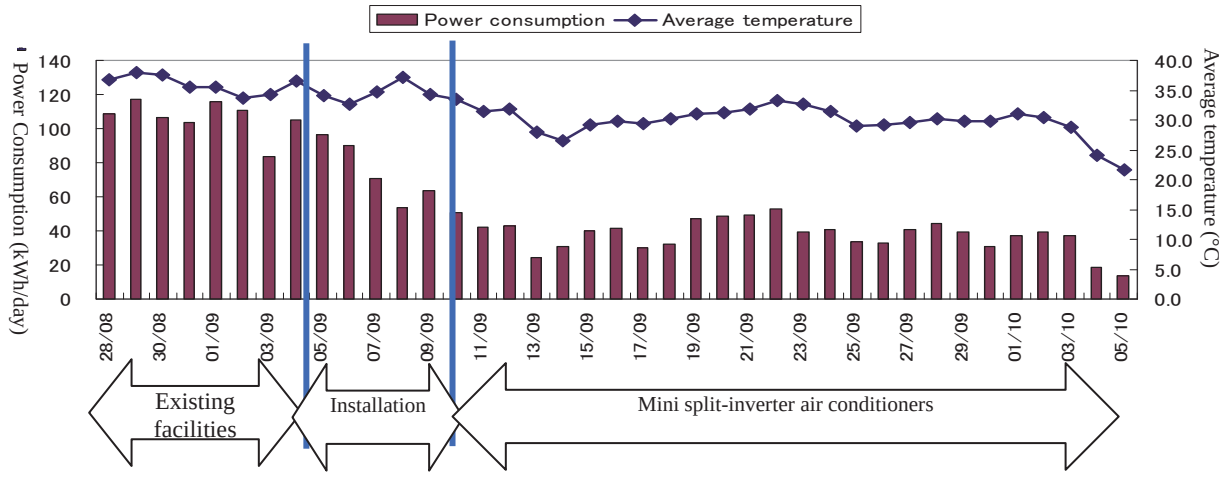


Figure 1: Change in House Power Consumption after Upgrade

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

The reference scenario is the scenario in which households participating in the project use existing appliances for the duration of their service life and then replace them with standard appliances available on the market. Reference emissions take into account change in energy consumption efficiency when appliances are replaced. The boundary is households participating in the project arranged by climate zone because of the impact of air temperature on air conditioning load and other factors.

(ii) Monitoring Methods and Plan

Monitoring is conducted in a survey of installed facilities and a survey after the project is implemented. For the survey of installed facilities, the following items will be recorded during the period the project is implemented and the information will be compiled into a database.

- Quantity of facilities installed for the project and related information
- Quantity of facilities removed in connection with updating facilities for the project, and related information

The survey after the project is implemented will survey the following items.

- Power consumption for the most recent one-year period

- Change in family composition
- Any house renovations
- Operating status of installed home appliances and solar power facilities

(iii) GHG Emissions and Reductions

If 10% of houses in Mexico are installed with energy-efficient air conditioning and lighting and with 3 kWp solar power generators, annual reduction of approximately 8.89 million tCO_2 can be expected.

(iv) MRV System for GHG Reduction

The MRV methodology involves assessing the amount of reduction in energy consumption for the same existing house before and after the project, on a whole house basis, making reference to the CDM methodology AMS-III.AE. for conducting MRV at the house level.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

When energy-savings programs are promoted, disposal of inefficient facilities that had been used previously becomes a major issue. In order to ensure environmental integrity, it is important to create a system for incorporating management and disposal of facilities into energy-savings programs and ensure that environmental impact is not increased due to inappropriate disposal.

(vi) Financial Planning

Creation of financing schemes for Japanese products utilizing ASI's (an energy-savings promotion organization affiliated with a power utility) energy-savings programs is considered in order to lessen the initial investment required of households. Specifically, there needs to be policies for promoting the Mexican government's various regulations and incentives as well as low-interest financing schemes that lessen the cost of energy-efficient home appliances and other facilities.

(vii) Introduction of Japanese Technology

ASI is currently planning and testing new energy-savings programs and is working to expand existing initiatives. The organization has taken a positive stance toward linkage with the BOCM scheme, so financing schemes that use BOCM credits as a resource are considered. The next step would be financing ASI and creating low-interest loans that can be used when installing products from Japanese manufacturers.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

More widespread use of energy-saving and energy-generating facilities can be expected to reduce power consumption and this can be expected to reduce power generation by thermal power plants, reduce sulfur oxide, nitrogen oxide and smoke dust released into the atmosphere and improve air quality.

(ix) Contribution to Sustainable Development in Host Country

The Mexican household appliances market is expected to gradually shift from inexpensive, inefficient facilities, which can be seen throughout the developing world, to appropriately priced, high-efficiency facilities through widespread adoption in Mexico of energy-saving and energy-generating facilities from Japanese manufacturers.

(3) Toward Implementation / Future prospects and issues

In order to conduct this project with the bilateral credit offset mechanism, the following there points are of particular importance.

- Building a cooperative framework with ASI
- Building a sales system for energy-saving and energy-generating facilities from Japanese manufacturers
- Coordination with the Japanese government's scheme financing, such as JBIC, NEXI and JICA

New Mechanism Feasibility Study for Integrated Energy Efficiency Activities at Beer/Beverage Factories Using Specific Energy Consumption Methods in South Africa

By Recycle One, Inc.

(1) Description of Project / Activity

The energy demand in South Africa (ZA) has been constantly strong, and large electricity outages are becoming a serious issue. This makes electricity price increasing drastically, which be forcing the businesses to implement energy saving measures. In accord with this situation, The Prospecton Factory located near Durban, South Africa, of SABMiller, plc. (SAB) was selected as a pilot case. The "Energy Consumption Structure Analysis Simulator" was applied and "Integrated Energy Saving Equipments" based on the analysis were proposed, both of which are advanced Japanese technologies. Through these activities, the fossil fuel consumption can be anticipated to be reduced, according to the reduction of electricity consumption from such energy saving activities, which will possibly contribute to the climate change mitigation in ZA.

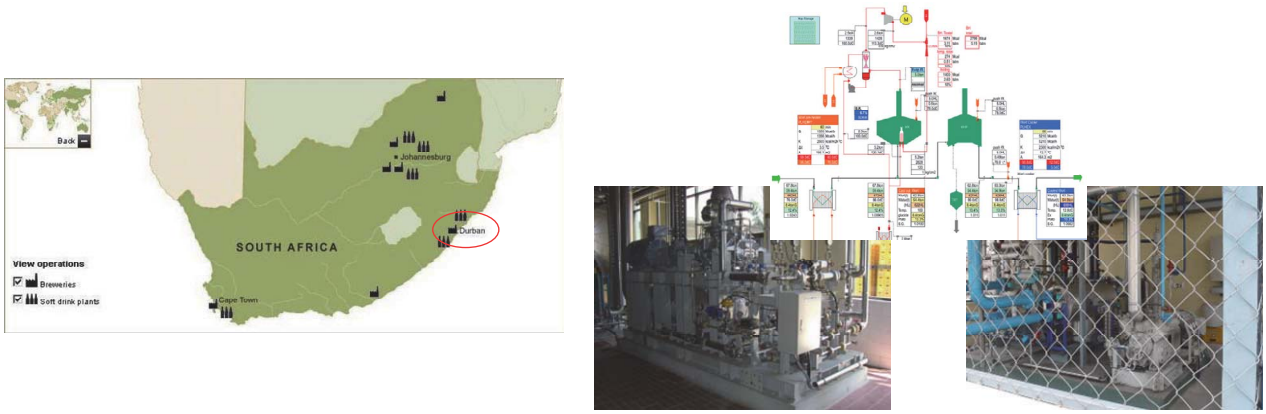


Figure 1: Location of Prospecton Factory, and Images of Proposed Technologies

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Boundary is the entire brewery, and Reference Scenario is BaU scenario accounting for the efficiency improvement on the specific energy consumption by the production increase. A new scheme of "Third Party Assessment" is proposed to assess the validity of the boundary, reference scenario, among others.

(ii) Monitoring Methods and Plan

To enhance reliability, it is ideal to use existing data monitored by meters, which usually be collected by SAB itself for factory management. The data should also be cross-checked with invoices to prove correctness.

(iii) GHG Emissions and Reductions

Approximately 31,000 tCO_2/y

Table 1: Estimated GHG Emission Reduction at Prospecton Factory

	Item	Unit	Mfg Process Equipment Installed				Others	Total
			Brew house	Bottle	Pasteu-rizer	Cooling		
Electri-city	Specific electricity	kWh /HL	-	-	-	0.0028	0.007	0.0098
	Specific electricity	kWh /HL	-	-	-	0.0018	0.007	0.008
	Improvement	kWh /HL	-	-	-	0.001	0	0.002
Heat	Specific heat consumption (RR)	GJ/HL	0.013	0.0046	0.0218	-	0.0365	0.076
	Specific heat consumption (PJ)	GJ /HL	0.0059	0.0031	0.0079	-	0.0365	0.0534
	Improvement	GJ/HL	0.0072	0.0015	0.0138	-	0	0.0226
Total	GHG Reduction	tCO2 /y	7,588	1,626	14,556	7,434	0	31,202

(iv) MRV System for GHG Reduction

"Third Party Assessment" is proposed. This means the third party (or individual) who have expertise in technology and other situations in the host country will assess the validity of the reference scenario, additionality, calculation method and monitoring method, which lead the MRV to be judged on the basis of reality in the host country.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

The Environmental Impact Assessment (EIA) must be held under the EIA regulation managed by municipalities. EIA department of the City of Durban gave the opinion by a letter that the technologies are presumed to satisfy EIA regulation, as long as there is no additional discharge of water nor exhaust gas.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

Based on co-benefit quantification manual, "SOx emission reduction due to the fossil fuel reduction by energy saving" is evaluated. As a result, 62 tons of SOx emission reduction from electric generation plant is estimated in case all the energy efficiency technologies proposed are implemented.

