CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Title: The model project for renovation to increase the efficient use of energy in brewery

Version: 7.3rev

Date: 14/04/2006

[Note] Changes from the previous version (ver. 6) are specified in red.

A.2. Description of the project activity:

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This project is an overall renovation for energy conservation of a medium-size brewery company BIA THANH HOA (BTH) in Vietnam. GHG emissions will be reduced by improving energy efficiency in the beer production process.

Thanh Hoa Beer Joint Stock Company (BTH) is a subsidiary of the state-owned Hanoi Alcohol Beer and Beverage Corporation (HABECO). BTH produced 20,200 kL/year in 2002 and is the eighth largest producer in Vietnam.

The beer production has soared in Vietnam in recent years and BTH produced 42,000 kL in 2003 and, in 2004, they plan to expand their production substantially to 53,000 kL driven by strongly growing demand in Vietnam.

Beer production generally requires a larger plant facility compared to other beverage production or food industries. This industry requires mixed processes using warm and cold thermal energy and consumes larger amounts of fossil fuels and electric power compared to other beverage production or food industries.

Figure 1: Current utility facilities at Thanh Hoa Brewery

Current Operation Status of the BTH Plants

BTH has been operating with a considerably lower energy efficiency for the following reasons:

- BTH uses coal as fuel because of its location close to coal mines. The boilers are operated at very low efficiency, however, by unnecessary purging because coal boilers cannot follow the rapidly changing demand for steam in the brewing process;
- Very low refrigeration efficiency due to old-fashioned refrigeration equipment;
- No waste heat recovery system is implemented.

Currently, wastewater is discharged after dilution and biogas (*incl*. methane) is emitted outside the BHT plant facility, wherever detention of wastewater is possible.

<u>Outline and the purpose of the project</u>

In this project, we are proposing to implement energy saving systems additional to the existing plant facility of BTH such as:

- VRC system (Vapour Recovery Compressor);
- Improvement in refrigeration efficiency together with ice thermal storage;
- Energy saving operation of pasteurizer (sterilizer after bottling process); and
- Steam generation using bio-gas boilers

without expanding beer production capacity.

Energy consumption of an entire brewery plant will be reduced which will, in turn, reduce emissions of GHGs (particularly CO_2) generated by combustion of fossil fuel.

This project is not a part of a larger or bundled project, but an independent one.

<u>Contribution to sustainable development of the host country</u>

As the brewery plant is often an advanced leader in the food industry, most of the energy saving systems proposed in this project can be applied and expected to penetrate to other food industries as well. This transfer of technology for energy saving as well as reduction of polluted emission substances will contribute extensively to the sustainable development of Vietnam. Following are concrete benefits resulting from the implementation of each system:

- VRC system:
  Substantial reduction in steam consumption with little additional power consumption.
- Improvement of refrigeration efficiency:
  Reduction in electric power.
- Ice thermal storage system:
  Reduction in power by producing cold thermal energy during the night when the ambient temperature is relatively low. This ideal Demand Side Management benefits the user by using economical off-peak tariff extensively and contributes to the sustainable development of the host country by levelling the peak electricity demand.
- Energy saving operation of pasteurizer:
  Reduction in steam consumption.
- Biogas boiler:
  Reduction in coal consumption.

It is also expected that this project will create more employment for skilled workers such as machine operators and maintenance staffs.

A.3. Project participants:
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Name of Party Involved(*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Vietnam (host)	**Thanh Hoa Beer Joint Stock Company (BTH)** Private entity authorized by the Vietnamese DNA	Yes
	Hanoi Alcohol Beer and Beverage Corporation (HABECO) Private entity authorized by the Vietnamese DNA (the parent company of BTH)	
	Research Institute of Brewing (RIB) Private entity authorized by the Vietnamese DNA (a division of HABECO supporting BTH technically)	
	Ministry Of Industry (MOI) Public entity (in charge of HABECO (Permits & Supervising))	
	Ministry Of Natural Resources and Environment (MONRE) Public entity (responsible for Environmental Impact Assessment for CDM projects)	
Japan	**The New Energy and Industrial Technology Development Organization (NEDO)** Public entity authorized by the Japanese DNA	No
	Mayekawa MFG. Co., Ltd. (MYCOM) Private entity authorized by the Japanese DNA (implementation of equipment under contract by NEDO and technology transfer)	

Vietnam ratified the Kyoto Protocol on 25 September 2002.

Japan sent its acceptance of the Kyoto Protocol on 4 June 2002.

This project was approved by the Japanese Government in January 2005.

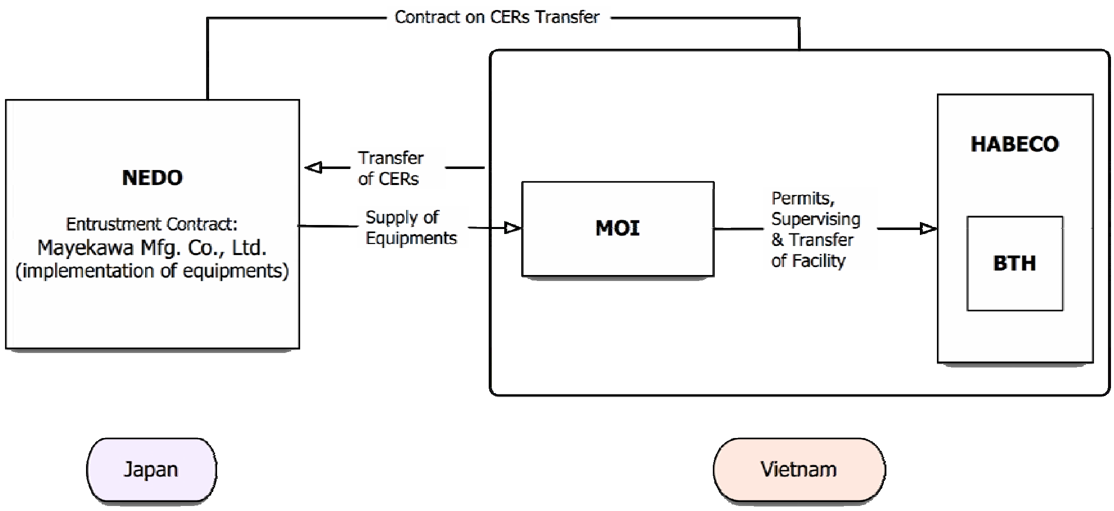

Figure 2: Roles of Project Participants

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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Socialist Republic of Vietnam

A.4.1.2. Region/State/Province etc.:

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Thanh Hoa

A.4.1.3. City/Town/Community etc:

>>

152 Quang Trung Thanh pho

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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Thanh Hoa Beer Joint Stock Company is a state-owned brewery company situated 150 km south (3 hours drive by car) of Hanoi—the capital of Vietnam, in the center of the Province of Thanh Hoa which is the northern end of Central Vietnam. It is situated along National Route

No.1 which runs north to south through Vietnam. Route No.1 is the trunk route in Vietnam with continuous traffic throughout the day.

BTH plant with an area of approximately 40,000 m^2, is surrounded by closely spaced houses and 4-meter wide streets to North, South, East and West. Only one gate on Southeast side is open to Route No.1. A rural area develops behind the plant (Northwest) 50 meters away across crowded houses. Sam Son, a beach resort along Tonkin Bay is located about 20 km to the West.

There are about 20 breweries in Vietnam which produce more than 10,000 kL per year. Among them, six breweries including BTH are using coal as the primary fuel because they are located in the northern part of Vietnam close to coal mines.

BTH is the second largest plant in Thanh Hoa province and Thanh Hoa is designated as one of the most important for development purpose.

Figure 3: Map of Vietnam and the Location of BIA THANH HOA

A.4.2. Category(ies) of project activity:

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Energy efficiency improvement project:
[Demand-side energy efficiency improvements for specific industrial production]

A.4.3. Technology to be employed by the project activity:

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Currently, even a simple energy saving technology is not used at the site and in Vietnamese beer brewery sector.

Energy saving technologies used in the project are integrated system of:

(1) VRC, (2) Improvement of refrigeration efficiency & thermal storage, (3) Optimization of pasteurizer efficiency, and (4) Biogas boiler.

(1) VRC System

Currently, in a brewery plant, the boiling kettle in the brew-house discharges large amounts of waste steam into the atmosphere. This system recovers and compresses waste steam by a steam compressor and reutilizes recovered steam as a heat source for the Wort Kettle itself. VRC can reduce a substantial portion of steam consumption by adding only a small amount of driving power.

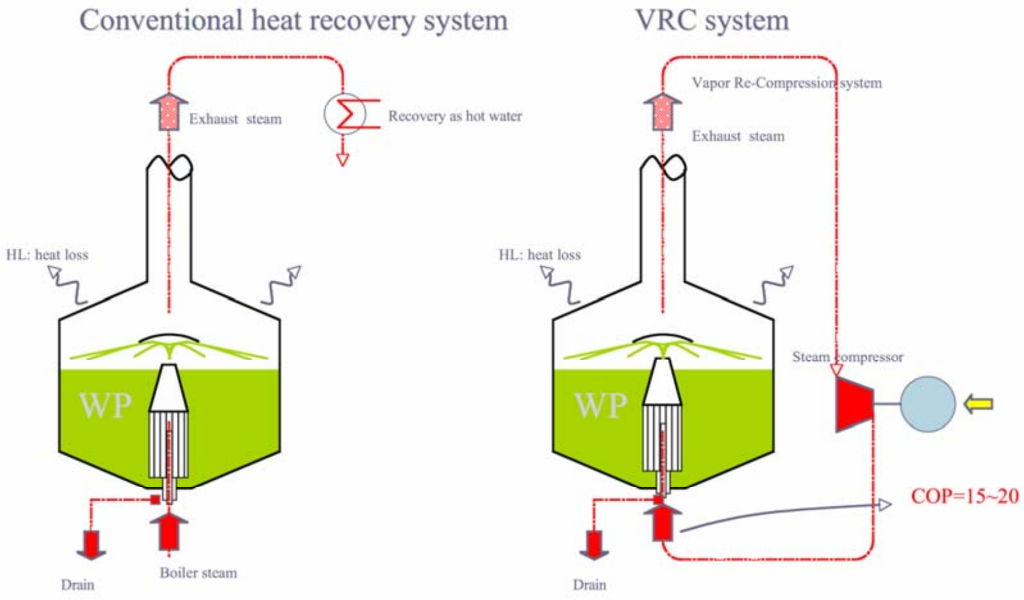

Figure 4: Conventional heat recovery and VRC systems

(2) Improvement of refrigeration system

2-1. Cascade Cooling System

Water used in the brewing process is chilled to approximately 3 °C. from ambient temperature. Because of its large temperature differential for cooling down, it is more efficient to run multiple chiller units in series (Cascade cooling system) rather than a single chiller unit so that refrigeration COP (Co-efficient of Performance) can be improved to 8.

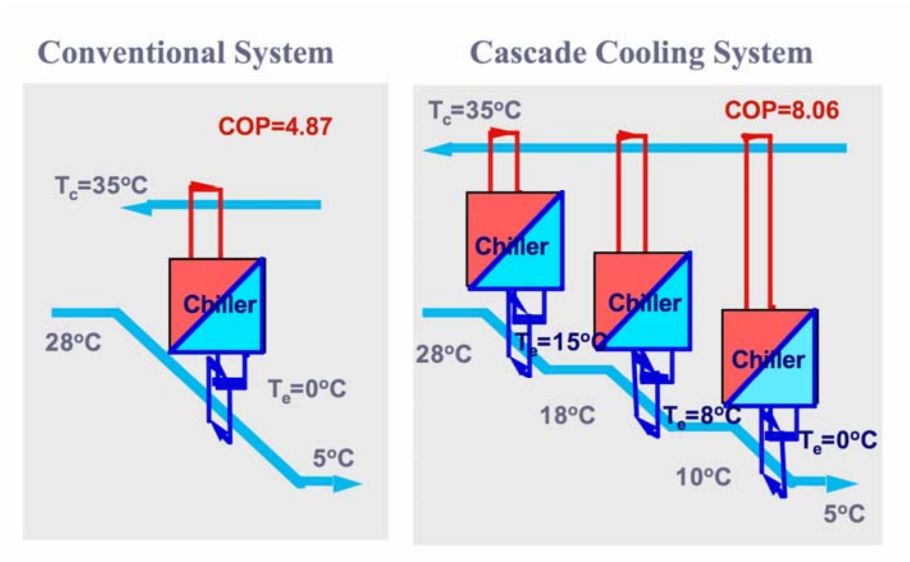

Figure 5: Conventional and cascade cooling systems

2-2. Dynamic Ice Thermal Storage and Transporting System

This is an ice thermal storage system for storing ice slurry (called "Dynamic Ice") made from brine freezing at –3 to –5 °C. By making ice during night at lower ambient temperature and operating the refrigeration compressors at 100% capacity, it will contribute to a reduction in power consumption rate per (cold) thermal unit produced. (Reduction of electric power by improving refrigeration efficiency).

