CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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SECTION A. General description of project activity

A.1. Title of the project activity:

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Title of the project	:Biodiesel Fuel Production from Waste Oil/Fat Project in Shanghai
Version number of the document	:00
Date	:March 26, 2010

A.2. Description of the project activity:

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Project Background

Shanghai is one of the largest cities in China, having its population of approximately 18 million. Shanghai enjoys highly economic growth, raising the level of per-capita income, and expanding motorization. The rapid expansion of motorization aggravates urban environment: local air pollution, noise, car accidents and congestion so on. In addition, the growth of motorization brings polluting emissions such as carbon dioxide (CO_2), primarily responsible for global warming. It is urgently expected to take appropriate measures to solve the mentioned issues simultaneously.

On the other side of the economic growth, it is said that output of waste oil/fat from restaurants and food processing factories or related commercial sectors has reached approximately 150 thousand tons per year in Shanghai. Although Shanghai authority has enforced regulation regarding proper management of waste oil/fat, the management system (collection and treatment) is immature and does not work well so far. Some of them illegally collected, unprofessional purification and re-selling such waste oil/fat as raw material for cooking oil have been still ongoing.

Shanghai Luming Environment Science Co., Ltd (hereinafter referred to "Project owner"), one of the waste management companies in Shanghai, started to conduct a feasibility study for a biodiesel from waste oil/fat project from the social responsibility in 2005. After their decision of investment in the project, the project was approved by Shanghai authority and the construction of the biodiesel production plant was completed in 2008. They have started a test-run of the plant since then but they found it difficult to keep operating the plant because they have run into the technological issue, in addition, it was unlikely to be commercially viable from cost/benefit point of view.

The Purpose of the Project Activity

The purpose of the project activity is to retrofit and renovate the above mentioned present biodiesel plant which has not been commercially operated due to the above reasons. The technology to be employed in the renovation of the biodiesel production plant is "Aceton method", a high-efficiency process using aceton as solvent, which is patented by Osaka Prefecture University. The process is based on the trans-esterification of glycerides using methanol as the alcohol to replace the glycerine.

The project activity includes production of 10,000 tons/year of biodiesel from waste cooking oil/fat, which is generated from restaurants and food processing factories or related commercial sectors in Shanghai. The produced biodiesel will be blended with petrodiesel fuel ("PDF") and used for transportation sector in Shanghai. The proportion of the blend is expected to be 5% (B5) in compliance with the standard and regulations of People's Republic of China (P.R. of China).

In the absence of CDM framework, the Project owner is not capable of an additional investment for improvement of the present situation, that is, no biodiesel for vehicle use will be produced from waste oil/fat due to the technological and financial issue.
The realization of the project activity under the CDM framework will play a part in reducing greenhouse gas emissions by displacing the use of petrodiesel for transportation in Shanghai.

Contribution to Sustainable Development

The proposed project activity will contribute to sustainable development of China in the following points of view:

- Biodiesel to be produced from waste oil/fat will contribute to diversifies the sources of fuel consumption and energy conservation and it will alleviate the shortage of fuel for vehicles in Shanghai;
- The successful of running of the project will encourage the proper collection system of waste oil/fat in the area and reinforce the appropriate waste oil/fat management ;
- The project activity will promote and expand the utilization of waste cooking oil/fat in amount, meanwhile, reducing unmanaged disposal of waste cooking oil/fat causing the water and/or soil contamination ;
- Biodiesel to be produced will displace some petrodiesel, and that will mitigate the air pollution due to the exhausted emission gas from diesel engine vehicle, such as carbon monoxide, unburned hydrocarbons and particulate matter ;
- The project activity is the first-of-its-kind in China to produce biodiesel from waste cooking oil/fat using Aceton method (process). It will have a significant demonstration effect in the country for utilizing an advanced and innovative technology, where very few biodiesel project succeed commercially.

A.3. Project participants:

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Name of Party involved(*) ((host) indicates a Host Party)	Private and/or public entity(ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Shanghai Luming Environment Science Co., Ltd (Private entity)	No
Japan	Ichikawa Kankyo Engineering Co., Ltd. (Private entity)	No

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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People's republic of China

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

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Shanghai city

A.4.1.3. City/Town/Community etc.:

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Waste cooking oil/fat recovery area	: 18 districts in Shanghai
BDF production plant	: Minghang district
BDF blending/consumption	: 18 districts in Shanghai

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

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The biodiesel production plant is located at Mingbei Industrial Park in Minghang district at latitude 31.22N and longitude 121.33E.
Area where waste oil/fat will be collected for the biodiesel production is almost within the radius of 50km.
The project site map is shown in the Figure A.4.1 below.