(vii) Contribution to Sustainable Development in Host Country

The continuous electric shortage considerably may slow down the economical growth in ZA. Energy efficiency projects will help preventing the electricity shortage, and so lead to sustainable economic growth in ZA in medium to long term.

Furthermore, implementing energy efficient technologies in ZA is very critical, because ZA as a developing country is considered to expand its GHG emissions similarly as other developing countries. Also, these projects possibly contribute to remedy air and water pollution around the factory.

(3) Toward Implementation / Future prospects and issues

Through energy simulation by the simulator, energy saving technologies had been identified and each cost-benefit analysis had finished in this FS. More precise and detailed proposal to SAB is needed as a next step. However, there are some issues to be solved such as;

a) Either meters or data management system or both should be improved to collect more real data.
b) Choose the technologies/manufacturers which can give maintenance properly in ZA.
c) Improvement in operation is needed simultaneously with technology implementation.
d) Other than global companies such as SAB, most of the companies in ZA need to be more aware of energy saving in order to spread new energy saving technologies in ZA.

New Mechanism Feasibility Study for REDD+ in Central Kalimantan Province, Indonesia

By Mitsubishi UFJ Research & Consulting Co., Ltd.

(1) Description of Project / Activity

This study was conducted in Paduran Mulia Village, Sebangau Kuala Sub-District, Pulang Pisau District, Central Kalimantan Province. A vast extent of peat forest still stands in Central Kalimantan Province, but the conversion of peat forest to farmland—due to the increase of immigrants from Java Island—and to oil palm plantations—triggered by a rise in oil prices—has been in progress.

In view of the fact that a majority of the deforestation and forest degradation in developing countries is a consequence of socio-economic conditions, it has been found necessary to pay full attention to improvement in the social and economic conditions existing in the surrounding areas when controlling deforestation and forest degradation.

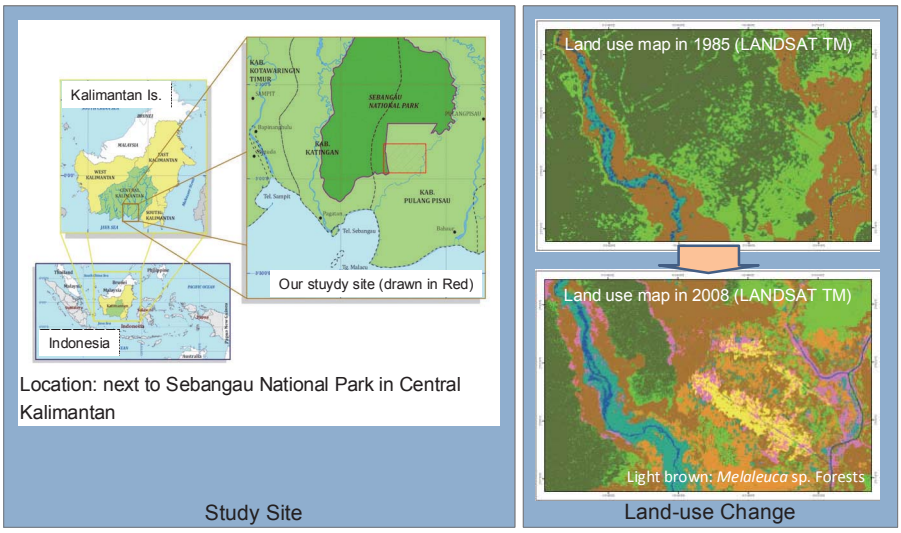


Figure 1: Study site and land-use change in the target Area

(2) Results of the study

(i) Reference level and Project/ Activity Boundary

For identification of the project boundary, land classifications based on Landsat TM images were used. From the Landsat TM images, the area is classified into secondary forest (with high stock), secondary forest (with medium stocks), Melaleuca forest, cropland and developed areas (settlements), shrub, bare land, wetlands, and lakes/rivers. These provisional classifications are then revised by checking the results of image analysis against the status of actual land-use in the field survey, and the area is finally classified into the respective land classifications. In this feasibility study, the volumes of activity (areas) were identified based on the principles of the Verified Carbon Standard (VCS) method and on Landsat TM images of the project area for four time points, 2000, 2004, 2008, and 2010.

For development of reference level, based on the activity data (area) and factors (carbon stock per unit area), the amount of carbon stocks in the area of this feasibility study in 2000, 2004, 2008, and 2010 were calculated.

(ii) Monitoring Methods and Plan

Monitoring in this study is scheduled to be conducted by combining biomass survey (ground survey) with remote sensing. The idea for calculating GHG emitted and removed by the implementation of REDD+ is based on the combination of two different monitoring techniques.

(iii) GHG Emissions and Reductions

As shown in Figure 2 below, GHG emissions reduced by the implementation of REDD+ were calculated from the difference between the reference level and the emissions after the implementation of the project.

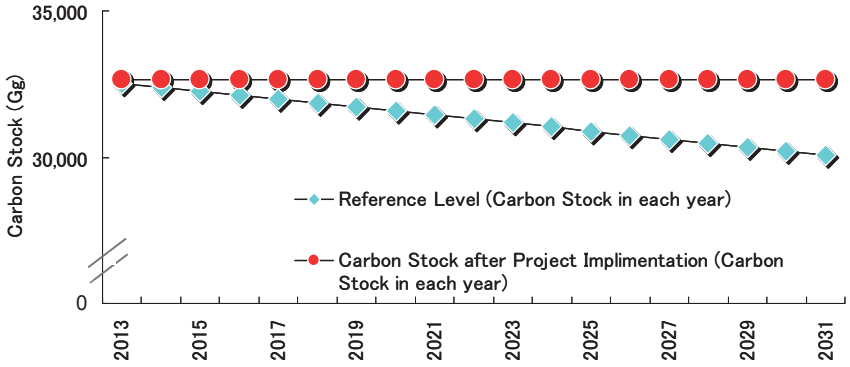


Figure 2: Reduction of GHG emissions expected to be achieved by REDD+

(iv) MRV System for GHG Reduction

We will establish a monitoring system that uses the dynamic data of satellite images from Landsat TM (Figure 3) to draw the activity levels (area), as well as these emission factors (GHG emissions per unit area).

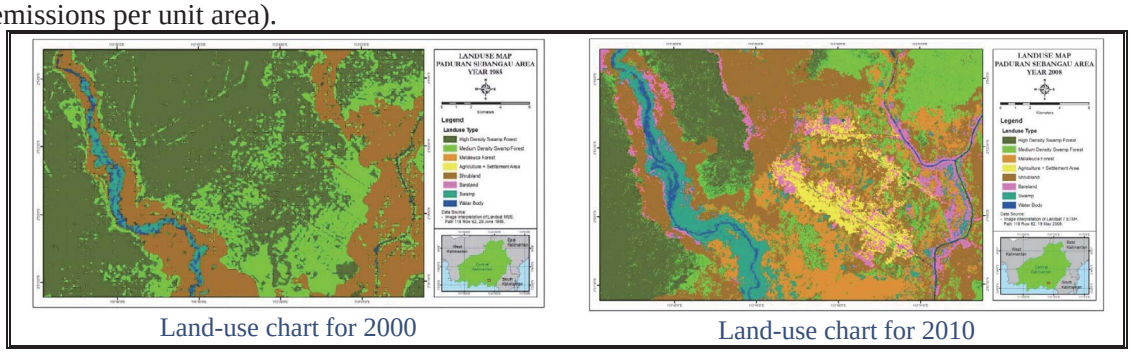


Figure 3: Land-use charts (2000–2010) in Paduran Mulia Village and adjacent areas

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Curbing deforestation and forest degradation will lead to an improvement of the functions of the forest ecosystem, and is unlikely to have negative impacts from the viewpoint of environmental integrity. While it is important in this study to keep in check the development of oil palm plantations in peat lands, as it is believed to be a factor of deforestation and forest degradation, the point is whether or not restricting the development of oil palm plantations will prompt the local residents to perform activities with high environmental load. Accordingly, we are going to conduct community and village surveys aimed at local residents and take necessary measures to give sufficient consideration to those issues. At this stage, conservation of wetlands and environmental function of Melaleuca forest are deemed important in securing the environmental integrity.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

While REDD+ is considered to be one of the mitigation schemes in the discussions under the UNFCCC, REDD+ is expected to help the forest ecosystem restore its functions as mentioned above, and is also considered effective in conserving biodiversity through its indirect impacts.