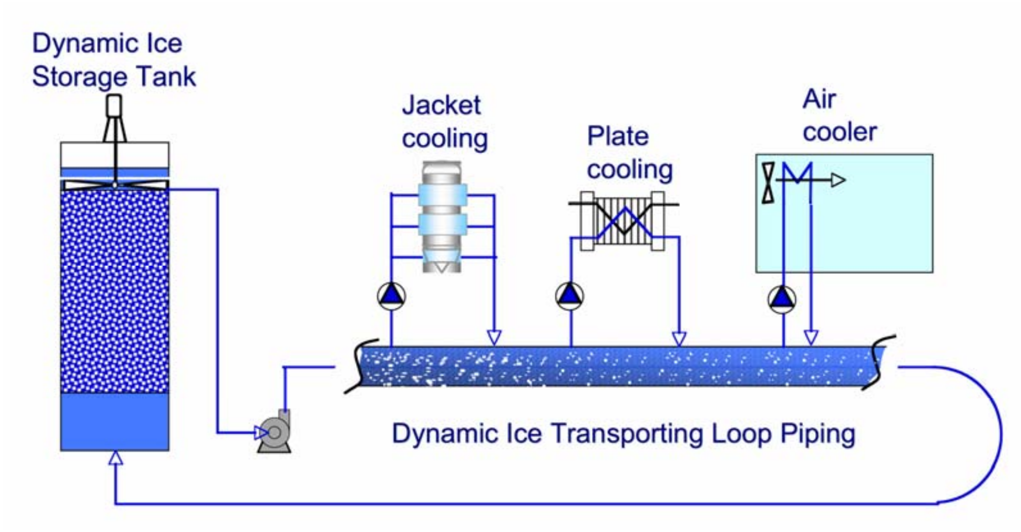

Figure 6: Dynamic ice thermal storage and transporting system

(3) Optimization of Pasteurizer

Pasteurizers in bottling and canning lines consume large quantities of steam and water because they have to be cooled down to ambient temperature after the heat sterilization process. Optimizing this process will reduce steam consumption. (Reduction of steam consumption without wasting energy).

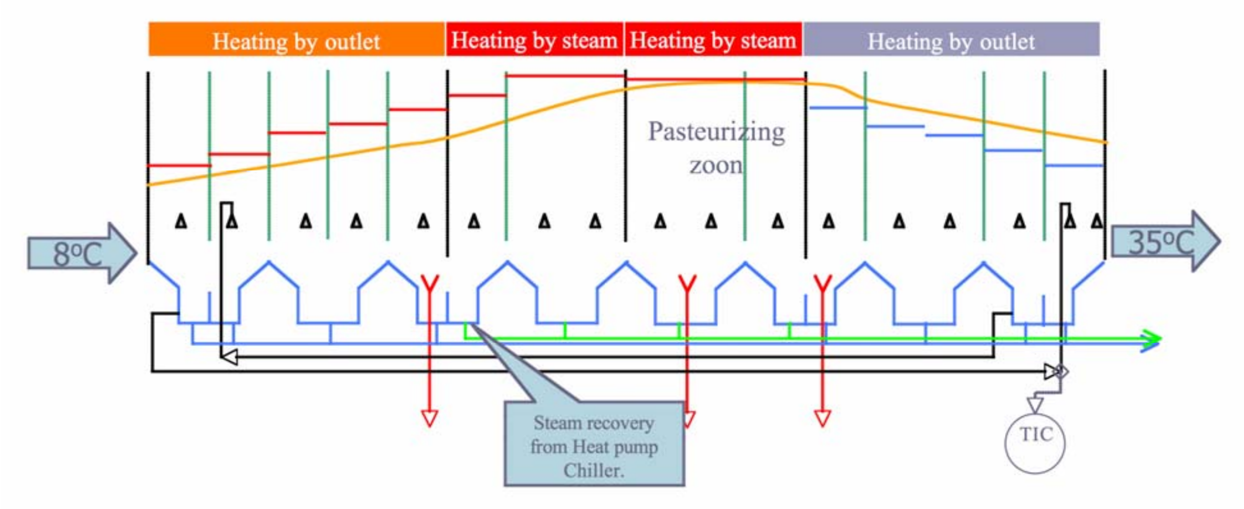

Figure 7: Optimization system in Pasteurizer

(4) Biogas Boiler

Recovery of methane Gas generated from wastewater treatment by anaerobic fermentation is used as boiler fuel. This boiler will be used to take up large fluctuations in steam consumption in the brewing process. (Reduction of steam generated by existing boilers and GHG emissions by the use of biogas as an energy source)

Using these technologies, it is possible to reduce Baseline energy consumption in the brewery plant significantly.

These technologies are already widely used in Japan and the transfer of technology is possible by engineering seminars and maintenance training.

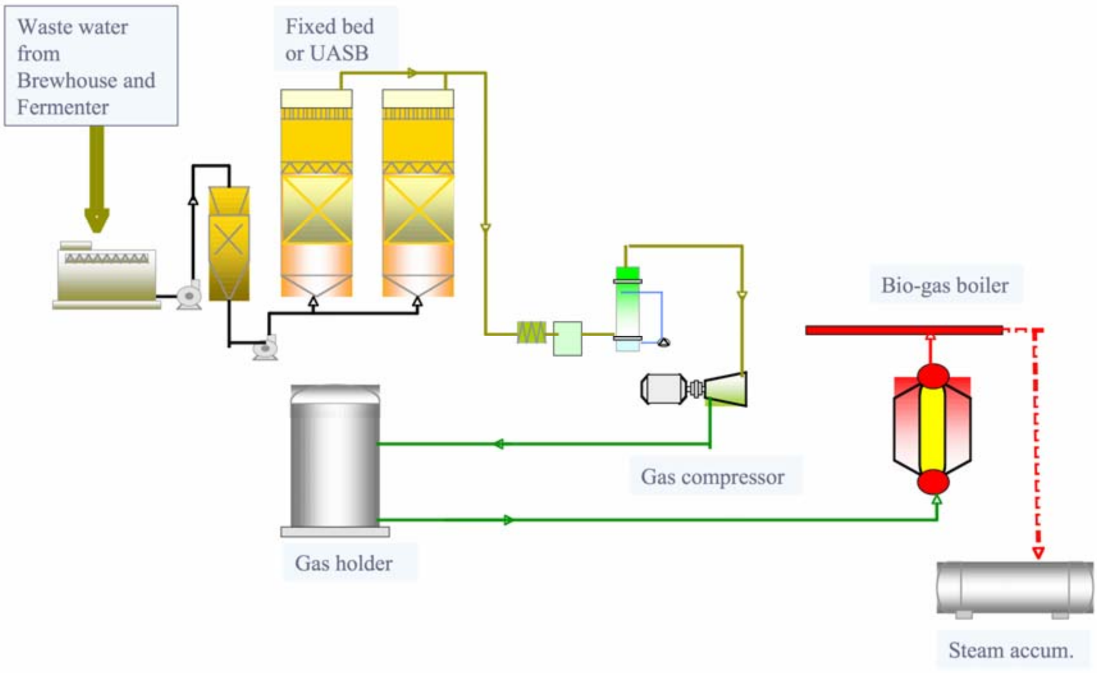

Figure 8: Anaerobic wastewater treatment and biogas boiler

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

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Additionality and Baseline Scenario:

Due to high capital investment cost and low utility cost, there is no economic attractiveness to implement this kind of energy conservation project in Vietnam, and BTH does not have such a plan. The estimated pay-back period of the proposed energy conservation system is more than 5.5 years for no CER case. BTH has no intension to invest in the project with more than 5.5 years of the pay-back period. Moreover, BTH has its priority in increasing beer production facility to meet the growing demand of beer in Vietnam, because it is more profitable, than utility sector improvement, especially under such long pay-back period within limited financial resource.

In addition, technological barriers exist for refurbishment type of energy efficiency improvement (even if it is simple one) as well as the lack of experiences to reform energy saving system by BTH.

Moreover, the reason why NEDO implements this project as a model project is that there exists significant barriers to implement by the host company itself.

Due to the lack of financial attractiveness and prohibitive barriers in accessing and implementing integrated up-to-date energy saving technologies, this project can only be realized

by CDM. Therefore, this project is an additional implementation for the BTH brewery plant in Vietnam.

However, BTH may implement some kind of energy saving practices if this project is not implemented. The baseline methodology tries to identify this practice/technology through thorough analysis of three possible options for the energy utility components and three options for the wastewater treatment system, and concludes that BTH could introduce aerobic wastewater treatment facilities in addition to the existing utilities with the same level of energy saving as the baseline scenario which is less energy efficient than the project scenario.

Energy Saving:

As the production capacity of BTH and the amount of beer production is *common* for the project and the baseline scenarios, CO_2 emissions, equivalent to the energy saved, are reduced by project implementation.

The baseline emissions depend on the energy consumption and carbon emission factor per unit of beer production. Such factors are affected by the rate of operation. It is not straightforward to estimate the carbon emission factor of the counterfactual baseline scenario, in which the operation rate is expected to increase. The methodology gives a formula based on analysis to estimate this factor.

This system is a combined system composed of VRC system, Refrigeration system improvement, Optimization of Pasteurizer and Bio-gas Boiler. CO_2 emissions can be reduced by reducing consumption of coal and electric power using these energy saving systems, compared to the brewing process used in an existing conventional plant facility.

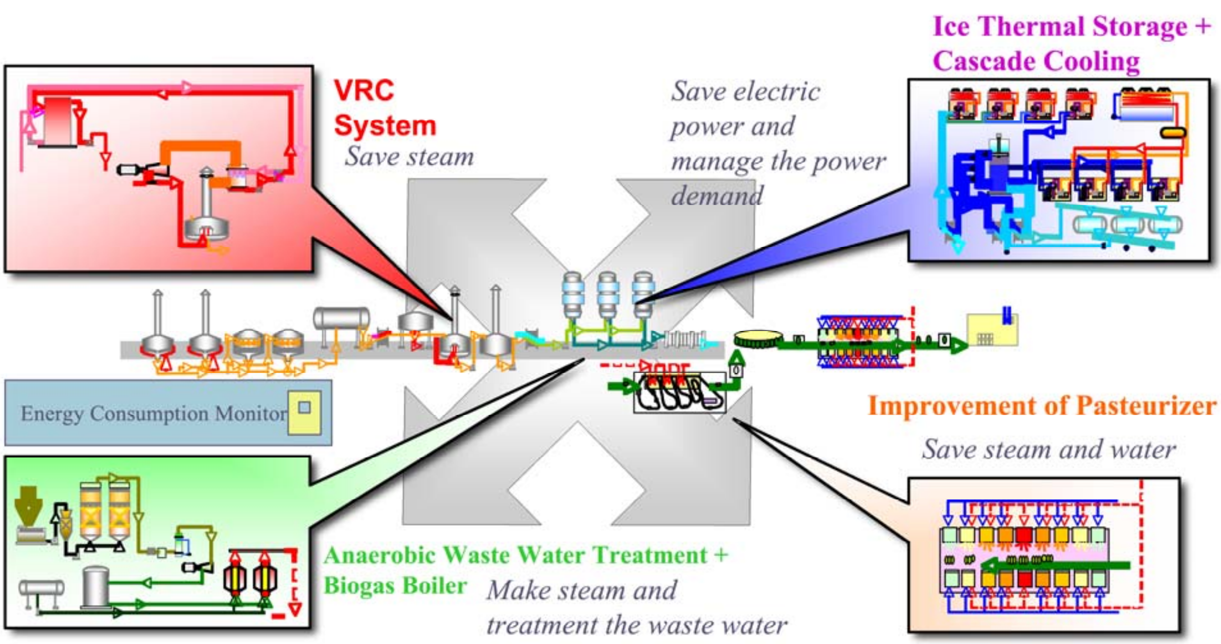

Figure 9: Proposed integrated high energy efficient system

Reduction in generation of fermented gas downstream of diluted wastewater discharge:

BTH is currently discharging wastewater from the plant after only diluting. Therefore, methane is generated under anaerobic conditions downstream where detention of water occurs. In this system, we collect highly concentrated wastewater from the brewing process and treat it under anaerobic conditions in order to generate biogas. Biogas is then recovered and used as fuel for biogas boilers. The amount of methane generated outside the plant facility will be reduced compared to the conventional system.

The amount of methane generation cannot, however, be determined precisely due to the technical difficulties in estimating the open water system which BTH utilizes. Therefore, in the baseline scenario, it is designed to be estimated on the conservative side, that there is no generation of methane with the help of the aerobic treatment and with additional power required.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

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Estimated total emission reduction is 116 kton-CO_2 over the crediting period (10 years).

