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: 5.0

Date: 30/05/2005

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.

Outline and the purpose of the project

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

- VRC system (Vapor 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.

Contribution to sustainable development of the host country

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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- BTH: Thanh Hoa Beer Joint Stock Company
  Project Executer, Project Sponsor, CDM Applicant, Monitoring after start of operation, Authorized by the Vietnamese DNA;
- HABECO: Hanoi Alcohol Beer and Beverage Corporation:
  The parent company of BTH;
  Authorized by the Vietnamese DNA;
- RIB (Research Institute of Brewing):
  A division of HABECO supporting BTH technically.
  Authorized by the Vietnamese DNA;
- MOI (Ministry Of Industry):
  Office in charge of HABECO (Permits & Supervising);
- MONRE (Ministry Of Natural Resources and Environment):
  MONRE is responsible for EIA (Environmental Impact Assessment) for CDM projects.

Vietnam ratified the Kyoto Protocol on 25 September 2002.

- NEDO:
  Project sponsor, supply of the equipment, CERs credit contractor (Expected CDM credit undertaker), Authorized by the Japanese DNA;
- Mayekawa MFG. Co., Ltd.:
  Implementation of equipment under contract by NEDO and technology transfer.
  Authorized by the Japanese DNA.

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

This project is expected to be approved by the Japanese Government soon.

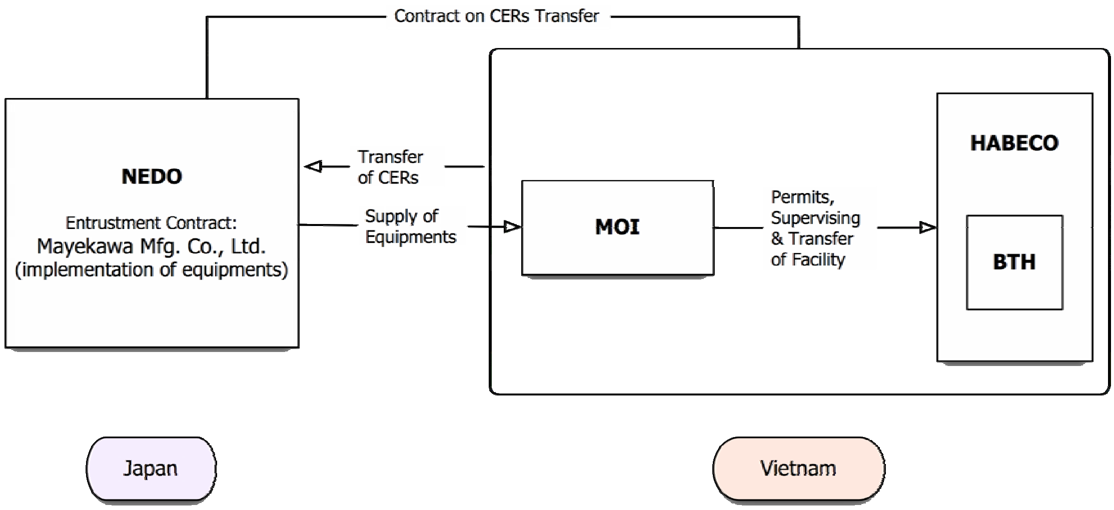

Figure 2: Roles of Project Participants

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 programs for specific technologies

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.

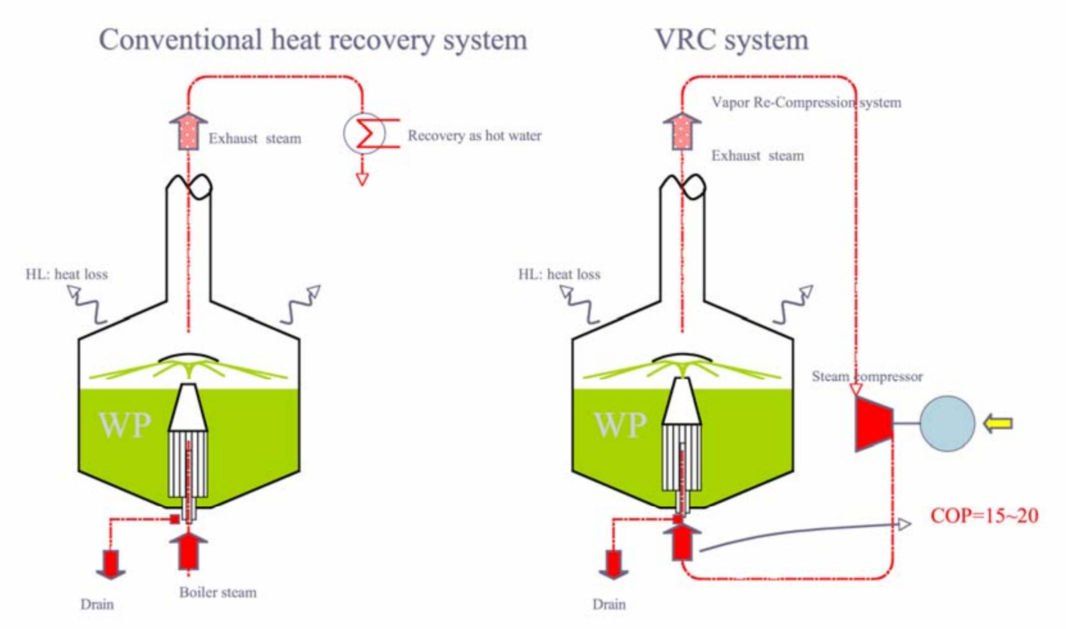

Figure 4: Conventional heat recovery and VRC systems

(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.

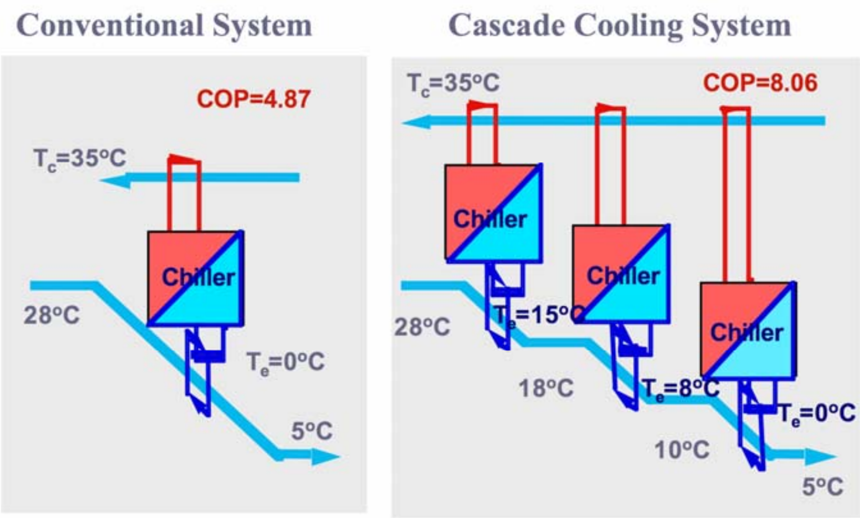

Figure 5: Conventional and cascade cooling systems

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).