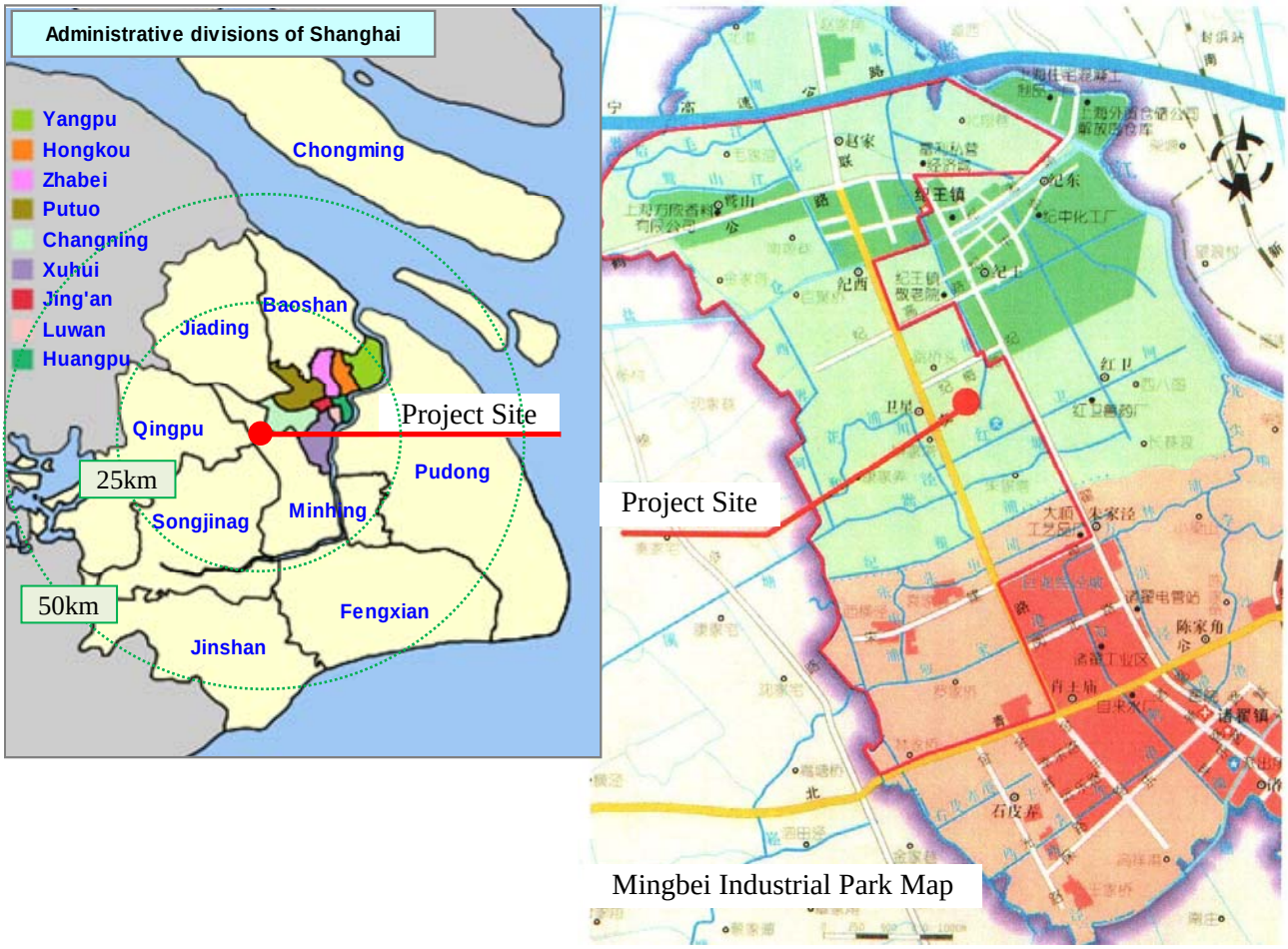

Figure A.4.1 Map showing the location of the project

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

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Energy industries (renewable / non renewable sources)

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

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Besides wind power generation and photovoltaic generation, biomass energy such as methane, ethanol and biodiesel fuel have been much attention for the protection of global warming due to the carbon neutral of biomass. Biodiesel production is the most popular one because the formation process is the fastest and the simplest compared with ethanol and methane productions. More than 10 million tons of biodiesel fuel have been produced in EU and about 3 million tons biodiesel fuel can be produced by addition of methanol to waste oil/fat with small amounts of potassium hydroxide or sodium hydroxide as catalyst. Waste oil/fat is one of good candidate for feedstock for biodiesel.