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2006	7,713
2007	8,306
2008	8,982
2009	9,750
2010	10,619
2011	11,599
2012	12,695
2013	13,918
2014	15,274
2015	16,776
Total estimated reductions (tonnes of CO_2e)	115,631
Total number of crediting years	10 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	11,563

Note: The above figure is "provisional" and indicative number at this stage due to the following reasons:

(1) The PDD will be finalized at the very end of the validation process (host country approval will be done at any time prior to this stage).

(2) The validation process starts after the approval of the new methodologies submitted. The PDD must be rewritten by using the approved methodologies (the calculation of emission reductions shall use the approved and reformatted methodology).

(3) The calculation method of emission reductions specified in the methodology needs some up-dated/latest data of the factory. These data have not yet obtained. Therefore, the figure above is derived by using a simple method used in the feasibility study. After collection of such data, the figure will be re-calculated in the revised version of the PDD.

(4) Even in the final version of the PDD, the figure of emission reductions is only an "expectation". True figure of emission reductions (which will be verified by the Operational Entity) will be calculated by using monitored parameters ex post (after implementation of the project).

See Section E.6 for calculation.

A.4.5. Public funding of the project activity:

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Public funding of the Japanese government is used for this project while this does not result in a diversion of ODA. See Annex 2 for details.

SECTION B. Application of a baseline methodology

Note: It is noted that this section must be rewritten by using the approved methodology, i.e., will be re-drafted after approval of the methodologies submitted. Therefore, this section B and section D are provisional and will be totally changed at the stage of validation (after approval and reformat of the methodology).

B.1. Title and reference of the approved baseline methodology applied to the project activity:

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Introduction of integrated demand-side energy saving system for existing beer brewing system (AM 00XX)

Note: The serial number AM 00XX will be assigned after the approval of the submitted new baseline and monitoring methodologies by the CDM Executive Board.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

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Justification concerning the applicability conditions:

The question is whether the applicability conditions of the methodology AM 00XX are appropriate to this project.

The applicability conditions of the methodology are

Condition 1:

The project activity shall not result in the construction of new/additional beer production facilities with separate/new energy utility systems. Modification of the existing utility system is eligible even if new beer production facilities are added simultaneously.

Condition 2:

The project activity does not set its crediting period beyond the physical lifetime of the whole existing utility system.

The project participants shall demonstrate the lifetime by determination of the technical lifetime on a case-by-case basis, for each equipment or equipment type that is being replaced. The transparent and suitable evidences may include quantitative and/or documented information when relevant, such as catalogue spec, renovation plan, the real situation of the beer factories in the host country, *etc.* and provide conservative interpretations. The DOE assesses the validity of the evidences.

Condition 3:

The project activity does not export electricity or heat to the outside of the beer factory.

Condition 4:

The project activity does not emit effluent water under an anaerobic condition in the

open air, *i.e.*, no methane is generated in the project scenario.

Condition 5:

The project participants shall use a theoretical model to have an energy audit for the beer brewery factory energy utility system. The model calculates the theoretical consumption of the utilities from the material balance and the energy balance.

The situation of Vietnam and BTH as well as the proposed project satisfy all of these conditions.

The project is an energy conservation project targeting "energy utility" and does not include the expansion of the utility facility. Therefore, the project does not link to the increase of beer production.

As shown in sub-section A.4.3., the project includes biogas recovery and its utilization for boiler in the system.

No brewery has introduced the integrated high energy efficient system in Vietnam to date.

For this project, the energy audit model developed by MYCOM is applied for theoretical calculation.

B.2. Description of how the methodology is applied in the context of the project activity:

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Here the logics to identify the baseline scenario specified in the baseline methodology are followed:

Step 1. Identify technically feasible options for energy saving at the beer brewing factory or other purposes

Step 1a. Technical options for energy saving at the beer brewing factory

The baseline scenario alternatives should include all possible options that are technically feasible to save the energy usage at the beer brewing factory. The category of options could include:

A. Continuation of current practice;

B. Technologies for element processes for beer production; and

C. Integrated technology system.

For Option Category B, the technologies include

B.1. Steam pressure recovery [multiple processes];
B.2. Vapor recompression system [brewing process];
B.3. Refrigerator efficiency improvement [multiple processes];
B.4. Energy saving by biomass CO_2 recovery [fermentation process];
B.5. Packaging process improvements [packaging process]; and
B.6. Biogas utilization [wastewater treatment process].

These options are those assessed/provided by the energy audit.

The option category C should include the proposed project activity not implemented as a CDM project.

The energy audit model, developed by MYCOM (Mayekawa MFG), applied to the BIA THANH HOA (BTH) project in Vietnam can treat all these technical options with appropriate theoretical calculations.

The technical analysis by using the model is to be shown to the DOE.

Step 1b. Options for other purposes

The baseline scenario alternatives should include other possible alternative options to the project activity for other purposes. These options may include

a. Expansion of the beer production system (rather than improving energy utility system);

b. Shut-down of the facility; or

c. Others.

If the options emit more GHGs than the most probable technical option for energy saving or continuation of current practice (*esp*. for case a), such options do not need to be assessed for conservativeness.

The BTH does not have a plan to shut down of the facility.

On the other hand, it has a plan to increase its beer production by using current utility system. The corporate decision-making of the BTH makes much of more profitable beer production than less profitable energy saving under the rapid growing demand of beer in Vietnam.

Written documents as well as the interview result of the beer brewery authority in Vietnam are provided to the DOE to confirm this decision-making.

Step 2. Eliminate baseline options that do not comply with legal or regulatory requirements

Any options identified in Step 1 that do not and are not expected to meet with local legal or regulatory requirements should be eliminated. The project participants shall provide evidences and supporting documents to exclude baseline options that meet the above-mentioned criteria.

The regulatory requirements include those on wastewater.

At present, the BTH does not have the wastewater treatment system. The effluent water is emitted outside of the facility. However, as the BTH increases its beer production as planned, it needs to install some wastewater treatment system in order to meet the local regulation. Therefore, a wastewater treatment system (most probably, the cheapest aerobic treatment system) would be installed in the near future if the proposed project would not be implemented.

The BTH would not be constrained by other regulatory requirements.

Step 3. Formulate baseline scenario alternatives

On the basis of the options that are technically feasible and comply with all legal and regulatory requirements, the project participants should construct coherent and comprehensive baseline scenario alternative(s). One of these alternative(s) shall be the proposed project activity not being registered as a CDM project.

The baseline scenario alternatives should clearly identify what amount of energy is saved theoretically using an energy audit model.

The baseline scenario alternatives should also identify how and what kind of fuel(s) and electricity is supplied to the facility considering costs, availability and technical aspects.

Though the steps above, all of the options specified in Step 1 remains, with the restrictions of:

- *Effluent water is treated aerobically,*
- *For main fuel for heat generation, coal is continued to be used, and*
- *For in-house electricity supply, current small self-power generation system is used without any modification; the rest is supplied from the grid,*

considering local cheapest and most reliable options.

For the energy consumption/saving for each scenario, the result of the energy audit model is provided to the DOE with underlying assumptions.

Step 4. Eliminate baseline scenario alternatives that face prohibitive barriers

Sub-step 4a. Identify barriers that would prevent the implementation of type of the proposed project activity:

Establish the complete list of barriers that would prevent alternatives from occurring in the absence of the CER revenue. Such barriers may include, among others:

Investment barriers *inter alia*:

- Debt funding is not available for this type of innovative project activity;
- Neither access to international capital markets due to real or perceived risks associated with domestic or foreign direct investment in the country where the project activity is to be implemented, nor sufficient ODA can be allocated to finance the considered project alternatives.

Technological barriers, *inter alia*:

- Skilled and/or properly trained labour to operate and maintain the technology is not available and no education/training institution in the host country provides the necessary skills, leading to the disrepair and/or malfunctioning of equipment;
- Lack of infrastructure for the implementation of the technology.

Barriers due to prevailing practice, *inter alia*:

- The project activity is the “first of its kind”: No project activity of this type is currently operational in the host country or region.

Provide transparent and documented evidences, and offer conservative interpretations of these documented evidences, as to how it demonstrates the existence and significance of the identified barriers. Anecdotal evidences can be included, but those alone are not sufficient proofs of barriers. The type of evidences to be provided may include:

(a) Relevant legislations, regulatory information or industry norms;

(b) Relevant (sectoral) studies or surveys (*e.g.*, market surveys, technology studies, etc.) undertaken by universities, research institutions, industry associations, companies, bilateral/multilateral institutions, *etc*;

(c) Relevant statistical data from national or international data;

(d) Documentation of relevant market data (*e.g.*, market prices, tariffs, rules);

(e) Written documentation from the company or institution developing or implementing the CDM project activity or the CDM project developer, such as minutes from Board meetings, correspondence, feasibility studies, financial or budgetary information, *etc*;

(f) Documents prepared by the project developer, contractors or project partners in the context of the proposed project activity or similar projects previously implemented;

(g) Written documentation of independent expert judgements from industries, educational institutions (*e.g.*, universities, technical schools, training centres), industry associations and others; or

(h) Theoretical calculation using an energy utility audit model.

[Barrier consideration in technological aspect]

Technological barriers exist for refurbishment type of energy efficiency improvement (even if it is simple one) as well as the lack of experiences to reform energy saving system by BTH. Moreover, the reason why NEDO implements this project as a model project is that there exists significant barriers to implement by the host company itself. Such barriers, especially for steam generation process (VRC: the core technology of the integrated system of the project), are explained below:

(a) A less technologically advanced alternatives

Since the VRC system is also a kind of efficient steam supply measure installed in order to cover growing steam demand, a less technologically advanced alternative for the proposed project is also to be a technology aiming to increase steam supply. Most likely less technologically advanced alternative aiming to generate more steam is a boiler because of widespread availability, low cost, simple and easy operation and maintenance, good performance, etc. The concept of "a less technologically advanced alternative" is nearly identical with the baseline scenario (the facility that would otherwise be built). Therefore, to select a coal or fuel fired boiler is a less technologically advanced alternative for the proposed project.

Needless to say, coal or fuel fired boilers lead to higher GHGs emission than the VRC system.

(b) Technological performance uncertainty due to "first-of-this-kind"

The VRC system was developed and commercialised by Mayekawa and Suntory, Ltd. in 1980s, supported by R&D subsidy of NEDO. Total number of the VRC system of this kind ever installed in brewery plants is only 7, and totally in Japan by Mayekawa.

Mayekawa, the supplier of the VRC system for the proposed CDM project, has not only patent of the VRC system but also the greatest experience and know-how of the VRC system. Besides, the VRC system ever installed in brewery plants in Japan has generally shown expected performance.

Nevertheless, numerically and geographically limited experience indicates that the technology might involve undetected uncertainly concerning its performance, for example, suitability with various type and capacity of Wort Kettles, pattern of operation, kind of brewed beer, climate condition, etc. BTH does not have capacity, i.e., enough skilled engineers who are keen on the operation/maintenance of this technology. In fact, the proposed project is the first case of the VRC system installed in Vietnam. Therefore, the potential performance uncertainty attributed to few experiences seems to exist in the VRC system.

Whereas, a coal fired boiler, which is a less advanced alternative for the proposed project, is greatly pervaded technology for steam generation at BTH plant with its enough knowledge/know-how of mechanism, operation and maintenance, in addition to the low cost of coal. Thus, the performance uncertainty of the VRC system is considered to be much higher than that of a conventional coal fired boiler.

(c) Low market share of the technology (even in developed countries)

The reason why the VRC system is not spread in other developed countries including Europe and US is as follows.

- *Beer engineers and manufacturers in Europe and US will not take initiative to manufacture or deal the VRC system. Although the VRC system was originally devised by beer engineers and manufacturers in Europe, they finally did not succeed in development and commercialisation of it. From such past experience, they still doubt applicability of the VRC system.*
- *Wort kettle manufacturers in Europe and US will not correspond to necessary engineering to introduce the VRC system. Since modification and adjustment of wort kettles are fundamental to introduce the VRC system, cooperation of boiling kettle manufacturers is vital. Without technological cooperation of boiling kettle manufacturers, it is very difficult to disseminate the VRC technology.*
- *In general, brewery plants in Europe and US are not so conscious of energy saving. It is attributed to relatively cheaper fuel cost compared to Japan.*

Market share of the VRC system is incomparably lower than that of boilers. Therefore, VRC system involves higher risk associated with the low market share, such as heavy dependency to limited manufacturer, difficulty to access the technology, uncertainty about future survival of technology, etc.

Based on the fact provided so far, it is concluded that the proposed project faces technological barrier, as the technology introduced by the proposed CDM project (on the core technology of the integrated system, i.e., VRC system) involves higher risks due to greater performance uncertainty and lower market share compared to a less technologically advanced alternative, namely, a boiler.