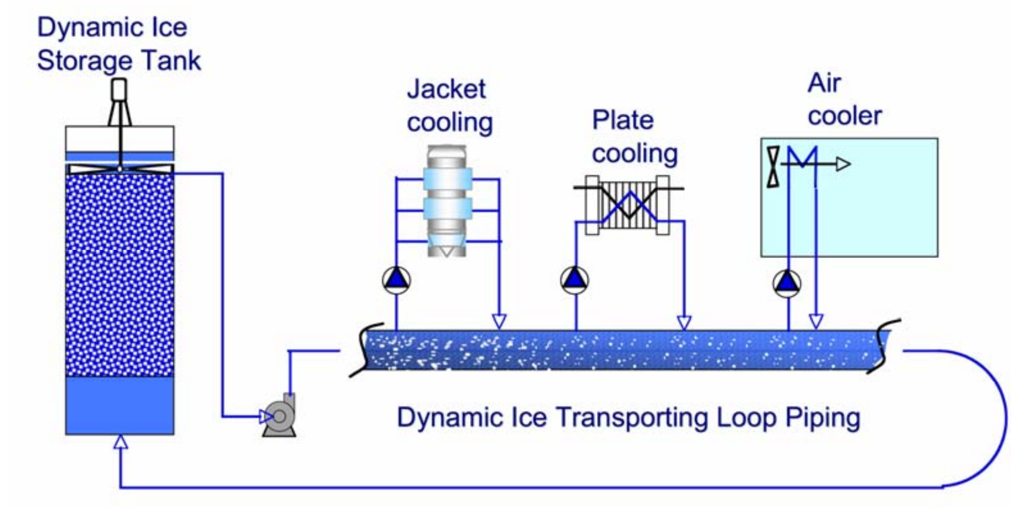

Figure 6: Dynamic ice thermal storage and transporting system

(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).

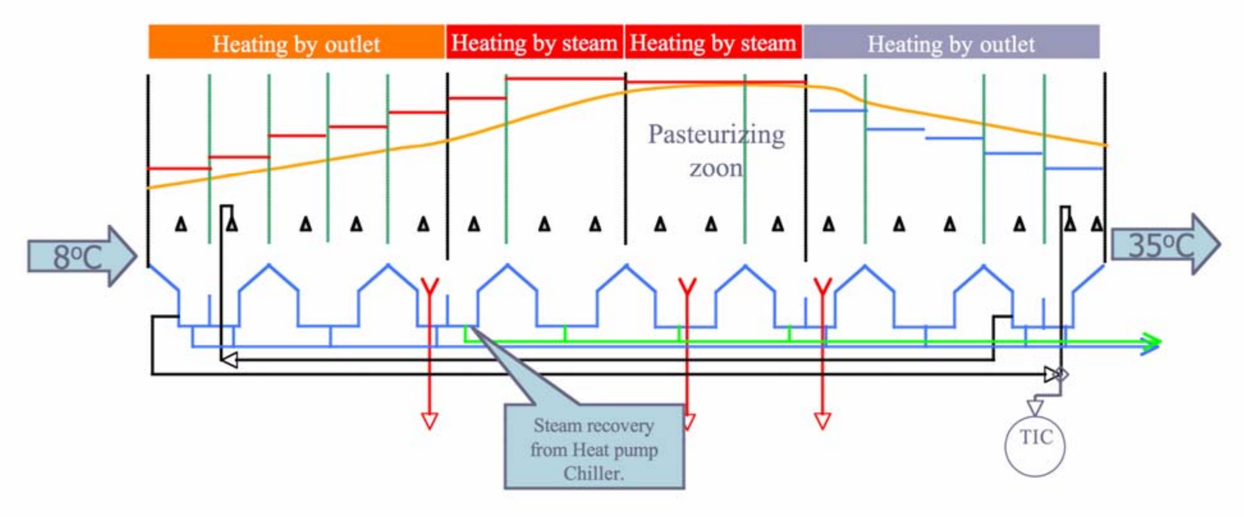

Figure 7: Optimization system in Pasteurizer

(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.

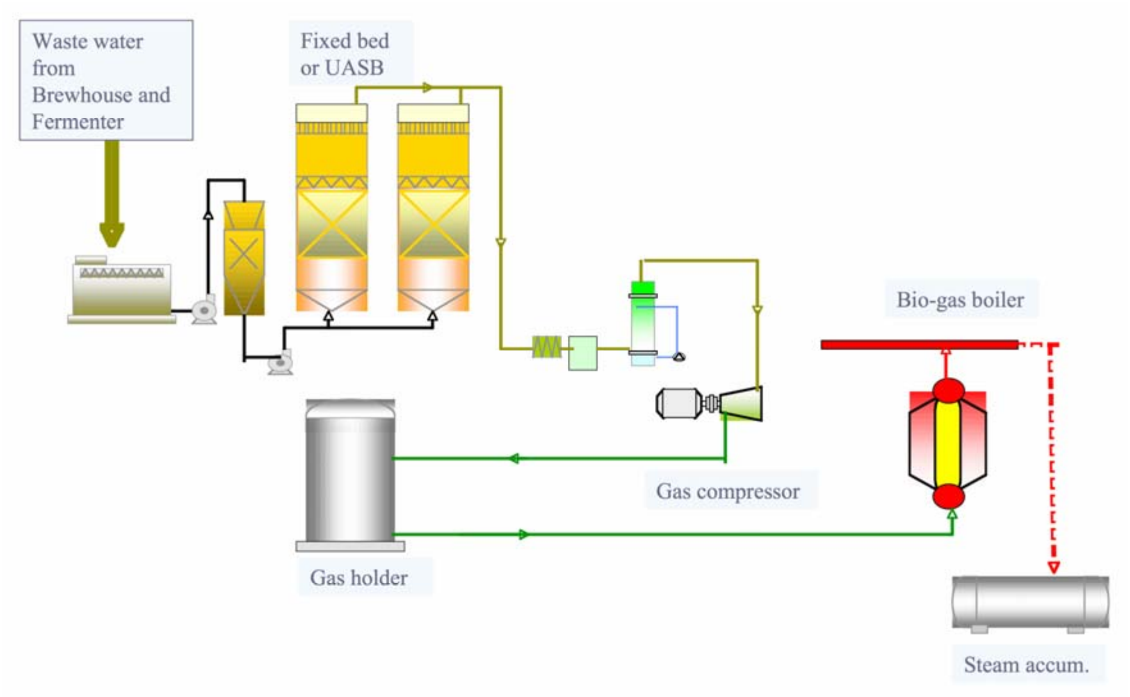

Figure 8: Anaerobic wastewater treatment and biogas boiler

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:

>>

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.