In 1984 Freeman et.al has studied the vegetable oil transesterification and showed The reaction scheme can be described as follows:

$$TG + MeOH \leftrightarrows FAME + DG$$

$$DG + MeOH \leftrightarrows FAME + MG$$

$$MG + MeOH \leftrightarrows FAME + GL$$

Where: TG=triglyceride, DG=diglyceride, MG=monoglyceride, GL=Glycerin, MeOH=methanol.

Many chemists have studied to develop the new technology for the production of biodiesel such as:

(1) Alkaline Catalyst method using NaOH or KOH
(2) Acid Catalyst such as H_2SO_4
(3) Solid Catalyst using CaO or MgO
(4) Enzyme method
(5) Super Critical Method
(6) Hydrogenation
(7) Ozonation

(2)-(7) method have developed to eliminate the formation of soap in the reaction of free fatty acid contained in vegetable oil, however (2), (3) and (4) are too slow and need high temperature to accelerate the reaction rate. (5), (6) and (7) are rapid reaction however the yield of FAME is not so high, therefore the distillation of the products is needed after the reaction.

The quality of waste oil/fat collected as raw material for biodiesel in Shanghai is quite bad, with high content of fatty acids and impurities. This makes it difficult to produce biodiesel to meet the quality standard of biodiesel for vehicles use or it is costly to meet the quality.
The technology to be employed in the biodiesel production plant is “Aceton method”, using aceton as solvent for esterification effectively without heat, which is based on the trans-esterification of glycerides using methanol as the alcohol to replace the glycerine. This high-efficiency biodiesel production process is patented by Osaka Prefecture University[1]. This new process will help to produce better quality of biodiesel and to reduce the production costs compared with the present process “Enzyme method”.

[1] Patent name : “The production method and system of Fatty Acid Methyl Ester”

The retrofit of the present process is to install an additional tank for primary esterification and to change some piping and to set measurement equipments for monitoring. The below figure shows the proposed process flow chart.