Sub-step 4 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed CDM project activity):

If any of the baseline scenario alternatives face barriers that would prohibit them from being implemented, then these should be eliminated.

If all project alternatives are prevented by at least one barrier, the proposed CDM project itself is the baseline, or the set of project alternatives has to be completed to include the potential baseline.

If there are several potential baseline scenario candidates, choose the most conservative alternative as the baseline scenario and go to Step 6, or go to Step 5.

It is obvious that the current utility system plus the aerobic wastewater treatment system would not be prevented by the barriers mentioned above.

Step 5. Identify the most economically attractive baseline scenario alternative (optional)

Determine which of the remaining project alternatives that are not prevented by any barrier is the most economically or financially attractive, and then it is a possible baseline scenario.

To conduct the investment analysis, use the following sub-steps:

Sub-step 5a. Determine an appropriate analysis method

Determine whether to apply simple cost analysis or investment comparison analysis. If the project alternatives generate no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II).

Sub-step 5b. – Option I. Apply simple cost analysis

Document the costs associated with alternatives to the CDM project activity and demonstrate that the corresponding activities produce no financial or economic benefits.

→***If there are no alternatives that generate any financial or economic benefits, then the least costly alternative among these alternative pre-selected projects is the baseline.***

→***If one or more alternatives generate financial or economic benefits, then the simple cost analysis cannot be used to select the baseline scenario.***

Sub-step 5c. – Option II. Apply investment comparison analysis

Identify the financial indicators, such as IRR, NPV, cost benefit ratio, or the unit cost of service (*e.g.*, the equalized cost of electricity production in $/kWh or equalized cost of delivered heat in $/GJ) most suitable for the project type and decision-making context.

Calculate the suitable financial indicators for each of the project alternatives that have not been eliminated in Step 4 and include all relevant costs (including, for example, investment costs, operations and maintenance costs, financial costs, *etc*.), and revenues (including subsidies/fiscal incentives, ODA, *etc*. where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.

Present the investment analysis in a transparent manner and provide all the relevant assumptions in the CDM-PDD, so that a reader can reproduce the analysis and obtain the same results. Clearly present critical techno-economic parameters and assumptions (such as capital costs, fuel prices, lifetimes, and discount rate or the cost of capital). Justify and/or cite assumptions in a manner that can be validated by the DOE. In calculating the financial indicator, the project's risks can be included through the cash flow pattern, subject to project-specific expectations and assumptions (*e.g.*, insurance premiums can be used in the calculation to reflect specific risk equivalents).

Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.

Present in the CDM-PDD submitted for validation a clear comparison of the financial indicators for the proposed project alternatives.

The alternative that has the best indicator (*e.g.*, highest IRR) can be pre-selected as a baseline candidate (Step 5.d). This process shall be performed for all projects alternatives that have not been eliminated in Step 2.

Sub-step 5d. Sensitivity analysis:

Include a sensitivity analysis to reasonable variations in the critical assumptions, which shows whether the conclusion regarding the financial attractiveness is robust. The investment analysis provides a valid argument in selecting the baseline only if it consistently supports (for a realistic range of assumptions) the conclusion that the pre-selected baseline is likely to remain the most financially and/or economically attractive.

In case the sensitivity analysis is not fully conclusive, select the most conservative among the project alternatives that are the most financially and/or economically attractive according to both Steps 5.c and the sensitivity analysis in this Step 5.d, for example. If the sensitivity analysis shows that one or more project alternatives compete with the one identified in Step 5.c, select the one with lower emissions.

[Economical consideration in investment] (Sub-step 5c is applied)

Investment analysis shows that the pay-back period of the project is around 5.5 years for the no CER case (to be shown to the validator as it includes confidential information. See Annex 6 for the outline), while prohibitive barriers (which is not enough to overcome under this level of the duration of pay-back period) on technological selection in Vietnam and difficulties accessing to the technology cannot allow BTH to make such a project as an economically attractive course of action at that level of the duration of pay-back period. One of the reasons why such energy efficiency improvement is not economically attractive is that BTH utilizes cheap local coal for its main fuel for beer production.

HABECO (BTH's parent company)'s investment decision making is based on the economical considerations taking technological and other barriers into account and little influenced by the governmental public policy. HABECO has no intension to invest in the project with more than 5.5 years of the pay-back period.

The energy audit model shows that other energy saving options with simpler technologies would result in the longer pay-back period than the project case (i.e., the project energy saving system is the most economically attractive course of actions among the several energy saving technology options).

As the beer demand is rapidly increasing, HABECO has its priority to invest in beer production facility, rather than utility energy saving. HABECO's decision-making criteria on investment for the utility's energy-saving is summarized as:

if Vietnamese Government requires installation of energy saving, it is going to do so only if:

- *it is synchronized to the production capacity increment,*
- *economical benefits to promote employment is expected, and*
- *the investment will be recovered within 5 years.*

One of the reasons why such energy efficiency improvement is not economically attractive is that BTH utilizes cheap local coal for its main fuel for beer production.

Therefore, at this time, BTH will never invest in the energy efficient system if such project would not be registered as a CDM project, nor other energy saving options would be realized as the baseline scenario. Only possible alternative is to invest in the beer production expansion, which results in more CO_2 emissions than "continuing current practice". Therefore, it can be concluded that the baseline scenario is to continue utilizing the current utility system, although beer production will increases simultaneously.

The Vietnamese government does not have a policy which influences the application of the approved methodologies (especially introduction of some incentive scheme) to date. However, the MOI is now preparing a programme for energy saving promotion in the industry sector. There is a possibility that BTH is going to invest in energy efficiency if the Government introduces some kind of subsidy scheme in future, however, such incentive framework is

recognized as "E–"-type policy in the host country which do not have to be taken into account in the baseline determination based on the CDM EB's decision at its 16th meeting.

Actually, HABECO/BTH does not have a plan to upgrade to such high technology and has not received any proposal to offer similar project except for NEDO's model project which is linked to registration as CDM.

Step 6. Common practice analysis

An analysis of the extent to which the proposed project type (*e.g.*, technology or practice) has already diffused in the relevant sector and region. This test is a credibility check to complement the above steps to determine the baseline scenario. Identify and discuss the existing common practice through the following sub-steps:

Sub-step 6a. Analyze other activities similar to the proposed CDM project activity:

Provide an analysis of any other activities implemented previously or currently underway that are similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, *etc*. Other CDM project activities are not to be included in this analysis. Provide quantitative information where relevant.

In case the pre-selected baseline would be with lower emissions than similar activities widely observed and commonly carried out, or would be one of them, the pre-selected baseline scenario can be adopted as the baseline scenario.

If similar activities, which are not implemented as CDM projects, are widely observed and commonly carried out and are different from the baseline scenario pre-selected and are with lower emissions, it calls into question the claim that the considered alternatives to the project activity do not face barriers or mandatory regulations or are financially the most attractive. Therefore, if similar activities are identified as above, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the pre-selected baseline scenario is economically or financially the most attractive or is not subject to barriers. This can be done by comparing the pre-selected baseline to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially more attractive (*e.g.*, subsidies or other financial flows) or why the pre-selected baseline faces barriers that have since be removed.

Essential distinctions may include a serious change in circumstances under which the pre-selected baseline would be implemented from those under which similar projects where carried out. For example, some barriers may have been removed, or promotional policies may have been implemented, leading to a situation in which the pre-selected baseline would be implemented in the absence of the CDM. The change must be fundamental and verifiable.

As mentioned before, no similar type of technologies has been applied to the beer brewery factory in Vietnam.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

>>

As specified in the methodology, the baseline scenario is to continue the current level of energy saving or to invest in expanding its beer production capacity. The project achieves much higher energy efficiency, so the resulting energy-saving reduces CO_2 emissions.

The logic of this is regarded as appropriate in the case that the methodology is approved and the project meets all of the applicability conditions.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

>>

The project boundary is defined as the associated facility site (where the energy conservation technologies are applied for the waste water treatment system) and the electricity supply system (power grid or privately-owned generator) connected to it.

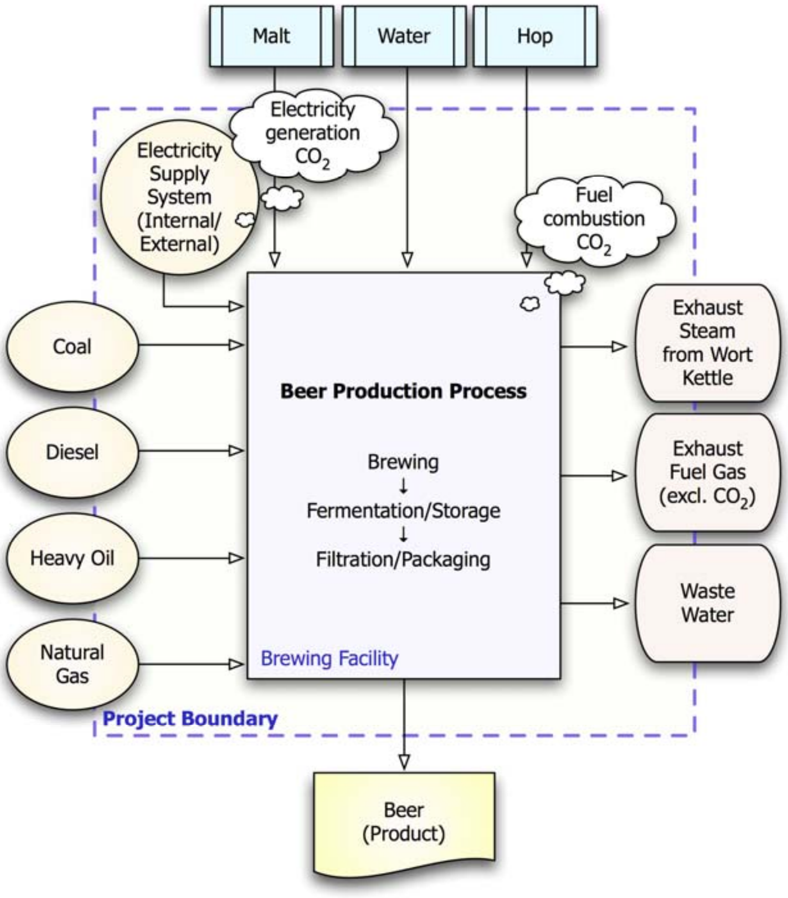


Figure 11: Project Boundary for Thanh Hoa Brewery Plant

In the above figure, the vertical flow shows the beer production process from raw material to final product together with necessary utilities and emission specified in the methodology as shown in horizontal lines.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

>>

Data related to the calculation of the baseline specific consumption rates for the project:

year	month	Beer Production Records: Bottled Beer (kL/month)	Beer Production Records: BiaHoi (kL/month)	Beer Production Records: BiaHoi/Total Ratio	Consumed Energies: Coal (kg/month)	Consumed Energies: Electricity (kWh/month)	Coal: Total Bottled Beer Equivalent Production (kL/month)	Coal: SEC (kg-coal/kL)	Coal: sec (kg-coal/kL)	Electricity: Total Bottled Beer Equivalent Production (kL/month)	Electricity: SEC (kWh/kL)	Electricity: sec (kWh/kL)	Fitted Function for Coal in Baseline (kg-coal/kL)	Fitted Function for Electricity in Baseline (kWh/kL)
2003	1	2,137	242	10%	198,500	239,668	2,282	87.0	37.0	2,331	102.8	27.8	67.5	90.4
	2	2,026	210	9%	187,250	245,962	2,152	87.0	37.0	2,194	112.1	37.1	69.1	91.1
	3	2,463	498	17%	205,750	308,145	2,762	74.5	24.5	2,861	107.7	32.7	62.8	88.0
	4	1,905	1,372	42%	229,750	345,560	2,728	84.2	34.2	3,003	115.1	40.1	63.1	87.5
	5	1,789	2,843	61%	228,250	363,838	3,495	65.3	15.3	4,063	89.5	14.5	57.9	83.9
	6	1,700	3,005	64%	240,250	456,537	3,503	68.6	18.6	4,104	111.2	36.2	57.8	83.8
	7	1,625	2,999	65%	234,750	442,970	3,424	68.6	18.6	4,024	110.1	35.1	58.2	84.0
	8	1,911	2,445	56%	248,750	444,295	3,378	73.6	23.6	3,867	114.9	39.9	58.5	84.5
	9	1,528	1,624	52%	192,250	343,482	2,502	76.8	26.8	2,827	121.5	46.5	65.2	88.2
	10	2,070	1,722	45%	217,500	307,384	3,103	70.1	20.1	3,448	89.2	14.2	60.2	85.8
	11	2,312	1,230	35%	205,500	318,662	3,050	67.4	17.4	3,296	96.7	21.7	60.6	86.4
	12	2,372	541	19%	196,250	272,597	2,697	72.8	22.8	2,805	97.2	22.2	63.3	88.3
2004	1	2,521	0	0%	171,000	244,810	2,521	67.8	17.8	2,521	97.1	22.1	65.0	89.5
	2	2,593	0	0%	176,500	246,250	2,593	68.1	18.1	2,593	95.0	20.0	64.3	89.2
	3	2,515	247	9%	190,250	245,313	2,663	71.4	21.4	2,713	90.4	15.4	63.6	88.6
	4	2,311	1,430	38%	211,250	325,759	3,169	66.7	16.7	3,455	94.3	19.3	59.8	85.8
	5	2,321	1,984	46%	226,500	350,010	3,511	64.5	14.5	3,908	89.6	14.6	57.8	84.4
	6	3,030	3,232	52%	279,000	489,143	4,969	56.1	6.1	5,616	87.1	12.1	53.0	80.5
	7	3,401	3,233	49%	282,000	523,962	5,341	52.8	2.8	5,987	87.5	12.5	52.3	79.9
	8	3,493	2,554	42%	310,000	502,447	5,025	61.7	11.7	5,536	90.8	15.8	52.9	80.6
	9	2,424	2,309	49%	280,000	383,664	3,809	73.5	23.5	4,271	89.8	14.8	56.4	83.4
	10	2,626	1,297	33%	256,000	338,532	3,404	75.2	25.2	3,664	92.4	17.4	58.4	85.1
	11													
		The monitoring will be continued to the end of 2005											conserbvative	