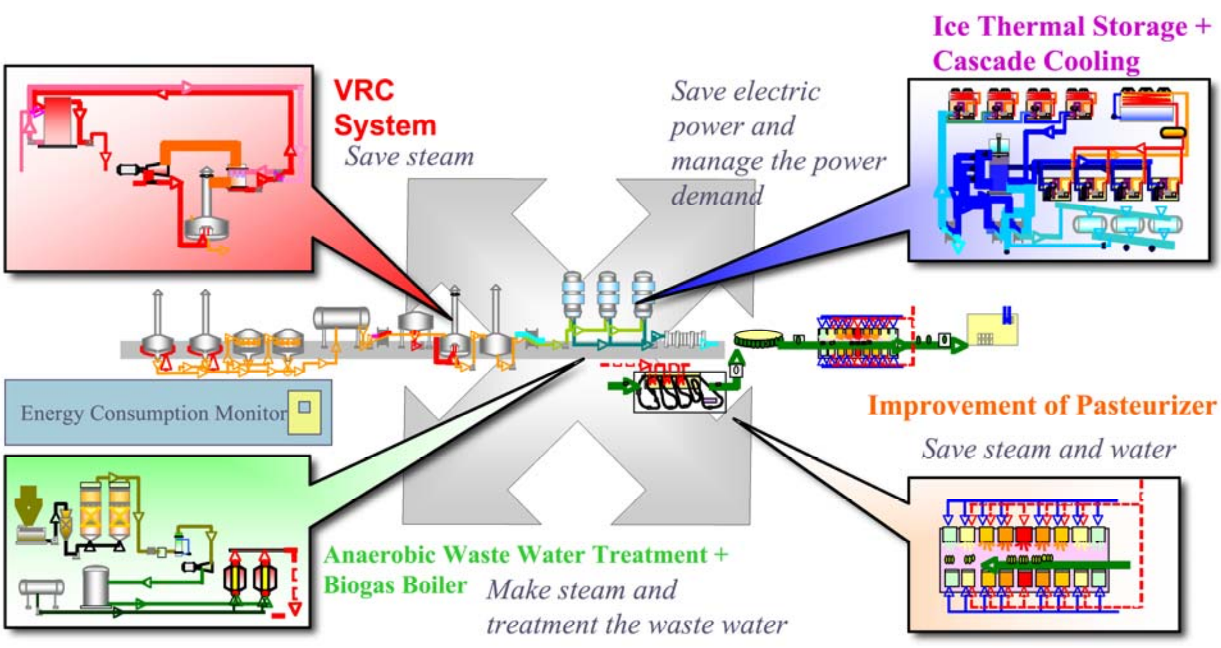

Figure 9: Proposed integrated high energy efficient system

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 121 kton-CO_2 over the crediting period (10 years).

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:

>>

Specific consumption rate projection for demand-side brewery energy saving processes (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 is to install energy saving systems (*incl*. in-house heat and/or power generation) in the existing production process if it does not result in new production facility with separate/new energy utility system.

> [**Explanation**] The brewery may increase its production capacity gradually in order to meet growing demand in the country, in general. The CDM project contributes *only* to demand-side energy efficiency improvement, even though the beer production capacity increases simultaneously. This is the fundamental difference between the energy saving projects (in energy *supply* industry sector) which expand the amount of output driven by such a project simultaneously (*i.e.*, the output and the target to save are common in the energy sector, while for the beer brewery sector energy saving project, energy saving and beer production is *independent* theoretically as the energy is only a *utility*). See ANNEX for real situation of the beer factories.

Condition 2:

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

> [**Explanation**] The baseline scenario may be changed beyond the lifetime of the existing energy utility system.

Condition 3:

The project includes biogas recovery and its utilization for boiler in the system

[**Explanation**] This condition reflects an aspect that the project installs "integrated" system to use energy efficiently. In addition, this condition ensures that no methane is emitted from the effluent wastewater in the project scenario.

Condition 4:

Integrated up-to-date technology (*e.g.*, VRC[1] system, high refrigeration efficiency, ice thermal storage system, energy-efficient operation of pasteurizer, and biogas-boiler) for energy conservation is not installed at the factory now and not commonly installed in the host country beer brewery sector [*i.e.*, lack of experience and knowledge]. In order to assess this Condition 4, the DOE (validator) is going to assess the situations below (it is not necessary to meet all situations). The DOE may request the project participants to provide other materials to support this Condition 4.

– Lack of integrated up-to-date technology above in the host country, with a penetration rate less than 10%;

– The decision making processes of enterprises in the host country on investment places low priority on energy conservation because of little knowledge of the technical and financial aspects of energy efficiency and/or setting priority on investment for increasing beer production than for energy saving (within the limited financial resources);

Condition 5:

Reduction of energy costs by the project (through energy saving) is not the most economically attractive course of action to invest without CER revenue. The project participants shall demonstrate its rationale by providing related information to the DOE (validator). "Investment analysis" method in the "Tool for the demonstration and assessment of additionality" is applied.

Condition 6:

The grid electricity displaced effect by the project is small enough to neglect build margin component in comparison with the capacity of the grid. The project participants shall confirm this by interviewing person(s) responsible for the grid power development plan.

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.

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[1] Vapor Recovery Compressor system (a core heat pump technology). This technology is usually the core part of the integrated highly efficient energy utility system in the brewery factory.

[Economical consideration in investment]

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. 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.

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.

[Barrier consideration in technological aspect]

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. 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.

Therefore, at this time, BTH will never invest in the energy efficient system if such project would not be registered as a CDM project.

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.