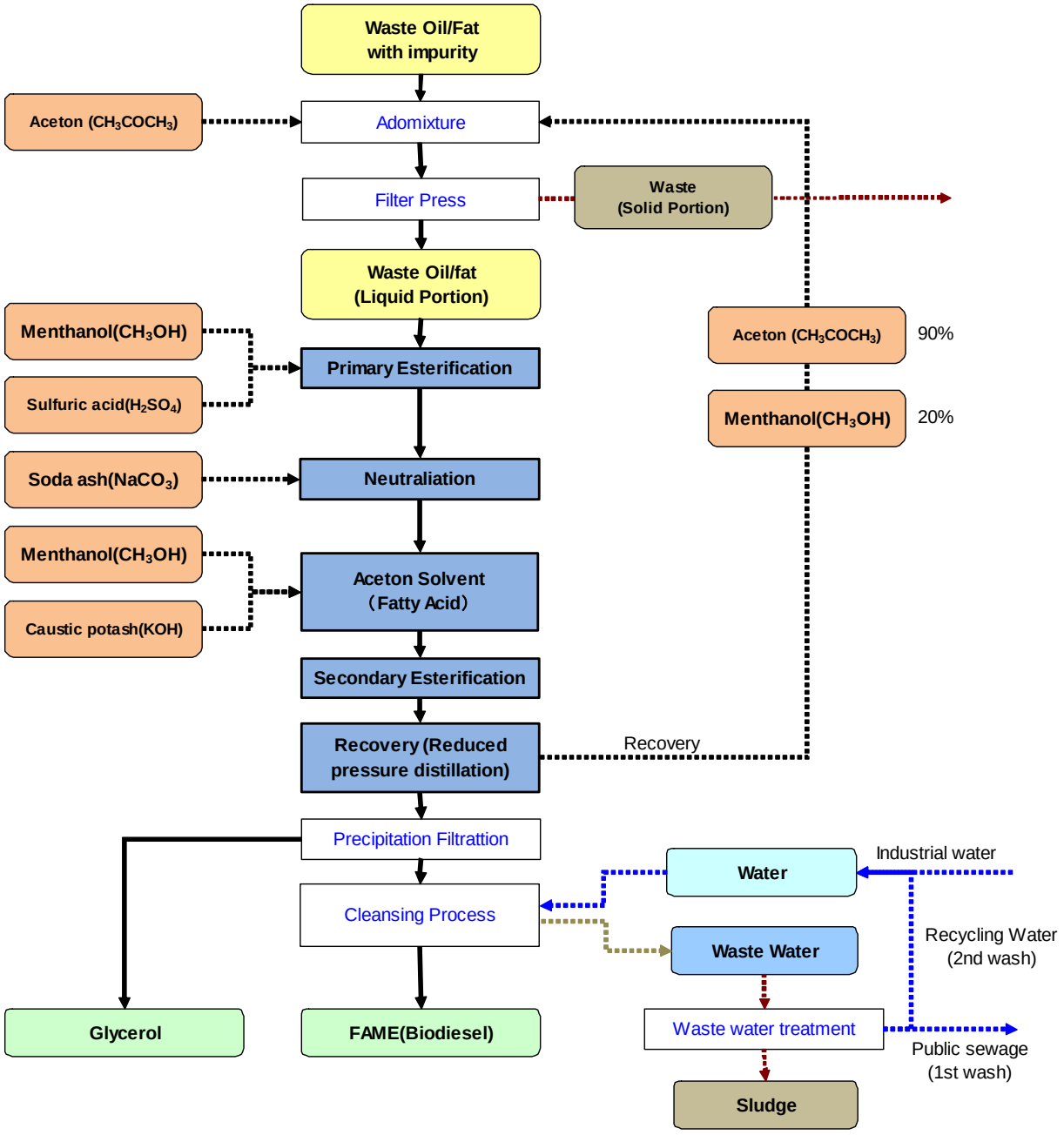

Figure A.4.2 Proposed Process Flow

The advantages of the proposed process are summarized in the below table.

Table A.4.1 Technology advantages

(1)	acceleration of the reaction rate of trans-esterification in homogeneous phase without heating
(2)	rapid separation of produced fatty acid methyl ester (FAME) from also produced glycerin because of the low viscosity of FAME-acetone solution and larger difference between low density of FAME-acetone solution (0.8645 for 66% FAME solution at 15^{o}C) and high density of glycerin(1.2644 at 15^{o}C)
(3)	the kinetic data in homogeneous phase shows that the retardation of transesterification is not due to the back reaction but the isolation of methanol and sodium hydroxide catalyst from the reaction field with precipitated glycerin produced at final stage of the reaction
(4)	there is no retardation in homogeneous reaction by coexistent water which produces soap with potassium hydroxide and stop the reaction in conventional heterogeneous reaction
(5)	smaller amounts of potassium hydroxide (0.1% of oil) has enough activity as catalyst compared with conventional heterogeneous phase method (1-2% of oil)

The below table shows the laboratory test results of the quality of biodiesel produced by the present process and the proposed process.

Table A.4.2 Test results (laboratory) of biodiesel composition

	BDF standard	**The present Process**	**The proposed process**
Biodiesel	96.5% <	95.3%	98.5%
Triglyceride	0.2% >	0.8%	0%
Monoglyceride	0.8% >	1.2%	0.1%
Diglyceride	0.2% >	0.8%	0.05%
Water content	0.05% >	0.15%	0.05%
Glycerol	0.02% >	0%	0%
Total glycerin	0.25% >	2.0%	0.15%

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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Table A.4.3 Estimated amount of emission reductions over the chosen crediting period

Year	Annual estimation of emission reductions (tCO_2)
2012	26,755
2013	26,755
2014	26,755
2015	26,755
2016	26,755
2017	26,755
2018	26,755
2019	26,755
2020	26,755
2021	26,755
Total estimated reductions	267,550
Total number of crediting years	10years
Annual average over the crediting period of estimated reductions	26,755

A.4.5. Public funding of the project activity:

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The project activity has received financial support from Ministry of the Environment of Japan (J-MOE) to carry out the feasibility study including preparation of the draft project design document, and is expected to utilize the public funding facility of J-MOE for the initial project cost partially.
The Japanese government will certify that the support for the project does not result in the diversion of ODA.

SECTION B. Application of a baseline and monitoring methodology

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

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The approved baseline and monitoring methodology applied to the Project activity is:

- Approved consolidated baseline and monitoring methodology ACM0017 (version01) " Production of biodiesel for use as fuel "

The methodology also refers to the latest version of the following tools:

- "Tool for the demonstration and assessment of additionality" (version 05.2);
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 2) ;
- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 2) ;

For more information regarding the methodology and the tools as well as their consideration by the Executive Board, please refer to http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html .

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

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The methodology ACM0017 (Version 01) is applicable to the Project due to following reasons:

1. Definition

The definitions are specified in the methodology ACM0017, and of them, the following definitions are applied to this PDD.