BiaHoi correction (bottled beer equivalence) (kL-bottled beer/kL-BiaHoi)
For Coal: 60%
For Electricity: 80%
[note] BiaHoi correction is calculated by theoretical analysis of the process

"Adjustment" implies specific consumption rate for excess of the ultimate rate level
Adjustment For Coal: 50.0 kg-coal/kL
For Electricity: 75.0 kWh/kL
[note] ultimate level is calculated by theoretical analysis of the process

Fitted sec^{BL} = exp(-lambda*x + B)

	lambda	B
For Coal:	0.000662	4.37
For Electricity:	0.000313503	3.46389707

with

		log(sec) for coal	log(sec) for electricity
R		0.843	0.516
R^2		0.711	0.266
Best guess	lambda	0.000556	0.000210
	B	4.731	3.850
Confidence level 80%	lambda	0.000662	0.000314
	B	4.375	3.464
P-value	lambda	0.000	0.014
	B	0.000	0.000

for $\log(sec^{BL}) = -\lambda * (\text{beer production}) + B$.

It shall be noted that one more year data will be collected for estimation of the specific energy consumption rates before implementation of the project.

Homoscedasticity of the residual factors are confirmed by the graph of the factors.

Autocorrelation of beer production values with some causal relations is not concluded because scattered values for the correlation between data with multi-months separation without regularity are observed.

The related data for calculation of the SECs will be updated and provided for the DOE.

Completion date: DD/MM/YYYY (t.b.d.)

Note: This date is to be set when the PDD is finalized at the end of validation process.

The baseline is determined by:

Mr. Koichi Eguchi
New Energy and Industrial Technology Development Organization (NEDO)
eguchikic@nedo.go.jp

Ms. Kanako Ohji
Mayekawa MFG, Co., Ltd.
k-ohji@mayekawa.co.jp

Dr. Naoki Matsuo
Climate Experts Ltd.(*)
n_matsuo@climate-experts.info

(*) Climate Experts Ltd. is not a project participant.

SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

01/04/2006

C.1.2. Expected operational lifetime of the project activity:

>>

30 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/04/2006

C.2.2.2. Length:

>>

10 years

SECTION D. Application of a monitoring methodology and plan

Note: It is noted that this section must be rewritten by using the approved methodology, i.e., will be re-drafted after approval of the methodologies submitted. Therefore, the section B and D are provisional and will be totally changed at the stage of validation (after approval and reformat of the methodology).

D.1. Name and reference of approved monitoring methodology applied to the project activity:

>>

Introduction of integrated demand-side energy saving system for existing beer brewing system (AM 00XX)

Note: The serial number AM 00XX will be assigned after the approval of the submitted new baseline and monitoring methodologies by the CDM Executive Board.

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

>>

As the applicability conditions are identical to those of the baseline methodology, the methodology is applicable to the project activity in Vietnam as stated in section B.1.1.

Major monitoring items in the Monitoring Plan are as follows:
(Refer to in Section B.4 Fig.11 "Project Boundary")

1) Beer production
2) Coal consumption
3) Diesel oil consumption (emergency generator)
4) Grid electricity consumption
5) Carbon emission factor (CEF) of grid electricity

Above monitoring items as well as items related to uncertainties etc. which may influence the baseline can be sufficiently covered by the current practice of BTH based on ISO9001.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P0-e-i. $EQ^{[electricity]}_i$	*pilsner-equivalent energy consumption factor for electricity*	*estimation by using an energy audit model*	*No dimension*	*estimated*	*Once before implementation of the project*	*100%*	*electronic*	*Pilsner-equivalent energy consumption factor for electricity of the product category i. Energy audit model is used for estimation.*
P0-h-i. $EQ^{[heat]}_i$	*pilsner-equivalent energy consumption factor for heat*	*estimation by using an energy audit model*	*No dimension*	*estimated*	*Once before implementation of the project*	*100%*	*electronic*	*Pilsner-equivalent energy consumption factor for heat of the product category i. Energy audit model is used for estimation.*
P1-e. $Q_y^{[Electricity-eq]}$	*Beer production of the facility*	*calculation*	*kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	*Aggregated by using "pilsner-equivalence (heat)" over the product category i of $Q_{i,y}$. Aggregation to be done monthly basis.*
P1-h. $Q_y^{[heat-eq]}$	*Beer production of the facility*	*calculation*	*kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	*Aggregated by using "pilsner-equivalence (heat)" over the product category i of $Q_{i,y}$. Aggregation to be done monthly basis.*
P1-i. $Q_{i,y}$	*Beer production of*	*Record of shipping*	*kL-beer*	*measured*	*daily*	*100%*	*electronic*	*Aggregated monthly production volume is*

	the facility (product category i)	bottles, cans, barrels						checked against the sales and stock record of beer products and tax records
P1. Q_y	Beer production of the facility	Record of shipping bottles, cans, barrels	kL-beer	measured	daily	100%	electronic	Aggregated monthly production volume is checked against the sales and stock record of beer products and tax records
P2-k. $Q\_Energy_{k,y}$	Energy source k consumed	meter (e.g., weightometer for coal, fuel meter for oil/gas, wattmeter for electricity, etc.)	Physical unit or energy unit	measured	daily	100%	electronic	All energy sources consumed at the facility. The energy source k includes the fuel(s) such as coal, heavy fuel oil, diesel oil, … and external electricity purchased from grid. Checked against the purchase record (receipt).
P3-0-el. $SEC_0{}^{PJ}{}_{electricity}$	Theoretical specific energy consumption rate of electricity	calculated by using energy audit model	kWh / kL-beer	calculated	once before implementation	100%	electronic	Theoretical energy audit model is used for calculation, specific to the utility configuration of the project scenario.
P3-0-heat. $SEC_0{}^{PJ}{}_{heat}$	Theoretical specific energy consumption rate of heat	calculated by using energy audit model	[Physical unit or energy unit] / kL-beer	calculated	once before implementation	100%	electronic	Theoretical energy audit model is used for calculation, specific to the utility configuration of the project scenario.
P3-y-el. $SEC^{PJ}{}_{electricity,y}$	Specific energy consumption rate of electricity	calculated by aggregating electricity sources	kWh / kL-beer	calculated	once before implementation	100%	electronic	Aggregated by electricity sources (P3-k). Data for the 1st year is the basis to obtain Kaizen effect
P3-y-heat. $SEC^{PJ}{}_{heat,y}$	Specific energy consumption rate of heat	calculated by aggregating heat sources /fuels	[Physical unit or energy unit] / kL-beer	calculated	once before implementation	100%	electronic	Aggregated by heat sources /fuels (P3-k). Data for the 1st year is the basis to obtain Kaizen effect
P3-k. $SEC^{PJ}{}_{k,y}$	Specific energy consumption	calculated from P1. &	[Physical unit or	calculated	monthly	100%	electronic	$SEC^{PJ}{}_{k,y} = Q\_Energy_{k,y}/Q_y$ Especially, the value for the

	rate of energy k	*P2.*	*energy unit] / kL-beer*					*first year is the basis to calculate "Kaizen" effect*
P3-int_el. $SEC^{PJ}{}_{electricity}{}^{INT}{}_{y}$	*Specific energy consumption rate of internal electricity*	*calculated*	*kWh/ kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	$SEC^{PJ}{}_{electricity}{}^{INT}{}_{y}$ $=Q\_Energy_{InternalElectricity,y}$ $/ Q_y{}^{[Electricity-eq]}$
P4-k. $CEF_{k,y}$ *(excl. Grid Electricity)*	*Carbon emission factor of energy k*	*Information provided by the fuel supplier*	tCO_2 */ [Physical unit or energy unit]*	*Provided or calculated (by using energy content and carbon content of the fuel)*	*yearly*	*100%*	*electronic*	*If sufficient data is not provided by the fuel supplier, regular (monthly) sampling should be done to measure such carbon emission factor.* *For coal, take many samples to check the dispersion of data. Afterwards, regular (monthly) sampling by lot is applied.* *Checked against the IPCC default values.*
P4-GridElectricity. $CEF_{GridElectricity,y}$	*Carbon emission factor of grid electricity*	*Information provided by the grid operator or Statistics of the electric power company*	tCO_2*/kWh*	*calculated (*CO_2 */ kWh from the marginal plant(s))*	*yearly*	*100%*	*electronic*	*The calculation methods specified in the small-scale CDM methodology for renewable power plants connected to the grid (AMS-I.D.) because the saved electricity level is less than 15* GWh_{el}*/yr.*
P5. $Loss_{GridElectriocity,y}$	*Transmission & distribution loss*	*Obtained from power supplier's statistics or information*	*No dimension*	*Cited*	*yearly*	*100%*	*electronic*	*Latest statistics or information is applied.*

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

$Q_y^{[\ ]} = \sum_i Q_{i,y} * EQ^{[\ ]}_i$ is the annual production of beer at the facility [kL-beer/yr] calculated by using "pilsner-eq. (for electricity)" and "pilsner-eq. (for heat)", *i.e.*, adjusted beer production.

The amount of project emissions PE_y in a year y is given by

$$PE_y = Q_y * \sum_k SEC^{PJ}_{k,y} * CEF_{k,y} / (1 - Loss_{k,y}) = \sum_k Q\_Energy_{k,y} * CEF_{k,y} / (1 - Loss_{k,y}) \quad (1)$$

where Q_y is the annual production of beer in the facility [kL-beer/yr], $SEC^{PJ}_{k,y}$ is the specific energy consumption rate (energy intensity) of the project scenario [MJ/kL-beer], and $CEF_{k,y}$ is the CO_2 emission factor of the energy k (such as external electricity, diesel oil, heavy oil, *etc.*) [tCO_2/MJ or tCO_2/t-fuel, tCO_2/kL-fuel] consumed by the facility (measured annually).

$Loss_{k,y}$ is the transmission and distribution loss of the grid for k = external electricity. Otherwise, $Loss_{k,y}$= 0.

As for the calculation of the $CEF_{GridElectricity,y}$,

$$CEF_{GridElectricity,y} = w^{OM} * CEF^{OM}_y + w^{BM} * CEF^{BM}_y \quad (w^{OM} + w^{BM} = 1) \quad (2)$$

where CEF^{OM}_y and CEF^{BM}_y are carbon emission factors of the operating margin and build margin power plants in the grid, respectively, with associated weights w^{OM} and w^{BM}. As the electricity saving level is much less than 15GWh/yr, the calculation method is:

- specified in the small-scale CDM methodology for renewable power plants connected to the grid (AMS-I.D.).