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

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As a specific case which the methodology is applied, the proposed project has the specific parameters as follows:

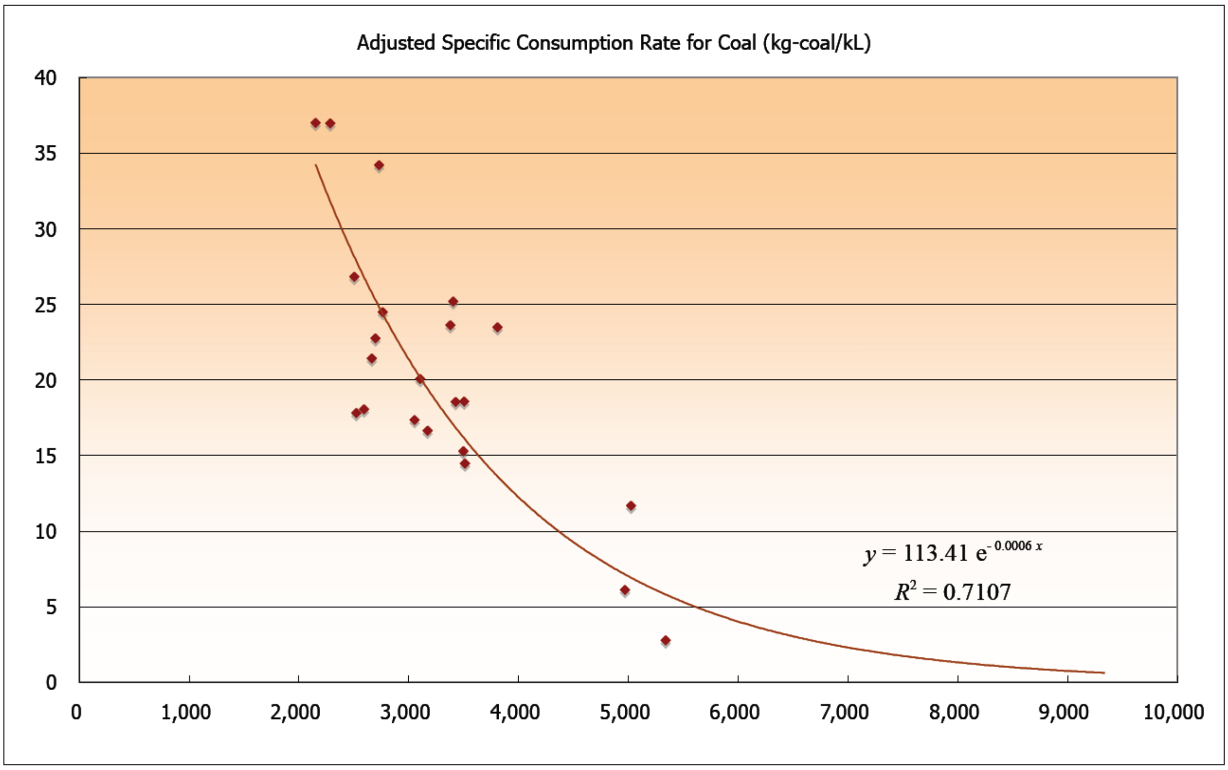
- Existing or new:
  - Existing facility. The current utility system has its lifetime over 10 years (no need to be replaced before the end of the lifetime).
- Fuel type:
  - Local coal for heat generation by boiler (therefore Option A-2 is not selected from technological considerations as shown in the methodology[2]),
  - Diesel oil for in-house power generation.
- Marginal power plant type:
  - To be determined by interview with the grid operator (*e.g.,* coal in summer and winter, gas turbine for spring and autumn) *Note: This would be identified afterwards.*
- Specific energy consumption rates (monthly; [kg-coal/kL-beer] or [kWh/kL-beer]):
  - For coal: $113.41 \exp(-0.0006\, x) + 50{,}0$
    for x: coal consumption [kg-coal/month]
  - For electricity: $24.632 \exp(-0.00008\, x) + 75.0$
    for x: electricity consumption [kWh/month]

  <u>*Analysis*</u>

  It can be seen from Figure 10 that the specific consumption rate of coal, which is the fuel to produce steam, well shows the exponentially dumping figure as a good approximation. On the other hand, that of electricity does not have a good correlation to the beer production, although some declining tendency can be found. It means that the specific consumption rate of electricity may be regarded as almost constant (i.e., independent of the beer production), although the resulted declining function is applied to estimate the baseline rate in this PDD.

2 A simple energy system is not an integrated set of technologies, but a system to install elementary technology such as condensers (pan-condenser) for the steam from the Wort Kettle and/or recovery of warm water from waste heat in the brewery plant.

Technically, recovery of the steam from the Wort Kettle is not worth implementing for several tonnes per hour volume. For boilers using coal, economizer is not economically attractive course of action. So, this option can be possible only for heavy fuel oil boiler case in reality. This feasibility is to be checked by the validator (Operational Entity) taking the local situations into account.