(vii) Contribution to Sustainable Development in Host Country

REDD+ is expected to not only be a mitigation scheme but a way to contribute to the improvement of the lives of local and native residents dependent upon forest resources, as well as to the improvement of the conservation of biodiversity. These direct and indirect effects are considered to contribute greatly to the sustainable development of Indonesia, the host country.

New Mechanism Feasibility Study for REDD+ and Bio-Fuel Production and Utilisation in Gorontalo Province, Indonesia

By Kanematsu Corporation

(1) Description of Project / Activity

This feasibility study (FS) is to provide a plan to prevent the deforestation and degradation of forest in the Gorontalo Province, Sulawesi island, of Indonesia. We have performed the FS together with Indonesia-Japan Friendship Association and Panasonic Gobel Indonesia, who have good relationship with the local government and community of Gorontalo. We have found the deforestation drivers, and have considered the countermeasures as follow;
(i) Corn farmers living near the forest frontier slash & burn the forest due to low yield
➔ Capacity building for high productivity agriculture, such as agro-forestry (coconuts, cacao, etc.), so that the famers may make more profit without “slash and burn” the forest.
(ii) Kerosene oil supply is not sufficient. People cut the trees because they cannot afford to buy it.
➔ Crude Bio-fuel program covers the shortage of Kerosene. Project Developer will buy Jatropha seeds etc. from farmers at rational price, and refines crude oil, then, distributes to farmers
(iii) Indonesia-Japan Friendship Association will coordinate above activities with local Government, farmers, communities, and the developer, with the aim of producing BOCM credits.

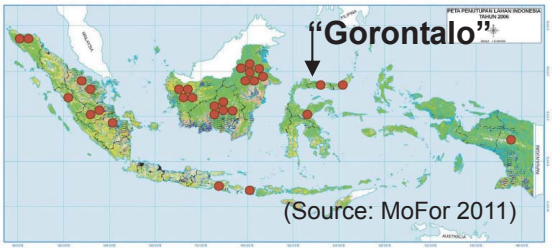


Figure 1: Pilot REDD Projects in Indonesia

Figure 2: Slash & Burn Agriculture

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Project Area and Reference Area are selected and set according to forest map, village border, and VCS methodology discussing closely with the local government and community of five villages.
Project Area : 20,230ha, Reference Area : 155,020ha
Project area is still covered by forest, however, the area is under high risk of deforestation.
Reference Scenario: Forest area size decreases at -0.68%/year, and its carbon density declines.
Project Scenario: Forest area will continue to be the same size with 2010, and the carbon density will recover and become higher.

(ii) Monitoring Methods and Plan

Our partner remote sensing engineering company, Kokusai Kogyo Co., Ltd. will supervises the local government forest staffs, community people, and GIS consultant for the ground truthing activity, which verifies and makes better reliability of the remote sensing analysis data. Here, the technology transfer will help the local Government. Participating this carbon stock data monitoring activity, the local community people may obtain some incentives from the project fund. This activity will also contribute to lowering the costs of the project implementation, and will improve the project feasibility.

(iii) GHG Emissions and Reductions

Reduction of CO_2 emission will supposed to be between 19,647 - 61,429 tCO_2/y depending on the budget and implemented activities by the local government and community.

(iv) MRV System for GHG Reduction

We are developing reliable but more simplified methodology by applying;

- Reasonable size of reference area for setting the baseline
- Application of "default regional deforestation rate"
- Simple carbon stock sampling (ground truthing) for monitoring
- Setting "standard sampling rates" implementation

We plan to provide some incentives for local people as a reward for ;

- Data sampling by local people
- Forest protecting activities (patrol, fire controls etc.)

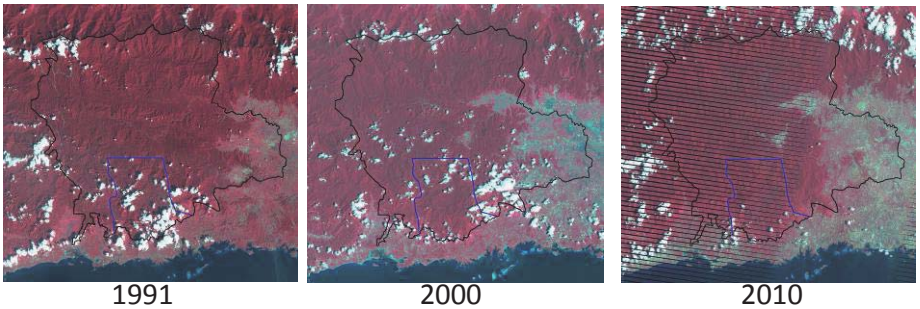


Figure 3: Deforestation analysed by LANDSAT imageries with remote sensing technology

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Recovery of vegetation and ecosystem functions will be expected. Sulawesi Island is well known for its abundance in endemic species of animals and plants, and the national park there is endeavoring to preserve its biodiversity. There is a high risk of the ecosystem being damaged and collapsed, so it will be meaningful to perform the monitoring of the situation of not only forests but also its ecosystem

(vi) Financial Planning

Carbon credit revenue will be used effectively as incentive for the REDD+ activities, assuming that credit price will be US$ 12-21/tCO_2 during 2013-2022. The credit income US$ 737-1,290k/y shall cover the cost of activities such as remote sensing, capacity building, refinement of crude oil, or forest protection activities etc.

(vii) Co-benefits (i.e. Improvement of Local Environmental Problems)

It is useful for REDD+ project to evaluate the impacts, by monitoring the number of living species, sizes, distribution etc. This kind of measurements will bring co-benefits to preservation of biodiversity and mitigation of climate change.

(viii) Contribution to Sustainable Development in Host Country

Indonesian government is promoting a sustainable forest management and plantation in local communities. Gorontalo government and its communities are also promoting restoration of vegetation in forest. Thus, our project, we believe, rightly meets the policy of the governments, and will lead to the sustainable development.

(3) Toward Implementation / Future prospects and issues

We are now looking for REDD fund, with which we may implement the REDD+ project together with the local government and community.

New Mechanism Feasibility Study on Reduction of Aerobic Decomposition Caused by Peat Drying and Power Generation Using Rice Husks from Increased Rice Production in Jambi Province, Indonesia

By Shimizu Corporation

(1) Description of Project / Activity

Project site is approximately 10,000 ha of farming peatland in the regency of Tanjung Jabung Timur in Jambi, Sumatra. Project activity consists of 1) Restoration of the water table in the peatland by means of upgrade/construction of water gates and introduce water management to suppress aerobic decomposition of peat and reduce carbon dioxide emissions, 2) Increasing rice production through raising of the water table, thereby contributing to sustainable development with major benefits for the host region, and 3) Supply of electric power to non-electrified areas by means of biomass power generation using rice husks, thereby helping to raise rural living standards.

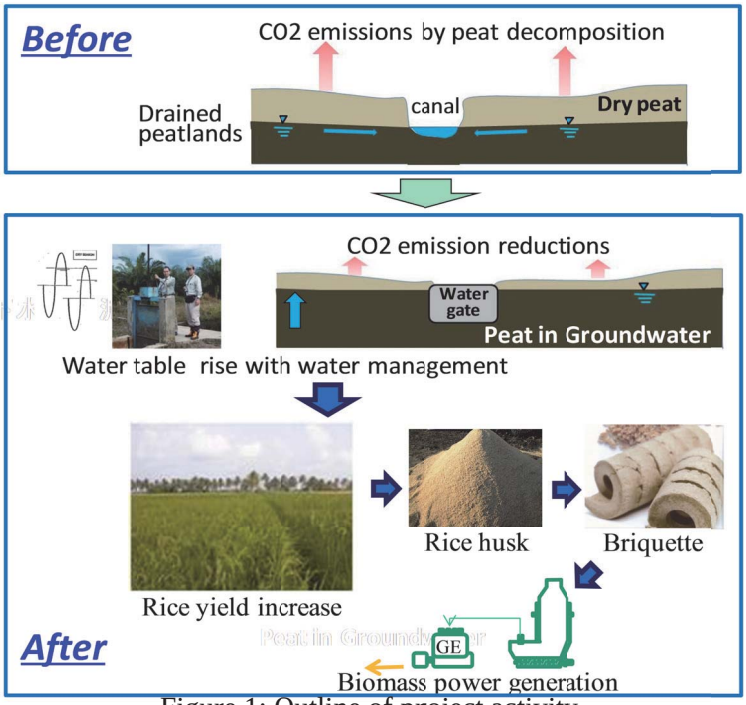


Figure 1: Outline of project activity

(2) Results of the Study

(i) Reference Scenario and Project/Activity Boundary

BaU is adopted as the reference scenario on the basis that non-conservation of the peatland will continue if the project is not implemented. The project boundary is the hydrologically and administratively distinct delta formed between the Batang Hari and Berbak Rivers.

(ii) Monitoring Methods and Plan

Reference points will be established in the peatland to measure water tables and peat subsidences in order to determine reference emissions. Emissions reductions through the project will be determined from the difference of the water tables, and the reductions can be confirmed from the peat subsidences. Water tables calculated with a hydrological model will be used to interpolate the measured ones.