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B1-el-k. $SEC^{BL(el)}_{k,y}$	*Specific electricity consumption rate of energy*	*Calculated by* $SEC^{BL}_{electricity,y}$	*[MWh / kL-beer*	*calculated*	*yearly*	*100%*	*electronic*	*See B.2.4. for calculation*

	k							
B1-heat-K. $SEC^{BL(heat)}_{K,y}$	*Specific heat consumption rate of energy K*	*Calculated by* $SEC^{BL}_{heat,y}$	*[Physical unit or energy unit] / kL-beer*	*calculated*	*yearly*	*100%*	*electronic*	*See B.2.4. for calculation*
B2. $SEC^{BL}_{electricity,y}$	*Specific energy consumption rate of electricity*	*Calculated by B2-0 and B2-s.*	*[MWh /kL-beer]*	*calculated*	*monthly*	*100%*	*electronic*	*See B.2.4. for calculation*
B2-0. $SEC_0{}^{BL}_{electricity}$	*Specific energy consumption rate of electricity with perfect operation*	*Calculated from an energy audit model*	*[MWh /kL-beer]*	*calculated*	*Once before implementation*	*100%*	*electronic*	*An energy audit model is used for calculation. Fixed value. In case some modification is found for past and/or for the baseline scenario, appropriate adjustment is added by using an energy audit model.*
B3. $SEC^{BL}_{heat,y}$	*Specific energy consumption rate of heat*	*Calculated by B3-0 and B3-s.*	*[MJ (or physical unit of fuel) /kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	*See B.2.4. for calculation*
B3-0. $SEC_0{}^{BL}_{heat}$	*Specific energy consumption rate of heat with perfect operation*	*Calculated from an energy audit model*	*[MJ /kL-beer]*	*calculated*	*Once before implementation*	*100%*	*electronic*	*An energy audit model is used for calculation. Fixed value. In case some modification is found for past and/or for the baseline scenario, appropriate adjustment is added by using an energy audit model.*
B4. Q^{before}_{y}	*Beer production prior to implementatio n of the project*	*Meter or sales/stock record*	*kL-beer*	*measured*	*Monthly before implementation of the project (at least for three years)*	*100%*	*electronic*	*Monitored for checking chronological consistency*
B5. $Electricity^{before}_{y}$	*Electricity consumption prior to*	*Wattmeter*	*MWh*	*Measured (and calculated)*	*Monthly before implementation of the project*	*100%*	*electronic*	*Monitored for checking chronological consistency*

	implementation of the project				*(at least for three years)*			
B6. $Fuel_K^{before}{}_y$	*Fuel consumption prior to implementation of the project*	*Fuel meter (oil/gas) or weightometer (coal)*	*MJ*	*Measured (and calculated)*	*Monthly before implementation of the project (at least for one year)*	*100%*	*electronic*	*Monitored for checking chronological consistency*

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

The amount of baseline emissions BE_y in a year y is given by

$$BE_y = Q_y^{[Electricity\text{-}eq]} * \sum_k SEC^{BL(el)}{}_{k,y} * CEF_{k,y} / (1 - Loss_{k,y}) + Q_y^{[Heat\text{-}eq]} * \sum_K SEC^{BL(heat)}{}_{K,y} * CEF_{K,y} \quad [tCO_2/yr] \qquad (3)$$

where

$SEC^{BL(el)}{}_{k,y}$: specific energy consumption rate (energy intensity) for electricity use in the baseline scenario [MWh/kL-beer or MJ/kL-beer] of the energy type k (such as external electricity, fuels for internal power generation),

$SEC^{BL(heat)}{}_{K,y}$: specific energy consumption rate (energy intensity) for heat use in the baseline scenario [MJ/kL-beer or MWh/kL-beer] of the energy type K (such as coal, heavy oil, diesel oil, *etc*).

For the specific energy consumption rate for *heat* ($SEC^{BL}{}_{heat,y}$) and *electricity* ($SEC^{BL}{}_{electricity,y}$) regardless of its origin (*e.g.*, fuel type or grid/internal power generation), $SEC^{BL}{}_{\#\#,y}$ is given by: (## = heat or electricity)

$$SEC^{BL}{}_{\#\#,y=1} = SEC^{PJ}{}_{\#\#,y=1} + (SEC_0{}^{BL}{}_{\#\#} - SEC_0{}^{PJ}{}_{\#\#}) \quad \text{for } y = 1^{st} \text{ year to implement the project} \qquad (4)$$

It can be confirmed that the significant Kaizen practices has not been implemented at the BTH factory.

To calculate *SEC*s for each energy source, *SEC*s for aggregated electricity and aggregated heat are provided:

$$SEC^{BL}{}_{electricity,y} = SEC_0{}^{BL}{}_{electricity} + sec^{BL}{}_{electricity,y} \qquad (5)$$

$$SEC^{BL}{}_{heat,y} = SEC_0{}^{BL}{}_{heat} + sec^{BL}{}_{heat,y} \qquad (6)$$

For disaggregation of $SEC^{BL}{}_{electricity,y}$,

$$SEC^{BL}{}_{electricity}{}^{GRID}{}_y = SEC^{BL}{}_{electricity,y} - SEC^{PJ}{}_{electricity}{}^{INT}{}_y \qquad (7)$$

As for the heat part, $SEC^{BL}{}_{heat,y}$ is decomposed into each fuel with the same ratio of the project scenario measured *ex post*:

$$SEC^{BL}_{heat,y} = \sum_K SEC^{BL}_{K,y} \quad (8)$$

with

$$SEC^{BL}_{K,y} / SEC^{BL}_{heat,y} = SEC^{PJ}_{K,y} / SEC^{PJ}_{heat,y} \quad (9)$$

for each fuel *K*.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

Not applicable

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>>

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

No significant leakage is recognized.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>> No significant leakage is recognized

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

The amount of emission reductions ER_y in a given year y is given by

$$ER_y = BE_y - PE_y$$

See the notations above.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data	Uncertainty level of data	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

(Indicate table and ID number e.g. 3.-1.; 3.2.)	(High/Medium/Low)	
P1, P2, B4, B5	*Low*	*Checked against the sales/stock/purchase records as well as the tax records. For P2 (energy used by type), the associated meters are to be calibrated annually.*
P4-k	*Low*	*If sufficient data are not provided by the fuel supplier, regular (monthly) sampling should be done to measure such carbon emission factor.* *For coal, take many samples to check the dispersion of data. Afterwards, regular (monthly) sampling by lot is applied. Checked against the IPCC default values.* *IPCC default factors are used to for appropriateness check.*
All	*Low*	*Consistency with the past records are checked in order to minimize errors.*

A management system is established to identify/clarify the responsibilities for monitoring, recording and reporting the parameters. Its appropriateness is to be checked by the operational entity.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

>>

Mayekawa agreed with BTH to hold a set of training course on technological details and operation for 60 days in Japan and in Vietnam (Implementation Document on May 25, 2004).

The details of the management system will be completed at the time of validation process.

D.5 Name of person/entity determining the monitoring methodology:

>>

Ms. Kanako Ohji
Mayekawa MFG, Co., Ltd.
k-ohji@mayekawa.co.jp

and

Dr. Naoki Matsuo

Climate Experts Ltd.(*)
n_matsuo@climate-experts.info

(*) Climate Experts Ltd. is not a project participant.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

>>

The amount of project emissions PE_y in a year y is given by

$$PE_y = Q_y * \sum_k SEC^{PJ}_{k,y} * CEF_{k,y} / (1 - Loss_{k,y})$$

where Q_y is the annual production of beer of the facility [kL-beer/yr], $SEC^{PJ}_{k,y}$ is the specific energy consumption rate (energy intensity) of the project scenario [kcal/kL-beer], and $CEF_{k,y}$ is the CO_2 emission factor of the energy k (such as external electricity, diesel oil, heavy oil, *etc*.) [tCO_2/kcal or tCO_2/t-fuel, tCO_2/kL-fuel] consumed by the facility (measured annually).

$$Q_y * SEC^{PJ}_{k,y} = Q\_Energy_{k,y}$$: consumption of energy source k.

In this case, diesel oil is used for in-house power generation. It is assumed that such in-house power generation, which is for instable supply of grid electricity, is common for the baseline and project scenarios, thus neglected.

$Loss_{k,y}$ is the transmission and distribution loss of the grid for k = external electricity. Otherwise, $Loss_{k,y}$= 0.

E.2. Estimated leakage:

>>

No leakage is recognized.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

>>

Same as E.1.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

>>

The amount of baseline emissions BE_y in a year y is given by

$$BE_y = Q_y^{[Electricity\text{-}eq]} * \sum_k SEC^{BL(el)}_{k,y} * CEF_{k,y} / (1 - Loss_{k,y})$$
$$+ Q_y^{[Heat\text{-}eq]} * \sum_K SEC^{BL(heat)}_{K,y} * CEF_{K,y}$$

where

$SEC^{BL(el)}_{k,y}$: specific energy consumption rate (energy intensity) for electricity use in the baseline scenario [MWh/kL-beer or MJ/kL-beer] of the energy type k (such as external electricity, fuels for internal power generation),

$SEC^{BL(heat)}_{K,y}$: specific energy consumption rate (energy intensity) for heat use in the baseline scenario [MJ/kL-beer or MWh/kL-beer] of the energy type K (such as coal, heavy oil, diesel oil, *etc*).

To calculate *SEC*s for each energy source, *SEC*s for aggregated electricity and aggregated heat are provided:

$$SEC^{BL}_{\#\#,y} = SEC^{ER}_{\#\#,y} + SEC^{PJ}_{\#\#,y}$$
$$= (SEC_0{}^{BL}{}_{\#\#} - SEC_0{}^{PJ}{}_{\#\#}) + SEC^{PJ}_{\#\#,y=1}$$

for electricity and heat.

The method specified above (as shown in the methodology) can be used for *ex post* monitoring of the $SEC^{PJ}_{y=1}$. In order to evaluate the baseline emissions *ex ante*, we need to develop another method. Here we apply the "regression method" to estimate the baseline *SEC*s by using the past performance data.

For disaggregation of $SEC^{BL}_{electricity,y}$,

$$SEC^{BL}_{electricity}{}^{GRID}{}_{y} = SEC^{BL}_{electricity,y} - SEC^{PJ}_{electricity}{}^{INT}{}_{y}$$

As for the heat part, $SEC^{BL}_{heat,y}$ is decomposed into each fuel with the same ratio of the project scenario measured *ex post*:

$$SEC^{BL}_{heat,y} = \sum_K SEC^{BL}_{K,y}$$

with

$$SEC^{BL}_{K,y} / SEC^{BL}_{heat,y} = SEC^{PJ}_{K,y} / SEC^{PJ}_{heat,y}$$

for each fuel *K*.

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

>>

The amount of emission reductions ER_y in a given year *y* is given by

$$ER_y = BE_y - PE_y$$

See the notations above. For *ex ante* estimation below,

$$ER_y = Q_y * \sum_k (SEC^{BL}_{k,y} - SEC^{PJ}_{k,y}) * CEF_{k,y} / (1 - Loss_{k,y})$$

is used.

E.6. Table providing values obtained when applying formulae above:

>>

Years	Estimation of Project Activity Emissions (tonnes of CO_2e)	Estimation of Baseline Emissions (tonnes of CO_2e)	Estimation of Leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
2006	4,841	12,554	0	7,713
2007	5,325	13,631	0	8,306
2008	5,834	14,815	0	8,982
2009	6,391	16,140	0	9,750
2010	7,002	17,621	0	10,619
2011	7,702	19,301	0	11,599
2012	8,472	21,168	0	12,695

2013	9,319	23,237	0	13,918
2014	10,251	25,526	0	15,274
2015	11,277	28,053	0	16,776
Total (tonnes of CO_2e)	76,414	192,046	0	115,631

Note: The calculation and related data are "provisional" and indicative at this stage due to the following reasons:

(1) The PDD will be finalized at the very end of the validation process (host country approval will be done at any time prior to this stage).

(2) The validation process starts after the approval of the new methodologies submitted. The PDD must be rewritten by using the approved methodologies (the calculation of emission reductions shall use the approved and reformatted methodology).

(3) The calculation method of emission reductions specified in the methodology needs some up-dated/latest data of the factory. These data have not yet obtained.

(4) Even in the final version of the PDD, the figure of emission reductions is only an "expectation". True figure of emission reductions (which will be verified by the Operational Entity) will be calculated by using monitored parameters ex post (after implementation of the project).

The emission reductions and related parameters are expected to be:

year	Beer Production [kL/year]	Transmission Loss	Coal		Electricity		Emission Reductions [tCO_2/year]
			SEC^{BL}_{coal} [kg/kL]	SEC^{PJ}_{coal} [kg/kL]	$SEC^{BL}_{electricity}$ [kWh/kL]	$SEC^{PJ}_{electricity}$ [kWh/kL]	
2003	42,000		57.8		85.7		
2004	53,000		54.3		83.0		
2005	58,300		53.2		82.0		
2006	64,130	10%	52.3	15.0	81.0	73.0	7,713
2007	70,543	10%	51.6	15.0	80.1	73.0	8,306
2008	77,597	9%	51.1	15.0	79.2	73.0	8,982
2009	85,357	8%	50.7	15.0	78.4	73.0	9,750
2010	93,893	7%	50.4	15.0	77.7	73.0	10,619
2011	103,282	7%	50.3	15.0	77.2	73.0	11,599
2012	113,610	7%	50.2	15.0	76.6	73.0	12,695
2013	124,971	7%	50.1	15.0	76.2	73.0	13,918
2014	137,468	7%	50.0	15.0	75.9	73.0	15,274
2015	151,215	7%	50.0	15.0	75.6	73.0	16,776
2016	166,337	7%	50.0	15.0	75.4	73.0	18,436
	t.b.m.	t.b.m.	t.b.c.r.a.	t.b.m.	t.b.c.r.a.	t.b.m.	
						Total (10 years)	115,631

Other fixed parameters (for estimation; variable monitored *ex post*)

CEF for grid electricity	0.35	[$kgCO_2$/kWh]	t.b.m.	[Simple average; to be elaborated]
CEF for coal	3.14	[$kgCO_2$/kg coal]	t.b.m.	[Anthracite grade 4]
CEF for diesel oil fuel	neglected this effect here		t.b.m.	