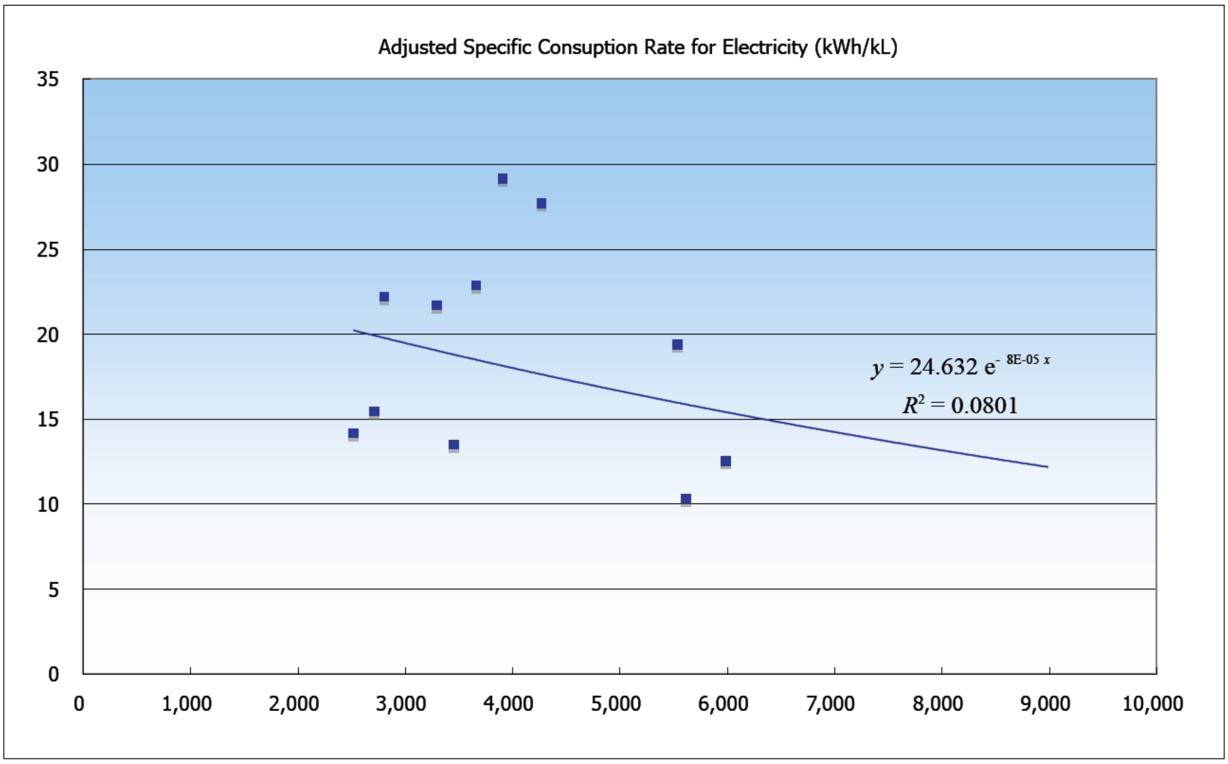


Figure 10: Regression analysis to estimate specific energy consumption rate (only exponentially declining part)

Note:

[The data is from 01.2003 for coal and 11.2003 for electricity to 10.2004, because the data is separated to non-Pasteurized Bia Hoi and normal beer from that point of time for coal and data credibility due to technological modification in the electricity part.]

[These regression analyses are provisional and to be revised using the latest data before implementation of the project.]

[Conversion to “normal beer-equivalence (electricity)” and “normal beer-equivalence (heat)” is to be elaborated afterwards (after accumulating the latest operation data of non-Pasteurized BTH), although set a provisional figures 0.6 for coal and 0.8 for electricity.]

- Wastewater treatment system:
  - Open-type [not lagoon][3]

Following the logic of the methodology, we conclude that the baseline scenario is:

- Utilizing current level of energy saving system, and
- Continuation of current practices for wastewater treatment before increasing beer production capacity. Later, utilizing aerobic wastewater treatment system.

The outline of the logic applied to this project is as follows:

[Baseline Scenario Options]

Energy utility component:

- [Option A-1] Utilizing current level of energy saving system,
- [Option A-2] Implementation of a simple energy saving system (elementary technology) in addition to Option A-1, and
- [Option A-3] Implementation of an advanced energy saving system (integrated technology).

Wastewater treatment component:

- [Option B-1] Simple dilution by water (current practice),
- [Option B-2] Utilizing aerobic wastewater treatment system, and
- [Option B-3] Utilizing anaerobic wastewater treatment system with biogas recovery.

[Screening tests]

[Step 1] Can the facility comply with local regulations for wastewater?

3 Therefore, CH_4 emission reductions are not claimed for this project.

The current practice Option B-1 can be continued for a while before increasing the beer production capacity.[4] *Later, Option B-2 or B-3 is to be introduced in order to meet the environment regulation on wastewater.*

[Step 2] Is the energy saving technology feasible to be applied to the facility?

From technological considerations as shown above (sub-section B.2.), Option A-2 cannot be the baseline scenario. Option A-3 cannot be realized as well taking barriers into considerations as backed by the fact that no brewery has introduced the integrated high energy efficient system in Vietnam to date. The latter is to be checked by the investment analysis below.

[Step 3] Which option is economically the most attractive course of action?

As shown in Annex 6, the pay-back period, which HABECO uses as the indicator of investment decision making, of Option A-3 is calculated as 5.5 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. In reality, HABECO is much more interested in enhancing its beer production capacity (which is much more profitable) than installing energy efficient system because the beer demand is growing very rapidly if it has extra money to invest. Therefore, Option A-3 cannot be the baseline scenario.

[Step 4] Is there any possibility that a similar project, which would replace the project if implemented, would be implemented using public fund?

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. No other proposal using public fund is offered.

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. 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.

---

[4] It is noted that this project does not claim CERs from methane reduction through the wastewater treatment process. This is because of the technical difficulty to measure such methane which may come out by dilution of such wastewater into a river stream (open water system). This leads to a conservative estimation.