(iii) GHG Emission and Reductions

After implementing project with a water table rise of an average 0.5 m, the reductions on the site scale may be estimated as: 69 tCO_2/ha/y/m x 0.5 m x 10,000 ha = 345,000 tCO_2/y. Contribution of the rice husk power generation to emission reductions is an additional about 4,000 tCO_2/y. Estimating the area of developed peatlands located in tidal areas be approximately 280,000 ha, the reduction potential in Indonesia as a whole is 280,000 ha x 34.5 tCO_2/ha/y = approximately 9,700,000 tCO_2/y

(iv) MRV System for GHG Reductions

The above CO_2 emissions have to be measured by dividing the site into a number of hydrological distinguishable plots of terrain that may be regarded as having a uniform average water table, and then aggregating the measurements for each of these units to determine emissions from the approximately 10,000 ha site as a whole. This will be achieved by the following process: 1) Topography, weather conditions, and water level are measured at representative points in the site, 2) Topography and weather satellite data of the site are obtained, 3) A GIS database is created containing information for each plot to calibrate and unify the above data, 4) Water table distribution in the site is calculated mathematically using a hydrological model to determine the average water level increase (ΔGWT) in each plot, 5) The emission reduction in each plot is calculated from ΔGWT and its sum over the site calculates total reductions, 6) Carbon content and subsidence are measured at representative points to confirm the calculated emission reductions.

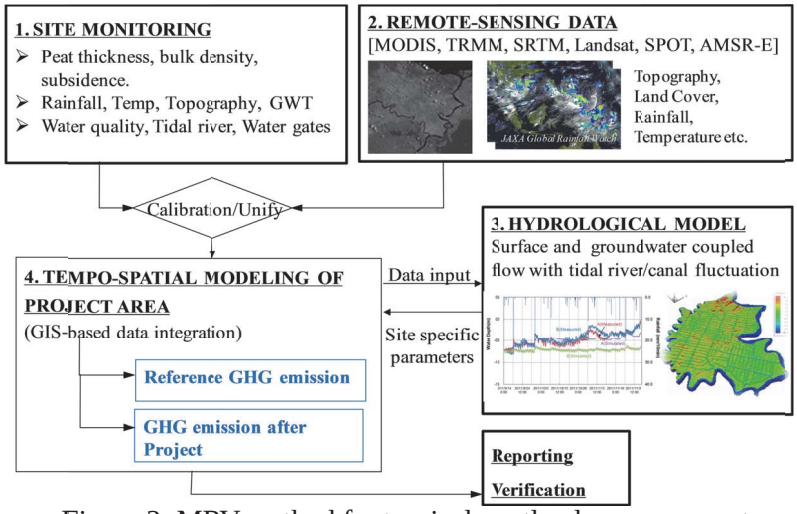


Figure 2: MRV method for tropical peatlands management

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

The purpose of the project activity is to raise the water table above its current level by introducing water level management so as to restore water levels to something approaching what they were prior to development. As conditions will therefore more closely resemble the original natural conditions, there will be hardly any negative impact on the environment, including ecosystems.

(vi) Co-benefits and Contribution to Sustainable Development in Host Country

By applying the current project activity overall, in which the water table in peat layers is maintained within 50cm of the surface, it is expected to prevent peat fire and health hazards caused by it. The project activity increases crop yields per unit of land area, thereby contributing to reduce new peatland development and improve living standards in rural communities. Supplying electricity to non-electrified regions by means of rice husk power generation should raise rural living standards and at the same time increase soil fertility and raise productivity through use of burned rice husk ash as a soil stabilizer.

(3) Toward Implementation

The GHG emission reductions scenario based on site specific conditions, including rice yield increase and associated rice husk power generation, and its MRV method have been developed toward project implementation. As the next step, we intend to conduct a pilot study to materialize water management and rice production increase, and establish a practical and reliable MRV method for tropical peatlands management.

New Mechanism Feasibility Study for REDD+ in Prey Long Area, Cambodia

By Conservation International Japan

(1) Description of Project / Activity

The Prey Long area is the largest lowland evergreen forest tract in Cambodia, which locates in the center-north part of Cambodia, to the west of the Mekong River. It stretched over four provinces: Kampong Thom, Kratie, Stung Treng and Preah Vihear. The forest estate is currently under the demarcation process by Cambodian Government for the establishment as a protection forest. The area is estimated to be over 400,000 ha.

High rate deforestation in the Prey Long area continues mainly due to small scale deforestation by local people and settlers for converting forest lands into agriculture lands, and due to large scale deforestation by obtaining land concessions for agro-industrial uses. Suggested options for potential REDD+ strategies include implementing local forest protection contracts with the local community through conservation agreements and enhanced law enforcement.

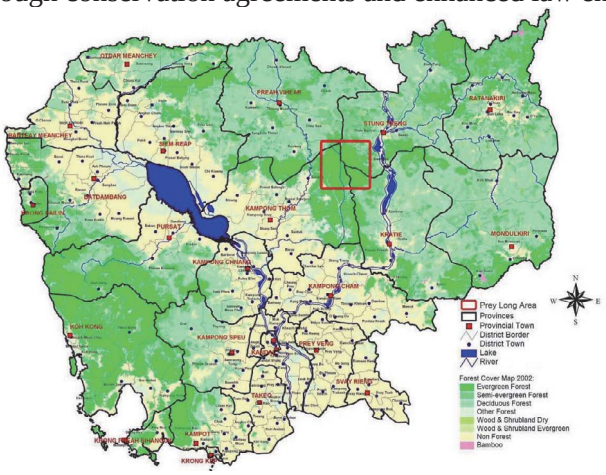


Figure 1: Forest Cover of Cambodia and the Prey Long area

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Cambodian government identifies the nested approach from sub-national to national-level as national strategy of REDD+ under the REDD+ Roadmap. The candidate sub-national units under the examination were a province, cantonment or sub-cantonment level. By considering this circumstance, the study applied entire four provinces where project boundary would locate as a reference region to draw the reference scenario.

Two options were applied for estimating reference emission levels while considering the continuation of the historical deforestation rates in both cases. Under the first option, a spatial model was run on the reference area to predict future deforestation inside the project boundary without separation of planned and unplanned deforestations. As the second option, the historical deforestation rates were obtained for large-scale planned deforestation and small-scale unplanned deforestation separately and were simply applied to the project boundary.

(ii) Monitoring Methods and Plan

As the method for forest change detection, the project applied a supervised classification using two dates Landsat imageries together. In the study, ca 2001, ca 2008 and ca 2011 data were used, and land cover changes between two years were classified into six: evergreen forest to evergreen forest, evergreen forest to non-forest, deciduous forest to deciduous forest, deciduous forest to non-forest, non-forest to non-forest, water body to water body.

Cambodian Government is developing a plan for National Forest Inventory with technical supports from JICA. The BOCM's monitoring plan should align with such effort to maximize

efficiency and effect of capacity building, which will be a key for quality control of monitoring.

(iii) GHG Emissions and Reductions

Three carbon stock data for evergreen and deciduous forests in this region from different sources were used for this study. The set of results with largest amount of calculated GHG emission reductions is shown in Table 1. We assumed a 50% project success rate and a 35% leakage rate from the years 1 to 5, and a 90% project success rate and a 5% leakage rate for the remaining years.

Table 1: Estimated GHG emission reduction

	Option 1	Option 2
2011 – 2020	1,482,919 tCO_2	14,970,909 tCO_2
2011 – 2025	3,906,875 tCO_2	26,671,978 tCO_2

(iv) MRV System for GHG Reduction

Overall

- The method based on IPCC's Guidelines for National Greenhouse Gas Inventories is preferred.

Measuring

- For the forest change and biomass, please refer (ii) Monitoring Methods and Plan.
- Collect the GIS data for existing approved information that leads to the deforestation (i.e., annual logging allocation, Concessions, Community Forestry.)

Reporting

- Apply 'Approach three' of IPCC report for the forest change based on the collection and understanding of spatial information.
- The external validation process is also being discussed by UNFCCC. It is ideal to establish the external validation system to secure the transparency and reliability. Data from other research initiatives and other REDD+ projects would be useful resources in the verification process.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

In order to ensure that positive development benefits to be provided and to avoid negative impacts to local communities, Climate, Community and Biodiversity Standards and REDD+ Social and Environmental Standard will be examined for application in the future in partnership with FA.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

The Prey Long area encompasses a very large tract of lowland tropical evergreen forest that supports an extremely high diversity of wildlife and local people who directly depend on the forest for their livelihoods under poverty. The protection of the Prey Long area will significantly contribute to improve the status of biodiversity and local livelihoods. This can be a great example for Cambodian government to contribute to the goal established by CBD for the smart utilization of the REDD+ scheme.

(vii) Contribution to Sustainable Development in Host Country

The forest in the Prey Long area is important watershed to sustain the fishery and agriculture activities in Cambodia and in Vietnam, and also is the source of Non Timber Forest Product such as resin which local communities are depending on their lives. Cambodian government regards the REDD as the most prioritized strategy within National Forest Program (2010-2029), and aims to maintain the 60% of the forest coverage rate by 2015, to enhance the law enforcement and to strengthen the governance to protect forest. The REDD+ in the Prey Long Area will contribute to the most prioritized strategy of Host County.