Private-owned Power Generation neglected this effect here Common for BLS and PJS

t.b.m.: to be monitored ex post
t.b.c.: to be calculated ex post
t.b.c.r.a.: to be calculated ex post by using regression approximation

$$ER_y = Q_y * \cdot_k (SEC^{BL}_{k,y} - SEC^{PJ}_{k,y}) * CEF_{k,y} / (1 - Loss_{k,y})$$

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

In general, the project reduces environmental impact as follows:

Wastewater:

In the conventional method, wastewater is discharged after dilution only. The load by the wastewater will be reduced significantly—around a half by implementing this project.

Air pollution:

Air pollution will be mitigated by reduction of coal consumption.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The project does not increase toxic emissions.

Reports on measurement of noise and air pollution of the plant are submitted to the city office once a year and environmental standards are cleared. Additionally, emissions from the traffic on Route-1 are greater than that of BTH's which results in no complaints to BTH.

For wastewater, because of substantial amounts of emissions from household wastewater in the vicinity, constant discharge of diluted wastewater from BTH contributes someway to the dilution of the wastewater content of the entire area.

BTH reports analysis of wastewater once a year. According to analysis of 2002, several items exceed standards (COD 110 [100] mg/L, BOD 72 [50] mg/L in Vietnamese Standard TCVN5945-1995). BTH is planning to buy neighboring property for aerobic treatment of wastewater in the future and obtain a permit for plant operation.

BTH has acquired ISO9000 certification already and is increasing production by consignment production for other companies. However, emissions may increase without control if no action is taken. Due to this background, we expect great benefit from this project.

BTH plans to obtain ISO14000 certification after implementation of this project based on CDM and expects to become an internationally competitive beer company.

Furthermore, reduction of utility costs is expected from this project due to energy saving effect and water saving effect. This will contribute to reduced production costs for beer which will be refunded broadly to consumers in general.

SECTION G. Stakeholders' comments

>>

G.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

Upon consultation with the People's committee of the province of Thanh Hoa, presentation of this project will be made to neighbourhood residents and the office of environmental issues of Thanh Hoa city for their comprehension.

Comments received:

1) the People's committee of Thanh Hoa province dated on 12th July, 2004

2) HABECO dated on 14th July, 2004

3) Stakeholder's meeting at BTH dated on 9th December, 2004

Total 47 representatives were present for the meeting.

G.2. Summary of the comments received:

>>

1) The People's committee of Thanh Hoa province dated on 12th July, 2004

After reviewing the project, The People Committee of Thanh Hoa province recognized that this is a sustainable development project. It helps the brewery do well the environment protection through reduction of polluted wastes and saving of the energy. This project has not only economic efficiency but also social efficiency, and contribute to motivate the sustainable development of the brewery in future.

2) HABECO dated on 14th July, 2004 (Minutes of the meeting on the model project)

100% participants approve the NEDO project at Thanh Hoa Beer Joint Stock Company.

The meeting has consensus to propose to the Ministry of Industry, Ministry of Natural Resources and Environment make good conditions for the project to be extended and carried out soon.

The minutes is read at the meeting and voted to approve the project.

3) Stakeholders' meeting on 9th December, 2004. Comments by Mr. Lu Kha Cat, representative of People's Committee of Thanh Hoa province.

This is an outstanding project achieving energy saving and environmental improvements simultaneously. We hope that this project will be implemented as soon as possible with effective performances and also hope NEDO to expand such projects to sugar and paper industries in Thanh Hoa in the future.

G.3. Report on how due account was taken of any comments received:

>>

N/A

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Thanh Hoa Beer Joint Stock Company (project site of BTH)
Street/P.O.Box:	152 Quang Trung Thanh pho
Building:	
City:	Thanh Hoa
State/Region:	
Postfix/ZIP:	
Country:	Vietnam
Telephone:	037-852-669
FAX:	
E-Mail:	thbeco@hn.vnn.vn
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Dung
Middle Name:	
First Name:	Lung
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	HABECO (Hanoi Alcohol Beer and Beverage corp.) (parent company of the project site)
Street/P.O.Box:	94 Lo Duc Str., Hai Ba Trung Dist.
Building:	
City:	Hanoi
State/Region:	
Postfix/ZIP:	
Country:	Vietnam
Telephone:	+84-4-821-9267
FAX:	+84-4-821-8433
E-Mail:	
URL:	
Represented by:	
Title:	Chairman of the Board
Salutation:	Dr.
Last Name:	Viet
Middle Name:	Van
First Name:	Nguyen
Department:	
Mobile:	
Direct FAX:	
Direct tel:	

Personal E-Mail:	nvviet@hn.vnn.vn

Organization:	RIB (Research Institute of Brewing, A division of HABECO, Technical advisor to BTH)
Street/P.O.Box:	94 Lo Duc Str., Hai Ba Trung Dist.
Building:	
City:	Hanoi
State/Region:	
Postfix/ZIP:	
Country:	Vietnam
Telephone:	+84-4-662-0911
FAX:	+84-4-662-1727
E-Mail:	rib@netnam.vn
URL:	
Represented by:	
Title:	Director
Salutation:	Dr./Mrs.
Last Name:	Thu
Middle Name:	Thi
First Name:	Nguyen
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	MOI (Ministry of Industry - Government office in charge of HABECO)
Street/P.O.Box:	54 Hai Ba Trung Str. Hoan Kiem Dist.
Building:	
City:	Hanoi
State/Region:	
Postfix/ZIP:	
Country:	Vietnam
Telephone:	+84-4-824-6762
FAX:	+84-4-826-5303
E-Mail:	
URL:	http://www.moi.gov.vn/
Represented by:	
Title:	Deputy Director General
Salutation:	Ms.
Last Name:	Huong
Middle Name:	Phan Thu
First Name:	Dang
Department:	Department of International Cooperation
Mobile:	
Direct FAX:	
Direct tel:	

Personal E-Mail:	huongdpt@moi.gov.vn

Organization:	MONRE (Ministry of Natural Resources and Environment - MONRE is responsible for EIA for CDM projects)
Street/P.O.Box:	83 Nguyen Chi Thanh
Building:	
City:	Hanoi
State/Region:	
Postfix/ZIP:	
Country:	Vietnam
Telephone:	+84-4-834-3911
FAX:	+84-4-835-9221
E-Mail:	webmaster@monre.gov.vn
URL:	http://www.monre.gov.vn/
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	NEDO (New Energy and Industrial Technology Development Organization) (CERs Credit Holder)
Street/P.O.Box:	1310, Omiya-cho, Saiwai-ku
Building:	Muza Kawasaki Building
City:	Kawasaki
State/Region:	Kanagawa
Postfix/ZIP:	212-8554
Country:	Japan
Telephone:	+81-44-520-5191
FAX:	+81-44-520-5193
E-Mail:	
URL:	http://www.nedo.go.jp
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Eguchi
Middle Name:	
First Name:	Koichi
Department:	International Projects Dept.
Mobile:	
Direct FAX:	
Direct tel:	

Personal E-Mail:	eguchikic@nedo.go.jp

Organization:	MAYEKAWA MFG, CO., LTD.
Street/P.O.Box:	2-13-1, Botan
Building:	
City:	Koto-ku
State/Region:	Tokyo
Postfix/ZIP:	135-8182
Country:	Japan
Telephone:	+81-3-3642-8088
FAX:	+81-3-3643-7094
E-Mail:	
URL:	http://www.mycomj.co.jp
Represented by:	
Title:	Deputy General Manager
Salutation:	Mr.
Last Name:	Sakashita
Middle Name:	
First Name:	Shigeru
Department:	International Project Dept.
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	sigeru-sakashita@mayekawa.co.jp

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no Official Development Assistance spent in this project.
A confirmation of the non-diversion of this public funding from ODA towards the host country will be delivered at a later stage.

1) The funding for Model Projects is not counted for ODA.

- Model Projects = Joint demonstrative projects for energy conservation technology implemented abroad

Purpose: Dissemination of energy conservation technology of Japan

i) Contribution to mitigation of global warming through GHG emissions reduction

ii) A stable energy supply in foreign countries

A stable energy supply in Japan

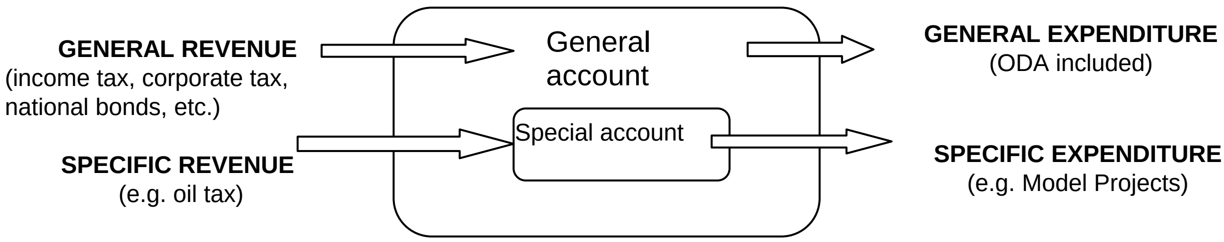
⇩

The funding for Model Projects is not counted for ODA.

2) The funding for Model Projects is decided in accordance with the Japanese budgetary system independently from ODA budget allocation.

- The Japanese budgetary system permits the establishment of a specific law to apply specific revenue to a specific expenditure separately from the general revenue/expenditure management. Currently there are 38 special accounts.
- The expenditure for Model Projects implemented by NEDO originates in the "Account for Petroleum and Sophisticated Structure of Energy of Supply and Demand" in the special accounts established in accordance with the "Law on Special Accounts for Coal, Petroleum and Sophisticated Structure of Energy of Supply and Demand", and as its sources revenues from oil tax, etc. are specified.

<Reference> Japanese Budgetary System (General account and Special account)



Annex 3

BASELINE INFORMATION

The information used for the calculation of baseline emissions consists of two groups:

(1) Information to calculate specific energy consumption rate as well as the beer production (ex ante for planned/expected value and ex post for real results).

(2) Information to obtain carbon emission factors of the grid electricity displacement effect and fuel used.

The information belongs to the first group is directly linked to the confidential information of the BTH. Therefore, it will be disclosed for the Operational Entity in the validation process. Only analyzed/processed data will be cited on the PDD (Section B).

The precise and up-dated information belongs to the second group is under preparation. These are compiled in the PDD (Section B and Annex 3) at the stage of validation.

Annex 4

MONITORING PLAN

Monitoring Plan will be completed based on the Monitoring Methodology as per D.2.

Major monitoring items in the Monitoring Plan are as follows;
(Refer to B.4 Fig.11 "Project Boundary")

No.	Monitoring Items	Unit	Source	Frequency of monitoring
1	Beer production	kL	Meter	Daily
2	Coal consumption	kg	Weight scale	Daily
3	Diesel oil consumption (emergency generator)	kL	Meter	Daily
4	Grid electricity consumption	kWh	Meter	Daily
5	Carbon emission factor (CEF) of grid electricity	($kgCO_2/kWh$)	EVN report	Annual

Above monitoring items as well as items related to uncertainties etc. which may influence the Baseline can be sufficiently covered by the current practice of BTH based on ISO9001.

Note: It is not clear what are to be described in Annex 4 (in addition to the Section D) as there are no guidance specified by the CDM Executive Board.

Annex 5

STAKEHOLDER'S COMMENTS

Comments are provided in the Section G.2.

The People Committee
Of Thanh Hoa Province
-♣-
No: 2612/ UB-§N
On NEDO Project – Japan

The Socialist Republic Of Viet Nam
Independence- Freedom- Happiness

Thanh Hoa, July 12th 2004

To: ***Ministry of Industry***

Ministry of Natural Resources and Environment

Thanh Hoa Beer Joint Stock Company is allowed by Ministry of Industry and Ministry of Natural Resources and Environment to implement the model project for renovation to increase the efficient use of energy in brewery.

After reviewing the project, The People Committee of Thanh Hoa province recognized that this is a sustainable development project. It helps the brewery do well the environment protection through reduction of polluted wastes and saving of the energy. This project has not only economic efficiency but also social efficiency, and contribute to motivate the sustainable development of the brewery in future.