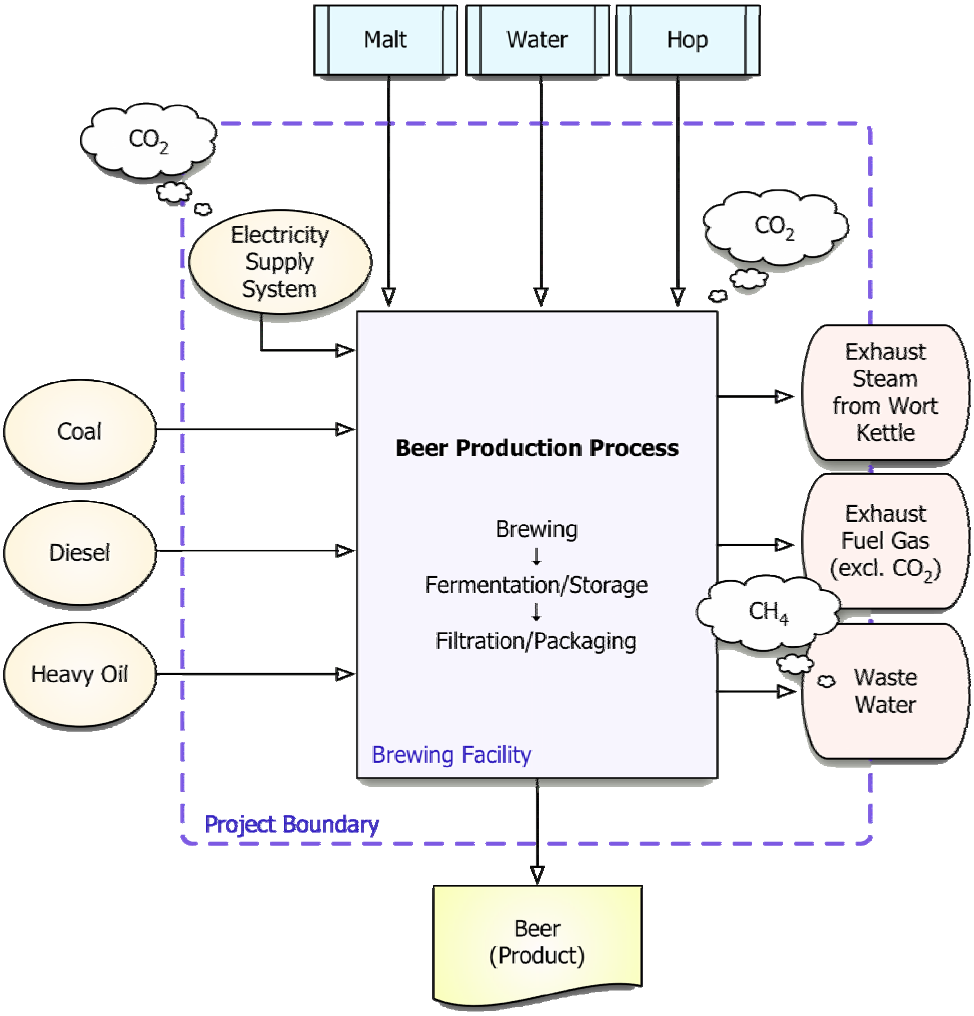


Figure 11: Project Boundary for Thanh Hoa Brewery Plant

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:

		Beer Production Records			Consumed Energies		Coal			Electricity					
year	month	Bottled Beer (kL/month)	BiaHoi (kL/month)	BiaHoi/Total Ratio	Coal (kg/month)	Electricity (kWh/month)	Total Bottled Beer Equivalent Production (kL/month)	Specific Consuption Rate (kg-coal/kL)	Adjusted Specific Consuption Rate (kg-coal/kL)	Total Bottled Beer Equivalent Production (kL/month)	Specific Consuption Rate (kWh/kL)	Adjusted Specific Consuption Rate (kWh/kL)	Fitted Function for Coal (kg-coal/kL)	Fitted Function for Electricity (kWh/kL)	
2003	1	2,137	242	10%	198,500	239,668	2,282	87.0	37.0	2,331	102.8	27.8	78.8	95.4	
	2	2,026	210	9%	187,250	245,962	2,152	87.0	37.0	2,194	112.1	37.1	81.2	95.7	
	3	2,463	498	17%	205,750	308,145	2,762	74.5	24.5	2,861	107.7	32.7	71.6	94.6	
	4	1,905	1,372	42%	229,750	355,560	2,728	84.2	34.2	3,003	118.4	43.4	72.1	94.4	
	5	1,789	2,843	61%	228,250	363,838	3,495	65.3	15.3	4,063	89.5	14.5	63.9	92.8	
	6	1,700	3,005	64%	240,250	456,537	3,503	68.6	18.6	4,104	111.2	36.2	63.9	92.7	
	7	1,625	2,999	65%	234,750	442,970	3,424	68.6	18.6	4,024	110.1	35.1	64.5	92.9	
	8	1,911	2,445	56%	248,750	454,295	3,378	73.6	23.6	3,867	117.5	42.5	64.9	93.1	
	9	1,528	1,624	52%	192,250	383,482	2,502	76.8	26.8	2,827	135.6	60.6	75.3	94.6	
	10	2,070	1,722	45%	217,500	265,384	3,103	70.1	20.1	3,448	77.0	2.0	67.6	93.7	Excluded
	11	2,312	1,230	35%	205,500	318,662	3,050	67.4	17.4	3,296	96.7	21.7	68.2	93.9	
	12	2,372	541	19%	196,250	272,597	2,697	72.8	22.8	2,805	97.2	22.2	72.5	94.7	
2004	1	2,521	0	0%	171,000	224,810	2,521	67.8	17.8	2,521	89.2	14.2	75.0	95.1	
	2	2,593	0	0%	176,500	206,250	2,593	68.1	18.1	2,593	79.5	4.5	73.9	95.0	
	3	2,515	247	9%	190,250	245,313	2,663	71.4	21.4	2,713	90.4	15.4	72.9	94.8	
	4	2,311	1,430	38%	211,250	305,759	3,169	66.7	16.7	3,455	88.5	13.5	66.9	93.7	
	5	2,321	1,984	46%	226,500	406,964	3,511	64.5	14.5	3,908	104.1	29.1	63.8	93.0	
	6	3,030	3,232	52%	279,000	479,143	4,969	56.1	6.1	5,616	85.3	10.3	55.8	90.7	
	7	3,401	3,233	49%	282,000	523,962	5,341	52.8	2.8	5,987	87.5	12.5	54.6	90.3	
	8	3,493	2,554	42%	310,000	522,447	5,025	61.7	11.7	5,536	94.4	19.4	55.6	90.8	
	9	2,424	2,309	49%	280,000	438,664	3,809	73.5	23.5	4,271	102.7	27.7	61.5	92.5	
	10	2,626	1,297	33%	256,000	358,532	3,404	75.2	25.2	3,664	97.9	22.9	64.7	93.4	
	11														

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 Function	y-intercept	exponent
For Coal:	113.41	-0.0006
For Electricity:	24.632	-0.00008

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:

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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:

>>

Specific consumption rate projection for demand-side brewery energy saving processes (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. $EQ^{[electricity]}_{i}$	*lager-equivalent energy consumption factor for electricity*	*estimation*	*No dimension*	*estimated*	*Once before implementation of the project*	*100%*	*electronic*	*Lager-equivalent energy consumption factor for electricity of the product category i. Other product category can be used.*
P0-h-i. $EQ^{[heat]}_{i}$	*lager-equivalent energy consumption factor for heat*	*estimation*	*No dimension*	*estimated*	*Once before implementation of the project*	*100%*	*electronic*	*Lager-equivalent energy consumption factor for heat of the product category i. Other product category can be used.*
P1-e. $Q_{y}^{[Electricity\text{-}eq]}$	*Beer production of the facility*	*meter*	*kL-beer*	*calculated*	*daily*	*100%*	*electronic*	*Aggregated by using "lager-equivalence (heat)" over the product category i of $Q_{i,y}$. Aggregation to be done monthly basis.*
P1-e-0. $Q^{[Electricity\text{-}eq]}_{0}$	*Beer production of the facility before implementation*	*meter*	*kL-beer*	*calculated*	*daily*	*100%*	*electronic*	*Beer production average of the latest 18 months before implementation of the project*
P1-h. $Q_{y}^{[heat\text{-}eq]}$	*Beer production of the facility*	*meter*	*kL-beer*	*calculated*	*daily*	*100%*	*electronic*	*Aggregated by using "lager-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 the facility (product category i)*	*meter*	*kL-beer*	*measured*	*daily*	*100%*	*electronic*	*Aggregated monthly production volume is checked against the sales and stock record of beer products*
P1. Q_y	*Beer production of the facility*	*meter*	*kL-beer*	*measured*	*daily*	*100%*	*electronic*	*Aggregated monthly production volume is checked against the sales and stock record of beer products*
P2-k. $Q\_Energy_{k,y}$	*Energy source k consumed*	*meter (e.g., weightometer , wattmeter, 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-k. $SEC^{PJ}_{k,y}$	*Specific energy consumption rate of energy k*	*calculated from P1. & P2.*	*[Physical unit or energy unit] / kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	$IP_{k,y} = P\_Energy_{k,y}/P_y$
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	*Provided or calculated* (CO_2 */ kWh from the marginal plant(s))*	*yearly*	*100%*	*electronic*	*Confirmation: no build margin component by interviewing the power development officer (once). Identification of marginal plant(s) by interviewing the grid operator (once) or apply some conservative method specified in the baseline methodology. The marginal plant(s) or plant type(s) may differ by month.*
P5. $Loss_{GridElectriocity,y}$	*Transmission & distribution loss*	*Obtained from power supplier's statistics or information*	*dimensionles s*	*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.)