(3) Toward Implementation / Future prospects and issues

The next steps toward the implementation of the REDD+ in the Prey Long area include developing and applying sustainable financial scheme, formal understanding on the design of BOCM by both governments, MRV and PDD development, and consultation with local stakeholders.

New Mechanism Feasibility Study for REDD+ through Revegetation at Denuded Lands and Woody Biomass-based Power Generation in Son La Province, Viet Nam

By Sumitomo Forestry Co., Ltd.

(1) Description of Project / Activity

In Son La Province, northwestern Viet Nam, carry out revegetation of land used for slash-and-burn cultivation and denuded land, which make up a large portion of the area. Reduce pressure on existing natural forest, and quantify the resulting increase in carbon accumulation by plantations in order to acquire emissions credits for the reduction in GHG emissions. Large volumes of timber could be produced in the future if large-scale afforestation and revegetation activities were to be implemented, therefore also engage in timber processing business and biomass power generation, and reduce GHG emissions by using biomass to generate electricity instead of fossil fuels. The project will contribute to sustainable development in the region by developing forests, thereby helping to enhance their multi-faceted functions, such as cultivation of water resources, national land conservation, and biodiversity preservation, and by establishing new industry in northwestern Viet Nam, one of the country's poorest regions.

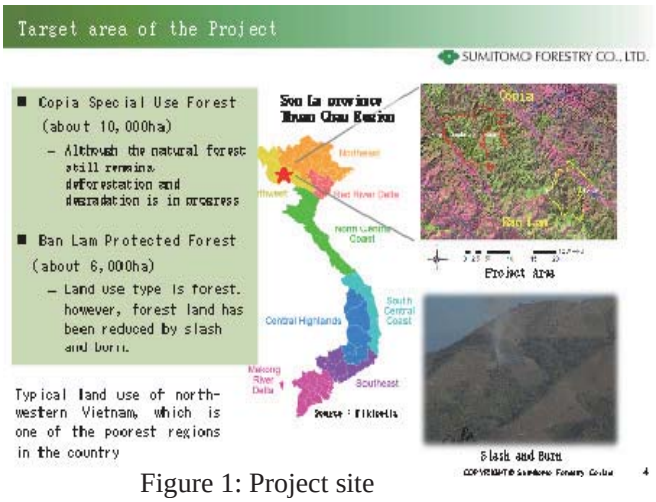


Figure 1: Project site

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Forest Management Segment: Three areas were established—project areas (approx. 16,000ha), leakage areas, and a reference area (approx. 205,000ha). The reference scenario is a situation in which forest depletion and degradation continue according to analysis of satellite images of the reference area at multiple points of time.

Biomass Use Segment: Based on CDM methodology AMS-I.A., importing electricity of the grid is the reference scenario as this is the most feasible form of power supply within Son La Province. Regarding the establishment of boundaries, a boundary shall be the "physical, geographical site of the renewable energy generating unit and the equipment that uses the electricity produced."

(ii) Monitoring Methods and Plan

Forest Management Segment: Data relating to changes in land use and land cover will be analyzed to estimate the change in forest growing stock. This will be carried out through combined use of remote sensing and ground data.

Biomass Use Segment: ISO 9001 certification will be acquired for timber processing mills/biomass power generation in order to establish a quality control framework. Monitoring procedure manuals will be incorporated into auditing systems related and not related to ISO so that monitoring will be integrated into business operations.

(iii) GHG Emissions and Reductions

Forest Management Segment: Emission reductions expected over 20 years of the project are 59,510 - 63,518tCO_2/y. It was found that the expected emission reductions varied greatly depending on the assumed deforestation rate for the reference scenario.

Biomass Use Segment: Emission reductions of 20,197tCO_2/y are expected for each plywood factory, based on estimates for plywood factories to be built under Son La Province's forest preservation and

development plan.

(iv) MRV System for GHG Reduction

Forest Management Segment: The degree to which forest depletion is prevented as a result of implementing revegetation activity as a forest depletion countermeasure will be quantitatively evaluated. Based on the results of monitoring, the project operator shall compile and submit monitoring reports containing related data such as the area of forest depletion and emission reductions. Regarding verification, required procedures and parameters of confirmation will be determined through reference to standards such as ISO 14064:2006.

Biomass Use Segment: Measurement reliability will be enhanced through conformance to methods stipulated under "Monitoring Methods and Plan." CDM methods will be referenced for reporting and verification.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Forest Management Segment: Negative effects on the environment are not expected to be great, but compliance with domestic regulations and international guidelines relating to areas such as biodiversity and forest preservation and development is required.

Biomass Use Segment: This is a project requiring an environmental impact assessment (EIA) based on Viet Nam's Law on Environmental Protection (Law No.52/2005/QH11), therefore an EIA-based study will be carried out and measures for avoiding or mitigating expected adverse impacts (noise, air pollution, water pollution etc.) will be taken.

(vi) Introduction of Japanese Technology

Application of Japanese know-how on sustainable forestry business, forestry road network design, forestry road development technology, and forestry machinery is possible.

(vii) Co-benefits (i.e. Improvement of Local Environmental Problems)

An increase in biodiversity is expected in protected areas of the area designated for forest rehabilitation. The project will also contribute to cultivation of water resources, strengthening of the local economy and access to sustainable energy.

(viii) Contribution to Sustainable Development in Host Country

In addition to preserving the environment by increasing the area of forest through planting, and carrying out sustainable forest management, livelihoods of local residents will be improved. At the same time, high value-added biomass use will be introduced. Thus, the project will contribute to sustainable development in the host country.

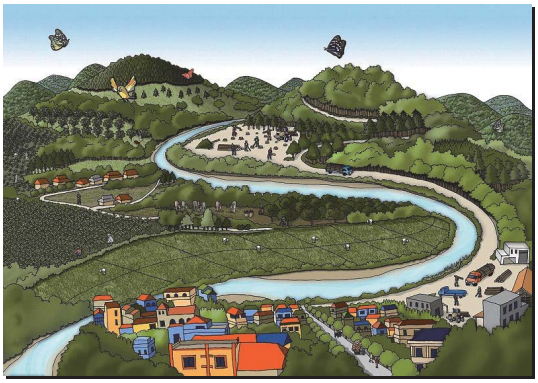


Figure 2: Future image of the society which would be achieved through the project

(3) Toward Implementation / Future prospects and issues

Assumptions made from the study so far for the forest management sector can be summarized as follows:

- There is an enormous amount of land in northwestern Viet Nam, and there is great potential for implementation of a GHG emissions reduction project.
- There is strong reason, in terms of environmental and social aspects, for pursuing REDD+ revegetation and forest preservation activities.
- Conditions are still not sufficient for an investment decision to be made.

As a result, the approach we would like to recommend is to aim for implementation of a small-scale pilot project (PP). The PP would be carried out as a preliminary activity until a bilateral REDD+ framework is established and would be considered an activity contributing to framework establishment and discussions and negotiations between Japan and Viet Nam.

New Mechanism Feasibility Study for REDD+ in Acre, Brazil

By Marubeni Corporation

(1) Description of Project / Activity

From 2011 to early 2012, we have conducted a feasibility study to reduce CO_2 emissions through REDD+ by working together with our counterparts in the State of Acre, Brazil, such as the Acre state government, ITTO, local NGOs and research institutions. We analyzed a possible mechanism of economic incentives for conducting countermeasures to deforestation and forest degradation by establishing educational and social programs with the funding of carbon emission credits among stakeholders in the host country. The target region of this study is the land of 1,557,431 ha illustrated in the following map. This region is adjacent to Rio Branco, which is the state capital of Acre, and experiencing the most rapid deforestation.

Figure 1: State of Acre, Brazil

Figure 2: Geographical boundary of the target region: project site (yellow bold lines)

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Surrounding the project site, we have designated 4.48 million ha as our reference area where the past deforestation rates and vegetation distributions are similar. We have also designated leakage management areas next to the project area. In the leakage management area, we will conduct active monitoring as well as take preventative measures to minimize the leakage. These management will be conducted in the around the high population areas and regions with road and river accesses.

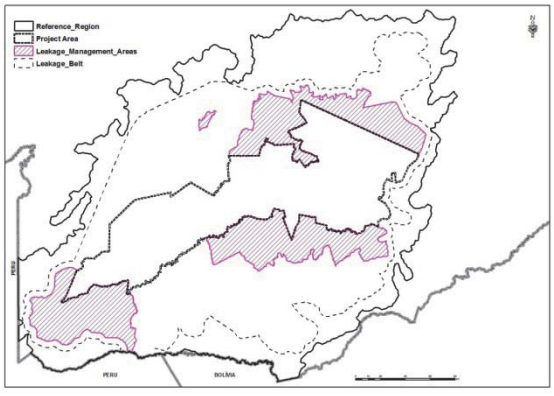


Figure 3: Project Boundary

Reference region: 4.48 million ha
Leakage areas: 1.13 million ha
Project area: 1.55 million ha

(ii) Monitoring Methods and Plan

The REDD+ area will be monitored by the satellite images every year. The ground level monitoring at the project sites will be conducted to measure the carbon stock on every three to five years.

(iii) GHG Emissions and Reductions

The carbon stock stored in the forest in 2030 is calculated as 404.3 million tons on a CO_2 basis from

the above formulae. By implementing REDD+ projects, the average annual CO_2 emission is estimated to decrease by 1.7 million tons.