We therefore would strongly support and propose the Ministry of Industry and Ministry of Natural Resources and Environment to review and approve the project as soon as possible.

The Mayor OF THE PEOPLE COMMITTEE
Vice Mayor

Chu Pham Ngoc Hien

HANOI BEER ALCOHOL BEVERAGES CORPORATION
THANH HOA BEER JOINT STOCK COMPANY

The Socialist Republish Of Viet Nam
Independence- Freedom- Happiness

MINUTES

The meeting on the model project for renovation to increate the efficient use of energy in brewery

1. Time and location: Joint Stock

1.1 Time: 14 h July 9th 2004

1.2 Location:
At the first floor of the office of Thanh Hoa Joint Stock Beer Company

2. The participants:
- A board of directors.
- Chief of bureau, board, workshop
- Supervisors and worker representative.

3. The total of participants: 154 people

4. The person in charge of the meeting : Mr Luong Dung- The Director

5. The Content:

5.1 Brief the purpose of the project:

In this project, the energy saving systems will be installed at BTH in addition to existing facility of Thanh Hoa Beer Joint Stock Company, including:
- VRC system (Vapor Recovery system)
- Improve the refrigeration efficiency by using ice thermal storage;
- Save the energy to operate pasteurizer
- Steam produced by using bio-gas boilers,

Energy consumption of an entire brewery is reduced, the emissions of GHG (particularly CO_2) generated by using fossil fuel will also be reduced.

5.2. Support for sustainable development of the company.

The concrete benefits resulting from the implementation of each system:

- VRC system: Substantial reduction in steam consumption with little additional power consumption.
- Improvement of refrigeration efficiency. Reduction in electric power
- Ice thermal storage system: Reduction in power by producing cold thermal energy during the night.
- Energy saving operation of pasteurizer: reduction in steam consumption.

Besides, a group of skilled workers to operate and maintain the equipment will be additionally trained through the project

5.3 Efficiency for economic, society and environment
Environmental benefits:

- More balanced of peak electric power demand
- Reduction air polluted because of using bio-gas boilers
- Saving natural resources: Coal, electric power and water
- Reduction of GHG emissions.

Social and economic benefits:

- Substantial reduction of energy cost, water cost, coal cost.
- Balance of peak electric power demand.

Direct benefits:

- Improve the skill of local engineers and workers
- Reduction of operation cost

Other benefits:

- Be able to transfer the technology to other beer companies and other beverages or foodstuff companies.

5.4 The meeting to approve the project and the participants' comments are summarized as follow:

- Thanh Hoa Beer Joint Stock Company is allowed by Ministry of Industry and Ministry of Natural Resources and Environment to implement the model project for renovation to increase the efficient use of energy in brewery.
- After reviewing the project, The People Committee of Thanh Hoa province recognized that this is a sustainable development project. It help the brewery do well the environment protection through reduction of polluted wastes and saving of the energy. This project has not only economic efficiency but also social efficiency. The good environment contributes to motivate the sustainable development of the brewery in future.
- 100% participants approve the NEDO project at Thanh Hoa Beer Joint Stock Company.

The meeting has consensus to propose to the Ministry of Industry, Ministry of Natural Resources and Environment make good conditions for the project to be extended and carried out soon.

The minutes is read at the meeting and vote to approve the project.

The meeting is ended at 17 h on the same day. /.

Chairman of Meeting
Worker Representative

Secretary

Luong Dung
Nguyen Quang Huynh

Nguyen Thi Ninh

(ANNEX-5)

Ministry of industry
Hanoi Beer Alcohol Beverage Corporation
-♣-

The socialist republic of Vietnam
Independence- Freedom- Happiness

No: 264/ CV-VP
On implementing CDM project in Thanh Hoa Beer Company

Ha Noi, July 30th 2004

To: ***Ministry of Industry***

Ministry of Natural Resources and Environment

Now, New Energy and Industrial Technology Development Organization of Japan (NEDO) is preparing to implement a CDM project in Thanh Hoa Beer Joint Stock Company.

Thanh Hoa Beer Joint Stock Company is a subsidiary of Ha Noi Beer Alcohol Beverage Corporation. This is a model project on renovation to increase energy efficiency at brewery in Viet Nam for the first time. Advanced technologies on environment and energy saving will be applied in order to reduce consumption of electricity, coal, steam in brewery contributing to the reduction in GHG emission in production process.

Technologies that will be applied include:

- Vapour recovery compressor system: recovery of steam from wort kettle, reduction in steam consumption for brewhouse.
- Improvement of refrigeration efficiency by cascade cooling system.
- Ice thermal storage system: reduction in electricity consumption by producing cold thermal energy at night time.
- Energy saving operation of pasteurizer, reduction in steam consumption.
- Biogas boiler: reduction in coal consumption

These up to date technologies have been successfully applied in Japan. Estimated pay back period of the model project in Thanh Hoa Beer Joint Stock Company is 5.5 years and the reduction in GHG emission is about 10,476 tons of CO2 per year.

Ha Noi Beer Alcohol Beverage Corporation realises that this project can bring back many benefits:

- Conservation of energy in production process.
- Contributing to environmental protection, ensuring sustainable development of brewery.

This project satisfies all CDM project criteria which are sustainability, additionality and feasibility.

For above mentioned reasons, Ha Noi Beer Alcohol Beverage Corporation

proposes the Ministry of Industry and Ministry of Natural Resources and Environment to review and approve the project as a CDM project in Thanh Hoa Beer Joint Stock Company.

General director
Ha Noi Beer Alcohol Beverage Corporation

Dr. Nguyen Van Viet

Annex 6

PAY-BACK PERIOD

The Model Project for Renovation to Increase the Efficient Use of Energy in Brewery

Investment Cost

NEDO (Japan Portion)	JPY 380 million
BTH (Vietnam Portion)	JPY 25 million
Total	JPY 405 million

Running cost merit (Coal/Electricity/Water saving)

Total	JPY 74million/year

Pay-Back period

405million / 74million = 5.47years ➔5.5years

The estimated cost of investment per a unit of ton-CO_2 of emissions reductions during the crediting period (approximately 15,000 ton-CO_2/yr) is 24.55 US$/ton-$CO_2$
(exchange rate: 110 yen/$).

It is noted that the expected CO_2 credit amount and value are those of feasibility study as it is used for investment decision making. The latest estimation is 12,100 ton-CO_2/yr in average.

Annex 7

ENVIRONMENTAL IMPACT ASSESMENT

ministry of natural resources and environment

-♣-

No: 2566/ BTNMT-TD

The socialist republic of Vietnam
Independence- Freedom- Happiness

Ha Noi, July 29th 2004

certificate of
registration document on environmental standard conformation
of
The Model project for renovation to increase the efficient use of energy in brewery
(Thanh Hoa Beer Joint Stock Company)

Ministry of Natural resources and environment

confirms

Article 1: *Thanh Hoa Beer Joint Stock Company (Project owner) submitted the registration document on environmental standard conformation of the Model project for renovation to increase the efficient use of energy in brewery on July 21 st, 2004.*

Article 2: *Project owner has the responsibility to strictly implement all the contents stated in this registration document on environmental standard conformation.*

Article 3: *The registration document on environmental standard conformation of the project is the basis for the State Environmental Management Authorities to inspect the environmental protection of the project.*

Article 4: *After completing all project's articles on environment, the project owner has to report in written to State Environmental Management Authorities for inspecting.*

Article 5: *Assigns Thanh Hoa Natural Resources and Environmental Department to monitor, supervise and inspect the implementation of the proposed contents on environmental protection in the registration document on environmental standard conformation and to report once per six months to The Department of Inspection and Environmental Impact Assessment for monitoring./.*

on behalf of the minister of
ministry of natural resources and environment
Director of Department of Inspection and Environmental Impact Assessment

NGUYEN KHAC KINH

Annex 8

CDM PROJECT CRITERIA (VIETNAM)

Sustainability

A1. Be congruent with the national sustainable objectives

Environmental issues such as global warming are inevitable issues in the 21st century. It is necessary to take measures combining global environmental issues and energy issues taking into consideration that a majority of greenhouse gases are derived from energy utilization. Such measures can include introduction of energy conservation technologies as well as utilization of the market mechanism such as CDM project activities in an effort to reduce fossil fuel consumption. In this view, the Vietnamese government recognizes the vital importance of energy conservation policies and thus enacted the "Decree of Government on Energy Conservation and Energy Efficiency " in 2003 to promote energy conservation. Promotion of energy conservation can help in securing energy, in realizing favorable economics as a result of efficient energy utilization and in furthering development of energy conservation technologies and their transfer. The Governments of Vietnam and of Japan have a common recognition for the above-mentioned perspectives and are jointly conducting annual intergovernmental Policy Dialogue for the purpose of promoting more efficient energy/environmental policies. This Project was confirmed during the Policy Dialogue of this year as a Model Project, which promotes energy conservation, and as a CDM project activity, and that both Governments will implement it jointly. In addition, the MOU of this intergovernmental Project was concluded between New Energy and Industrial Technology Development Organization (NEDO), an Incorporated Administrative Agency under the jurisdiction of the Ministry of Economy, Trade and Industry of Japan and the Ministry of Industry of Vietnam, with MONRE signing as a witness.

A2. MEETS THE SECTORAL AND PROVINCIAL STRATEGY OBJECTIVES

Municipal governments in Vietnam are required to commit strong efforts to resolve issues in energy environmental conservation at the grassroots level and are regulatory authorities of Decree 64. Thanh Hoa Brewery Company should strengthen wastewater treatment based on Decree 64. The Project, which includes not only energy conservation technology but also introduction of wastewater treatment technology, will improve contaminated wastewater. In addition, the Project has acquired EIA approval, required by the Decree on Protection of the Environment.

A3. DO NOT AT LEAST IN AN INTEGRATED MEANS, WORSE ALL ASPECTS OF SECTORAL BASELINE

The Project aims at energy cost reduction and improvement of energy security through transfer of energy conservation technology as well as reduction of contaminants by introducing

wastewater treatment, thus truly contributing to energy and environmental conservation in Vietnam.
The Project does not pose any negative aspects from the standpoints of energy and the environment.

Additionality
B.1. Baseline
B.1.1. For existed baseline project:

All economical and technical indicators are in accordance with sub-sectoral BAU, otherwise it must be shown that the own resources have been maximally mobilized for achieving present stage.
The methodology in the PDD stipulates a baseline for energy consumption such as coal consumption (for boiler usage) required for beer production in unit quality as well as electric power consumption "in the absence of the CDM project activity". Thus, a baseline is estimated by regression analysis.
Data for such analysis is colleted and monitored accordingly at the project site.
A baseline for the energy consumption rate shall also be reviewed by selecting a beer brewery where coal is employed as a fuel source, and conducting monitoring.
In accordance with a substantial production increase in the targeted beer brewery, in case government programs or regulations are introduced, such will be flexibly treated, reviewing the baseline and revising the specific energy consumption rate by correct calculations.

B.2. Emission Reduction

GHG emission from CDM project must be less than baseline project. Emission reduction shall be measurable and verifiable.
Coal or electric power actually utilized and consumed are measurable and will be recorded for future verification. The amount of emission reduction can be calculated by subtracting the value of the baseline set in B1 "in the absence of the CDM project activity" from the actual energy consumption. The amount of emission reduction of the Project is calculated to be approximately 10,000 t/y.

B.3. FINANCE

The funding for Model Projects is decided in accordance with the Japanese budgetary system independently from ODA budget allocation.
The Japanese budgetary system permits the establishment of a specific law to apply specific revenue to a specific expenditure separately from the general revenue/expenditure management.
The expenditure for Model Projects implemented by NEDO originates in "The account for Petroleum and Sophisticated Structure of Energy of Supply and Demand" in the special accounts established in accordance with the "Law on Special Accounts for Coal, Petroleum and

Sophisticated Structure of Energy of Supply and Demand", and as its sources, revenues from oil tax, etc. are specified.

Feasibility

C.1. THE SUPPORT OF THE GOVERNMENT SHALL BE SECURED

As previously mentioned, the MOU of the Project was signed between NEDO, an Incorporated Administrative Agency under the jurisdiction of the Ministry of Economy, Trade and Industry of Japan, and the Ministry of Industry of Vietnam. (NEDO= an Incorporated Administrative Agency, established by the "New Energy and Industrial Technology Development Organization Law", and under the Ministry of Economy, Trade and Industry). The funding for the Project is derived from subsidies allocated by the Ministry of Economy, Trade and Industry, and the Japanese Government comprehensively supports the Project in the aspect of energy policy.

C.2. Monitoring methodology and performance shall be clearly clarified.

The monitoring methodology and performance are clarified in the New Monitoring Methodology of the PDD.
Training of technical experts is planned to be conducted in Japan and Vietnam in this regard.