>>

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

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

where Q_y is the annual production of beer of the facility [kL-beer/yr], $SEC^{PJ}_{k,y}$ (= $Q\_Energy_{k,y}/Q_{k,y}$) 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 in 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.

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-k. $SEC^{BL}_{k,y}$	*Specific energy consumption rate of energy k*	*Calculated by* $SEC^{BL}_{electricity,y}$ *and* $SEC^{BL}_{heat,y}$	*[Physical unit or energy unit] / kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	*See B.4. for calculation of* $SEC^{BL}_{electricity}{}^{GRID}_{y}$
B2. $SEC^{BL}_{electricity,y}$	*Specific energy consumption rate of electricity*	*Calculated by regression analysis*	*kWh /kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	*Refer to the baseline methodology. Significance of the data is checked by the beer authority.*
B2-0. $SEC^{BL}_{electricity}{}^{INT}_{0}$	*Specific energy consumption rate of electricity for past 18 months*	*Calculated from B2*	*kWh /kL-beer*	*calculated*	*Once before implementation*	*100%*	*electronic*	*Average of internal electricity related specific energy consumption rate for past 18 years before implementation of the project*
B3. $SEC^{BL}_{heat,y}$	*Specific energy consumption rate of heat*	*Calculated by regression analysis*	*Mcal (or physical unit of fuel) /kL-beer*	*calculated*	*monthly*	*100%*	*electronic*	*Refer to the baseline methodology. Significance of the data is checked by the beer authority.*
B4.	*Beer*	*Meter or*	*kL-beer*	*measured*	*Monthly before*	*100%*	*electronic*	*Used to obtain* $SEC^{BL}_{electricity,y}$

Q^{before}_{y}	*production prior to implementation of the project*	*sales/stock record*			*implementation of the project*			*and $SEC^{BL}_{heat,y}$ by using regression analysis. Checked against the sales/stock/purchase records.*
B5. $Electricity^{before}_{y}$	*Electricity consumption prior to implementation of the project*	*Wattmeter*	*kWh*	*Measured (and calculated)*	*Monthly before implementation of the project*	*100%*	*electronic*	*Used to obtain $SEC^{BL}_{electricity,y}$ by using regression analysis. Aggregated value of the purchased electricity and in-house generation. Checked against the sales/stock/purchase records.*
B6. $Heat^{before}_{y}$	*Heat consumption prior to implementation of the project*	*Weightometer or others to measure fuel consumption*	*Mcal or physical unit of the fuel*	*Measured (and calculated)*	*Monthly before implementation of the project*	*100%*	*electronic*	*Used to obtain $IB_{heat,y}$, by using regression analysis. Aggregated value of the fuels by using their energy content.*

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

>>

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

where

$Q_{i,y}$: annual production of beer/beverage at the facility [kL-beer/yr] of a category *i* (*e.g.*, lager, stout, juice, *etc.*),

$Q_y^{[Electricity\text{-}eq]}$: annual production of “beer” at the facility [kL-beer/yr] calculated by using “lager-eq.” for electricity, defined as $\sum_i Q_{i,y} * EQ(\text{electricity})_i$,

$Q_y^{[Heat\text{-}eq]}$: annual production of “beer” at the facility [kL-beer/yr] calculated by using “lager-eq.” for heat, defined as $\sum_i Q_{i,y} * EQ(\text{heat})_i$,

$EQ^{[electricity]}_i$: lager-equivalent energy consumption factor for electricity,

$EQ^{[heat]}_i$: lager-equivalent energy consumption factor for heat,

$SEC^{BL}_{k,y}$: specific energy consumption rate (energy intensity) of the baseline scenario [kcal/kL-beer] of the energy type *k* (such as external electricity, diesel oil, heavy oil, *etc*),

$CEF_{k,y}$: CO$_2$ emission factor of energy k

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

$Q_y^{[\ ]} = \sum_i Q_{i,y} * EQ^{[\ ]}_i$ is the annual production of beer at the facility [kL-beer/yr] calculated by using "lager-eq. (for electricity)" and "lager-eq. (for heat)", *i.e.*, adjusted one of the beer production.[5] It is noted that $EQ^{[\ ]}_i$ is different for electricity use and heat use. $Q_{i,y}$ is assumed to be common for the baseline scenario and the project scenario (if the beer production capacity increase scenario is not chosen as the baseline scenario) and monitored *ex post*. $EQ^{[\ ]}_i$ is estimated using technical consideration prior to implementation of the project and assumed to be constant.

In case beer production capacity increase scenario without energy efficiency improvement chosen as the baseline scenario (*i.e.*, identified as the economically most attractive course of action without the CER revenue) is, $Q_{i,y}$ is replaced as $Q^{PLAN}_{i,y}$ as planned, if and only if appropriate and sufficient documented evidences are provided by the project participants. The DOE (validator) assesses the appropriateness of such evidences considering the related data/information which may support such a plan. If the DOE finds that such information is insufficient, $Q_{i,y}$ is set to be common for the baseline scenario and the project scenario as the conservative estimation.

Summation over k is for the fuel for heat part; and electricity and fuel for power generation for electricity part) [tCO$_2$/kcal or tCO$_2$/t-fuel, tCO$_2$/l-fuel] consumed in the facility (measured annually). It is noted that $Q_{i,y}$ and $SEC^{BL}_{k,y}$ are monitored and estimated *monthly* basis.