Table 1: Reference scenario and project scenario (2005 data as a base year)

Reference Year	Remaining CO_2 Stock ($MtCO_2$)		Accumulated CO_2 Emission Reduction, in $MtCO_2$
	Reference Scenario	Project Scenario	
2015	444.1	464.4	20.4
2020	429.5	458.3	28.8
2025	416.3	452.4	36.0
2030	404.3	446.6	42.4

(iv) MRV System for GHG Reduction

With the utilization of satellite data, routine observation of ground sites and utilization of supplementary data such as Light Detection and Ranging (LIDAR), the monitoring and verification method will be conducted. Because the principle of ISO14064-2 is adopted in the VCS to which the methodology is applied, it is desirable to adopt a principle compliant with ISO14064-2 when MRV is established for REDD+.

(v) Analysis of Environmental, Socioeconomic and other Impacts

Generally REDD+ projects are expected to bring various benefits to the local environment and communities. Some of these examples are promoting forest management, promoting methods of using resources such as water, natural resources and energy, obtaining social, environmental, and economic interests from forests by promoting biodiversity and respecting the traditional cultures of indigenous people and introducing forest certification/approval systems by third parties based on a transparent process.

(vi) Financial Planning

The initial investment amount until PDD design and project validation is expected to be between 0.6 and 1.0 million US dollars. We assume that setting up REDD+ projects as business investment schemes is usually difficult from a profitability perspective, and so we will make a further analysis of the situation regarding local land ownership and concessions before also considering a REDD+ project scheme with the cooperation of public institutions and private land owners.

(vii)Introduction of Japanese Technology

Acre state government hopes to review the satellite technology and data supply of the Japanese-run “Daichi” advanced land observing satellite (ALOS). A proposal should be made to utilize ALOS 2, the successor to Daichi, due for launch in the future. There is also a need for a data utilization method.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

The co-benefits of the REDD+ projects include the improvement of the lifestyles of local residents due to credit income and protection of biodiversity by forest preservation.

(ix) Contribution to Sustainable Development in Host Country

REDD+ projects directly support the National Policies of Amazon Deforestation set out in December, 2008 by the Brazilian federal government. It can also contribute to the national strategy on biodiversity. Furthermore, it contributes to SISA and, by increasing the income of local residents and encouraging the transition to sustainable economic development, contributes to increasing their standard of living.

(3) Toward Implementation / Future prospects and issues

Despite a very significant GHG emissions reduction potential from REDD+ projects, the lack of international progress in agreeing a MRV standard puts any projects at serious risk. Furthermore, clear market demand signal is required to encourage investors to allocate risk capital to initiate a large scale projects.

New Mechanism Feasibility Study for REDD+ through Revegetation at Derelict Commercial Forested Lands and Fuelisation of Woody Biomass Chips for Cement Plants in Angola

By PricewaterhouseCoopers Aarata Sustainability Co., Ltd.

(1) Description of Project / Activity

This is an integrated project that combines a REDD+ project for restoration of vegetation in an abandoned industrial afforestation area in Angola and a project for the country's utilization of chips from the afforested area as an alternative fuel in a cement plant. The activities for the whole project are summarized as follows:

A) An afforestation project will be conducted on a site identified as reforestable land in an abandoned industrial afforestation area.
B) A REDD+ project will be implemented covering newly emerging natural forests in the abandoned industrial afforestation site and natural forests in the vicinity of the abandoned industrial afforestation site.
C) Eucalyptus logs derived from the afforestation operation will be transported by trucks and other means to the coastal city and processed into biochips in a chipping plant.
D) The chips will be utilized for biomass energy in a private cement plant that adjoins the chipping plant.

Activities A) to D) above will be undertaken to obtain emissions credits over the entire project by CO_2 sequestration from the REDD+ project and reducing emissions from the cement plant biomass fuel substitution project.

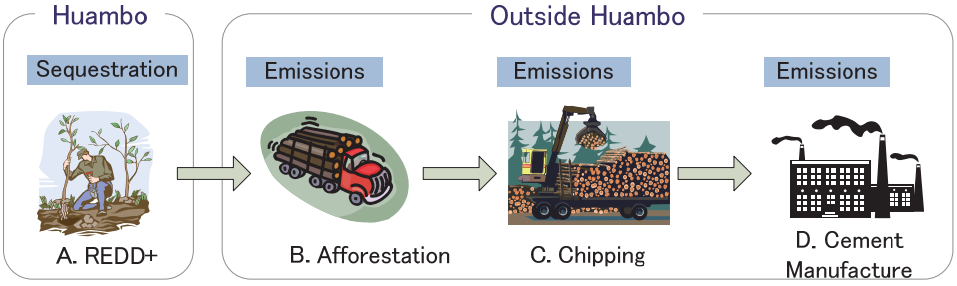


Figure 1: Boundaries for carbon emission and absorption sources for the entire project

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

REDD+ project: Two reference scenarios will be set up: a business-as-usual (BaU) case (Case A) and a case where economic growth will allow deforestation to progress to the level of forest reduction rates similar to those of neighboring countries (Case B). The project boundaries cover about 0.11 million hectares in populated area from Alto Catumbela in Benguela Province to Cassoco in Huambo Province, and natural vegetation in their vicinities.

Cement plant biomass chip fuel substitution project: A reference scenario will be set up as a BaU case, including wood chip transportation from the abandoned industrial afforestation site to a cement plant several hundred kilometers away and utilization of wood chips in the cement plant.

(ii) Monitoring Methods and Plan

REDD+ project: Monitoring must comprise quantifying the emission reductions in the project area to determine the effect of REDD+ activities, and quantifying the emission reductions in the leakage belt to confirm there is no leakage. Effective techniques for these purposes include generation of emission factors for respective major forest types by on-site surveys and forest typing using satellite images or similar. It is important to reconsider the emission factors and regenerate the reference levels every 10 years.

Cement plant biomass chip fuel substitution project: Items for monitoring include the amount of clinker and cement produced, the amount of mineral components used for cement production, kiln

fuel consumption (including heavy oil input and wood chip input, which are covered in the project/activities), energy consumption by non-kiln equipment, amount of wood chips produced in the chipping plant, energy consumption in the chipping plant, log transportation frequency and distance, kind, and consumption and efficiency of transport fuel.

(iii) GHG Emissions and Reductions

Table 1: Greenhouse gas emissions and emission reductions (tCO_2) for the entire project

Project	Greenhouse gas emission reductions (single year)		Greenhouse gas emission reductions (10 years)	
	Case A	Case B	Case A	Case B
REDD+	70,879	195,370	708,794	1,953,700
Cement plant biomass chip fuel substitution project	112,730		1,127,300	
Overall reduction in emissions (total)	183,609	308,100	1,836,094	3,081,000

(iv) MRV System for GHG Reduction

Usually, measurement, reporting and verification (MRV) for a bilateral project are conducted using methods specified by the agreement between the two countries and/or methods specified by the project sponsor country. However, no bilateral agreement exists between Angola and Japan, and no governance on MRV is available in Angola, the project sponsor country. In this situation, first priority should be given to preparing a national system for accepting the MRV of each project. It is desirable that the MRV of each project be designed on the basis of the national system.

- Measurement: The aforementioned monitoring parameters are measured.
- Reporting: Provided that a simplified method is adopted as a means of reporting, it seems appropriate that reporting take place every 5 years.
- Verification: Conducted with reference to ordinary internationally recognized approaches to MRV.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Afforestation project: An EIA need not be conducted in the case of an afforestation project alone; however, if a wood processing operation is included, an EIA is mandatory.

Wood chip processing project: Prior to constructing a wood chip plant, an EIA is needed. Should a former Companhia de Celulose e Papel de Angola (CCPA) plant be reconstructed for wood chip processing, a license must be obtained together with an EIA because the construction work for the plant took place before enforcement of the current Environmental Act.

Wood chip utilization in cement plants: A license with an EIA must be obtained before constructing a new cement plant.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

REDD+ project: A survey was conducted to evaluate associated co-benefits: water resources conservation (watershed conservation function), biodiversity conservation, and economic effects on the local community. Regarding regional economic effects, the project is expected to produce 100 new jobs, creating an income source of about one million US dollars.

(vii) Contribution to Sustainable Development in Host Country

Although Angola has been enjoying dramatic economic development since the end of the civil war, major economic disparities still exist; 57% of urban inhabitants and 94.3% of those living elsewhere reportedly live in poverty and do not receive adequate education. In the area covered by the project, joblessness and low education levels are recognized as two major social problems currently prevalent in the local community; 95% of the inhabitants are unemployed and are engaged in subsistence agriculture, with no options available for them to escape from poverty. The afforestation project and the REDD+ project lead to direct and indirect growth of household incomes, and therefore offer educational opportunities for many children and, from a long-term standpoint, opportunities for occupational choice.

New Mechanism Feasibility Study for Electric Generation based on Low-Level Coal Mine Methane and Integrated Energy Efficiency Improvement in Yunnan Province, China

By Tepia Corporation Japan Co., Ltd.

(1) Description of Project / Activity

The project aims to improve the comprehensive energy efficiency at Bailongshan coal mine located in Yunnan province, China from 3 aspects: generating electric power with methane gas, saving power consumption of electrical equipment with inverter and reducing the power loss at transformer substation with SVC. As to implement the project, reference and MRV methodology is developed under Bilateral Offset Credit Mechanism (hereinafter referred to as BOCM) for creating the projects in Yunnan province, China. The project installs: 2 sets of 5.75MW, in total 11.5MW of power generation system for recovering low concentrated coal mine methane (hereinafter referred to as CMM) and ventilation air methane (hereinafter referred to as VAM), 20 inverters to electrical equipment like pumps and fans and 2SVCs with capacity of 6000kvar and 800kvar to transformer substation. In consequence, 197,472tCO_2 of GHG would be reduced in average annually, while considerable amount of air polluters like SOx, NOx and dust are reduced simultaneously.

Figure 1: Location of the project site and Gas extraction station

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

Reference Scenario

The reference scenario of the project is reconsidered dynamically after the monitoring activity of the project. The reference scenario is determined based on the policies and regulations related to the project, common technologies in China and common practices in other coal mines following to the new methodology; those circumstances shall be monitored as well as the project emission after implementing the project.

Project Boundary:

The physical extent of project boundary is specified as 1.area from the methane extracted to destroyed, 2.all facilities which generate electric power and originally supply the power to the project site and 3.electric equipment with installed inverters to and output range of transformer substation. The GHG included in the project boundary is CH_4 and CO_2.

(ii) Monitoring Methods and Plan

Monitoring activity is conducted not only for determining the project emission but also specifying the realistic reference scenario in the year. The monitoring activity of the project requires the cooperation from the government in the host party under BOCM.

(iii) GHG Emissions and Reductions

The GHG emission under the reference scenario is reconsidered every year. As to the project, the crediting period is considered as 19 years since the reference and the project emissions will be the

same, in short, the emission reduction will be zero in the 20th year after implementing the project.

Table 1: Emission Reduction during the period (tCO_2)

	Reference Emission	Project Emission	ER
Total in project period	6,723,598	2,971,612	3,751,986
Total in crediting period	6,575,018	2,823,031	3,751,986
Average in crediting period	346,053	148,581	197,472

(iv) MRV System for GHG Reduction

The MRV system is designed as follows;

・Measuring

The measurable data like the amounts of generated power or methane gas flow to calculate the emission reduction are measured through the electric meters. As to the other values like emission factor of local grid are applied for the default values used under Kyoto mechanism or designed by IPCC.

・Reporting

The measurement result is reported to a verification institute and the related bodies both in Japan and China. The result is better to be submitted through a platform at fixed period every year.

・Verifying

The reported result shall be verified by a verification institute entrusted by both Japanese and Chinese governments.

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

No additional negative impact on nature or society is identified.

(vi) Financial Planning

The project requires 140 million RMB for the initial investment; the project IRRs with and without BOCM credits revenue are 26.98% and 13.14% and its payback periods are 3 and 7 years respectively.

(vii)Introduction of Japanese Technology

Although the Japanese technology is more expensive than the common technology in China, it is concluded that the Japanese technology is superior to those in China because of its performance and quality; thus introduction of the Japanese technology is very realistic with credit income under BOCM.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

As implementing the project, the part of electricity originally supplied from the coal dominant grid is replaced. Accordingly the considerable amount of SOx, NOx and dust emission are reduced. The estimated emission reductions of those 3 pollutants are 285,654kg, 503,056kg and 273,015kg respectively.

(ix) Contribution to Sustainable Development in Host Country

The implementation of the project contributes to the sustainable development in China from the following aspects; contributing to the power shortage, securing the safety of mining operation and creating the job opportunities.

(3) Toward Implementation/ Future prospects and issues

One of the main themes of the project is the gas extraction activity from the coal seams; the gas extraction activities at many coal mines in Yunnan province have some trouble. For stable operation of the project, the mutual communication between related organizations is necessary. In the case the gas extraction activity is not favorable with the Chinese domestic technology, it can be considered the installation of Japanese extraction technology.

New Mechanism Feasibility Study for CO_2 Reduction through Utilising Off-Peak Power from Storage Batteries and Introducing Electric Vehicles in Thailand

By Mizuho Information & Research Institute, Inc.

(1) Description of Project / Activity

In Thailand, the project will decrease CO_2 emission and air pollutants with counterparts such as EGAT, MEA and PEA by implementing those below.

[Installation of Storage Batteries]

Reducing fossil fuel use for power generation by installing batteries (including EV's batteries)

[Introduction of EV and Charging Facilities]

Reducing fossil fuel use for conventional vehicles by introducing EV and charging facilities

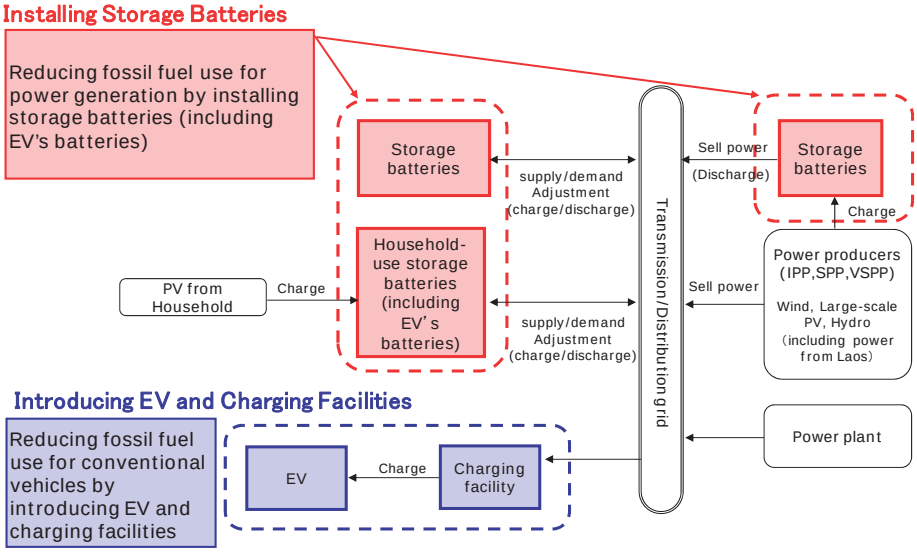


Figure 1: Overall Picture of Feasibility Study

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

[Installation of Storage Batteries]

The case that conventional power is used without introduction of storage battery is set as "Reference Scenario".

Boundary includes the supply of power charged and discharged from batteries.

[Introduction of EV and Charging Facilities]

The use of fossil fuel-powered vehicle (not EV) is set as "Reference Scenario".

Boundary includes emission from the usage of vehicle.

(ii) Monitoring Methods and Plan

[Installation of Storage Batteries]

Need to monitor power charged to and discharged from batteries and emission factors of charged power and of replaced power by discharged.

[Introduction of EV and Charging Facilities]

Need to monitor power consumed, efficiencies of EV and reference vehicle and emission factors of fuel and power.

(iii) GHG Emissions and Reductions

[Installation of Storage Batteries]

About 390,000tCO_2/y (year 2022)

[Introduction of EV and Charging Facilities]
About 190,000tCO_2/y (year 2026)

(iv) MRV System for GHG Reduction

- Measurement (M)
  Flexible methodologies with a wide range of monitoring should be adopted, considering the future availability of simpler monitoring.
- Reporting (R)
  Report the result of monitoring annually
- Verification(V)
  Verify the adequacy of monitoring

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

Developing pumping-up power plant is another way to make use of power surplus. Storage batteries should be adopted to avoid destruction of nature, which would be caused by development of pumping-up power plant.
When introducing battery or EV, it is also required to install battery recycling system.

(vi) Co-benefits (i.e. Improvement of Local Environmental Problems)

When transmission company adopts a long term fluctuation measure with NaS battery, annual emission reductions of SOx: 5,393kg, NOx: 10,785kg and Soot and dust: 539kg are expected.

(vii) Contribution to Sustainable Development in Host Country

[Installation of Storage Batteries]
- Improvement of Energy Security
- Decline of Health hazard by cutting environmental pollutants
- Reduction of Risk of Economic and Social Loss from Blackout Risk Reduction
- Avoidance of New Development of Pumping-up Power Plant
- Accumulation of knowledge about grid stabilisation technology using batteries

[Introduction of EV and Charging Facilities]
- Improvement of Energy Security
- Decline of Health hazard by cutting environmental pollutants
- Preparing statistics and mileage standards of vehicle category

(3) Toward Implementation / Future prospects and issues

[Installation of Storage Batteries]
- Information Provision related to grid stabilisation
  Offering our technological knowledge and arousing the needs for grid stabilisation measures
  - How much renewables will require grid stabilisation measures?
  - What measures for grid stabilisation?
  - How much cost for each measure?
  - How to share the costs? Etc.
- Cooperation for trial project
  Through trial project of battery installation, early knowledge accumulation and recognition of battery usability will occur.

[Introduction of EV and Charging Facilities]
- Support for installing measures to cut EV adopting cost
  Supporting the introduction of cost reduction measures such as subsidy and tax benefits
- Cooperation for trial project
  Supporting the trial project of EV installation through procedures such as setting model district
- Support for preparation of statistics and for establishment of standard value
  Supporting data preparation and standard setting to evaluate the effect of EV easily

New Mechanism FS for CO_2 Abatement through Utilisation of Blast Furnace Slags as Blending Material for Cement in Viet Nam

By Mitsubishi Research Institute Inc.