As the project does not install new power generation system, it is reasonable to assume that $Q_y * SEC^{BL}_{electricity}{}^{INT}_y$ *is common* (=$Q_y * SEC^{PJ}_{electricity}{}^{INT}_y$) for baseline and project scenarios, therefore

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

where $SEC^{PJ}_{electricity}{}^{INT}_y$ (=$Q\_Energy_{InternalElectricity,y}$/ $Q_y^{[Electricity\text{-}eq]}$) is that of the project scenario.[6]

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

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

[5] Electricity and heat are two major energy usage modes. Both of them are functions of beer production. However, the beer factory may produce several types of beer and beverages, in general. In this methodology, beer production is adjusted by each type of beer by using "lager-equivalence" concept (no need to specify "lager", while some typical type of beer is set for the basis). As "lager-equivalence" concept may be different for electricity and heat consumption, the lager-equivalent beer production has two different ones such as $Q_y^{[Electricity\text{-}eq]}$ and $Q_y^{[heat\text{-}eq]}$.

[6] It should be noted that $SEC^{PJ}_{electricity}{}^{INT}_y$ is obtained by the fuel use for in-house power generation.

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 *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
P1, P2, B4, B5	*Low*	*Checked against the sales/stock/purchase records.*
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.*
B2, B3	*Low*	*Significance of the data is checked by the beer authority.*

In general, 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:

>>

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and

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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).

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

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

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

where

$Q_{i,y}$:	annual production of beer/beverage at the facility [kL-beer/yr] of a category i (*e.g.*, lager, stout, juice, *etc.*),
$Q_y^{[Electricity\text{-}eq]}$:	annual production of "beer" at the facility [kL-beer/yr] calculated by using "lager-eq." for electricity, defined as $\sum_i Q_{i,y} * EQ(\text{electricity})_i$,
$Q_y^{[Heat\text{-}eq]}$:	annual production of "beer" at the facility [kL-beer/yr] calculated by using "lager-eq." for heat, defined as $\sum_i Q_{i,y} * EQ(\text{heat})_i$,
$EQ^{[electricity]}_i$:	lager-equivalent energy consumption factor for electricity,
$EQ^{[heat]}_i$:	lager-equivalent energy consumption factor for heat,

$SEC^{BL}_{k,y}$: specific energy consumption rate (energy intensity) of the baseline scenario [kcal/kL-beer] of the energy type *k* (such as external electricity, diesel oil, heavy oil, *etc*),

$CEF_{k,y}$: CO_2 emission factor of energy *k*

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

$Q_y^{[\ ]} = \sum_i Q_{i,y} * EQ^{[\ ]}_i$ is the annual production of beer at the facility [kL-beer/yr] calculated by using "lager-eq. (for electricity)" and "lager-eq. (for heat)", *i.e.,* adjusted one of the beer production.[7] It is noted that $EQ^{[\ ]}_i$ is different for electricity use and heat use. $Q_{i,y}$ is assumed to be common for the baseline scenario and the project scenario (if the beer production capacity increase scenario is not chosen as the baseline scenario) and monitored *ex post*. $EQ^{[\ ]}_i$ is estimated using technical consideration prior to implementation of the project and assumed to be constant.

Summation over *k* is for the fuel for heat part; and electricity and fuel for power generation for electricity part) [tCO_2/kcal or tCO_2/t-fuel, tCO_2/l-fuel] consumed in the facility (measured annually). It is noted that $Q_{i,y}$ and $SEC^{BL}_{k,y}$ are monitored and estimated *monthly* basis.[8]

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

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:

>>

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).

---

[7] Electricity and heat are two major energy usage modes. Both of them are functions of beer production. However, the beer factory may produce several types of beer and beverages, in general. In this methodology, beer production is adjusted by each type of beer by using "lager-equivalence" concept (no need to specify "lager", while some typical type of beer is set for the basis). As "lager-equivalence" concept may be different for electricity and heat consumption, the lager-equivalent beer production has two different ones such as $Q_y^{[Electricity\text{-}eq]}$ and $Q_y^{[heat\text{-}eq]}$.

[8] Here we follow the notation used in AM (*i.e.*, specifying the time-dependence by using the suffix *y*). However, it is better to specify the time-dependence by (*t*) or suffix which specifies (month and year), for mathematically strict expression.

(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		63.9		93.6		
2004	53,000		58.0		92.3		
2005	58,300		56.1		91.7		
2006	64,130	10%	54.6	15.0	91.1	73.0	8,423
2007	70,543	10%	53.3	15.0	90.4	73.0	8,968
2008	77,597	9%	52.3	15.0	89.7	73.0	9,597
2009	85,357	8%	51.6	15.0	88.9	73.0	10,324
2010	93,893	7%	51.0	15.0	88.2	73.0	11,161
2011	103,282	7%	50.6	15.0	87.4	73.0	12,120
2012	113,610	7%	50.4	15.0	86.5	73.0	13,203
2013	124,971	7%	50.2	15.0	85.7	73.0	14,418
2014	137,468	7%	50.1	15.0	84.9	73.0	15,772
2015	151,215	7%	50.1	15.0	84.0	73.0	17,272
2016	166,337	7%	40.2	15.0	71.5	73.0	13,076
	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)	121,257

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

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

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
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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.
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City:	Hanoi
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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
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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)
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City:	Hanoi
State/Region:	
Postfix/ZIP:	
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FAX:	+84-4-835-9221
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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
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Country:	Japan
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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
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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

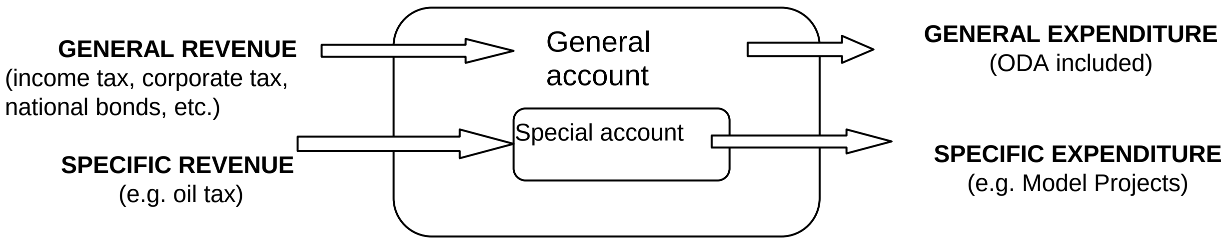
⇩

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	**Secretary**
Worker Representative	
Luong Dung	**Nguyen Thi Ninh**
Nguyen Quang Huynh	

(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.