(1) Description of Project / Activity

Export of Ground Granulated Blast Furnace Slag (GGBFS) to Vietnam, to be blended with cement clinkers to produce GGBFS blended cement.

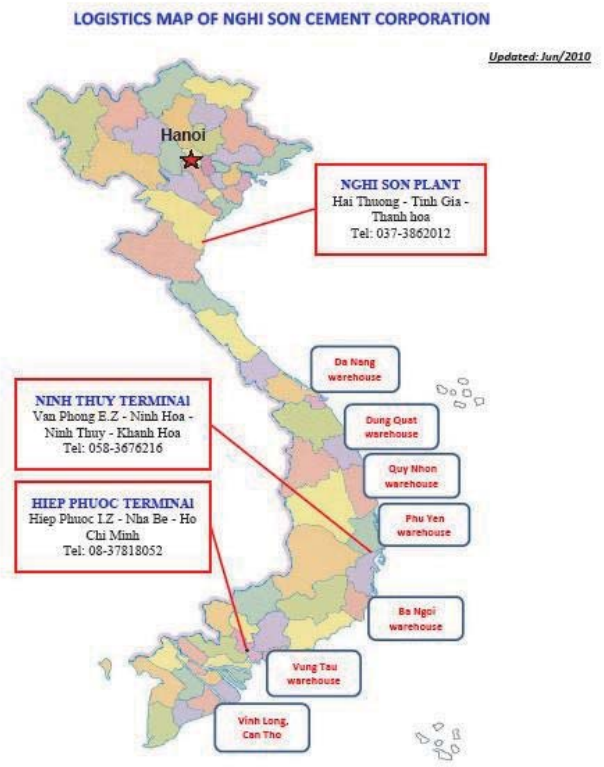


Figure 1: location of facilities of Nghi Son Cement Corporation
(From Nghi Son Cement Corporation website)

(2) Results of the study

(i) Reference Scenario and Project/ Activity Boundary

A new methodology was developed for the purpose of the project activity, based partly on CDM methodology ACM0005. Reference scenario is to be selected from the following:

A No change in existing facility (substitute cement in the market)
B Will use other blending material
C Will construct a new clinker production line
D No change in existing facility (substitute cement of existing facility)

(ii) Monitoring Methods and Plan

Monitoring methods differ according to the reference scenario.

- For scenarios A and C, MRV methodology incorporates various default factors so that consumption data of GGBFS alone will yield emission reduction.
- For scenario B, the MRV methodology is not applicable.
- For scenario D, the data of the project site is usable according to the provisions of ACM0005.

(iii) GHG Emissions and Reductions

GHG emissions reduction was calculated to be 396,505tCO_2 per year, based on the projected use of granulated blast furnace slag (GGBFS). Sensitivity analysis was carried out, and result indicates that expected to yield more than 350,000tCO_2 in most cases.

Table 1: Comparison of baseline and project emissions

Baseline emissions	Project emissions	Leakage emissions	Emission reduction
408,932tCO_2	12,428tCO_2	0	396,505tCO_2

(iv) MRV System for GHG Reduction

A simplified MRV methodology is developed, whereby GHG reduction can be calculated by minimal monitoring (by consumption of GGBFS)

(v) Analysis of Environmental, Socioeconomic and other Impacts (including Securement of Environmental Integrity)

It was found that there are limited positive and negative impact besides considerable GHG reduction and energy / resource conservation. Furthermore, it was also found that the project is expected to contribute to SO_2 reduction.

(vi) Financial Planning

Total investment cost is expected to be JPY 4 billion.

(vii) Introduction of Japanese Technology

Japanese technology on slag grinding and mixing is expected to be technologically superior, though high cost is a possible problem. It must be stressed that GGBFS itself is a Japanese product, and is considered to possess superior quality.

(viii) Co-benefits (i.e. Improvement of Local Environmental Problems)

There are considerable energy conservation results in reduction of SO_2. The project will also contribute to conservation of materials such as limestone.

(ix) Contribution to Sustainable Development in Host Country

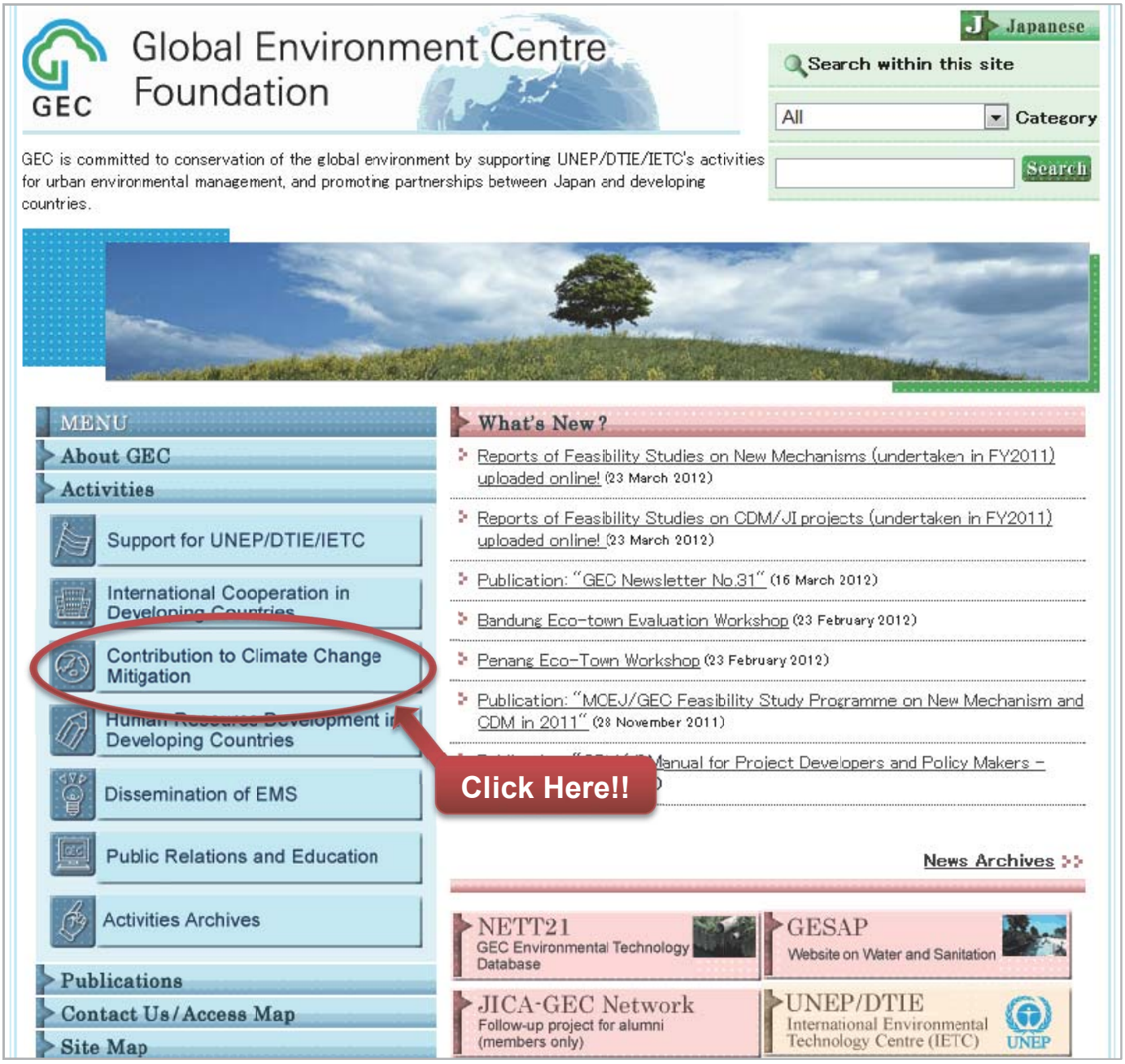
GGBFS blended cement, with its high resistance against sulfuric acid, is expected to suit the needs of infrastructure development in Vietnam. Furthermore, GGBFS blended cement emits less heat during hardening, which makes it suitable for use in massive quantities often required for infrastructure projects.

(3) Toward Implementation / Future prospects and issue

In 2006, Vietnam Institute of Building Materials (VIBM), with the assistance of the Japanese steel and cement sector, standards for GGBFS which can be blended into cement TCVN 4315) and portland cement with GGBFS blending rate between 40% and 70% (TCVN 4316) have been established. As a result, it is possible to use GGBFS in cement. Despite such recent developments, use of GGBFS is hardly existent due to its limited availability in Vietnam. Main impediment against implementation is the high cost of transport, since GGBFS needs to compete against domestic blending material with considerably less transport requirement.

It is expected that developing specification requirements to use GGBFS blended cement (which possess superior quality in chemical and water resistance) is desirable. Furthermore, possible offset credits such as the BOCM scheme would greatly improve the competitive advantage of GGBFS blended cement.

Global Environment Centre Foundation Website



Further details about Feasibility Studies are available at http://gec.jp

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