Biodiesel	is a diesel fuel consisting of long-chain alkyl (methyl, propyl or ethyl) esters which is produced by esterification of **waste oil/fat** with alcohol from **biogenic** and/or fossil origin.
Biodiesel production plant	is the plant where **waste oil/fat** is processed through **esterification** to **biodiesel**
Biogenic	means that the oils and/or fats originate from either vegetable or animal biomass, but not from mineral (fossil) sources
Biomass	is non-fossilized and biodegradable organic material originating from plants, animals and microorganisms. This shall include products, by-products, residues and waste from agriculture, forestry and related industries as well as the non-fossilized and biodegradable organic fractions of industrial and municipal wastes. **Biomass** also includes gasses and liquids recovered from the decomposition of non-fossilised and biodegradable organic material.
Biomass residues	are defined as **biomass** that is a by product, residue or waste steam from agriculture, forestry and related industries. This shall not include municipal waste or wastes that contain fossilised and/or non-biodegradable material (however, small fractions of inert inorganic material like soil or sands may be included).

Blended biodiesel	is defined as a blend of **petrodiesel** and **biodiesel**.
Esterification	denotes the formation of an ester compound from carbonic acid and alcohol. Transesterification denotes the exchange of one alcohol in an ester against another (for example glycerol against methanol). In this methodology , "**esterification**" is used to denote both **esterification** and transesterification for simplicity.
Petrodiesel	is 100% fossil fuel diesel.
Vegitable oil	is oil of **biogenic** origin that is produced from oil seeds from plants.
Waste oil/fat	is defined as residue or waste stream of **biogenic** origin from restaurants, agro and food industry, slaughterhouses or related commercial sectors.

2. Meet the applicability conditions apply to the methodology

The proposed project activity reduces emissions through the production, sale and consumption of blended biodiesel that is used as fuel, where the biodiesel is produced from one of the alternative sources (a) waste oil/fat as specified in applicability of the methodology. As the project activity will not use the other source (b) for the production of biodiesel, applicability conditions relating to (a) are selected for justification and explanation in this PDD.
The project activity meets such applicability conditions for the methodology in the following manner:

	Justification/Explanation
CER issue	The CERs will only be issued to the producer of the biodiesel and not to the consumer.
Feedstock inputs	a) The biodiesel in the project plant will be produced from 100% waste oil/fat collected in Shanghai and no other feedstock source will be included in the quantity of biofuel for which emission reductions are claimed.
	b) The project activity will not use the alcohol other than methanol from fossil fuel origin to produce the biodiesel in the project plant.
Biodiesel plant and products	a) The petrodiesel, the biodiesel and the blended biodiesel comply with Chinese laws and regulations including standards for usage of such fuels.
	b) The project activity will involve construction (modification and/or retrofit of the present BDF plant for introducing the high efficiency process) and operation of a biodiesel production plant.
	c) The by-product glycerol will not be disposed of or left to decay. Glycerol from the project plant will be used as raw material for chemical manufacturing factory and/or fuel for boilers in factories.
	d) Neither biomass nor biofuels will be used at the site of the biodiesel production plant for fuel consumption.
Consumption of biodiesel	a) The blended biodiesel is supplied to the truck and/or bus companies in Shanghai (within the host country) and such consumers are included in the project boundary.
	b) The truck and/or bus companies (consumers) and the producer of the blended biodiesel will be bound by such a contract as MOU that allows the producer to monitor the consumption of blended biodiesel and that states that the consumer shall not claim CERs resulting from its consumption.
	c) No modification in the vehicles engines will be made to consume the blended biodiesel. The blending portion of the biodiesel for the vehicles is 5% (B5) in compliance with Chinese standard.
	d) The trucks and/or buses consume the blended biodiesel are owned and

	Justification/Explanation
	operated by companies(entities) which is included in the project boundary.
	e) Only biodiesel consumed in excess of mandatory regulations is eligible for the purpose of the project activity = check later

The project activity meets all applicability conditions relating to the source (a) waste oil/fat, therefore, the methodology ACM0017(version01) is chosen and applicable to the project.

B.3. Description of the sources and gases included in the project boundary:

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The methodology ACM0017 applied to this project activity defines the spatial extent of the project boundary and in accordance with the methodology, the project boundary for this project activity will therefore include:

- Transportation of :

(a) Waste oil/fat from all collecting site to the biodiesel production plant; and

(b) The biodiesel to the site where it is blended with petrodiesel.

- The biodiesel production plant at the project site, comprising the esterification unit plus other equipments on the site, which is explained in "A.4.3. Technology to be employed by the project activity" in this PDD;
- Facilities where the biodiesel is blended with petrodiesel; and
- Vehicles where the blended biodiesel is consumed.

The following figure shows the boundary of the project activity.

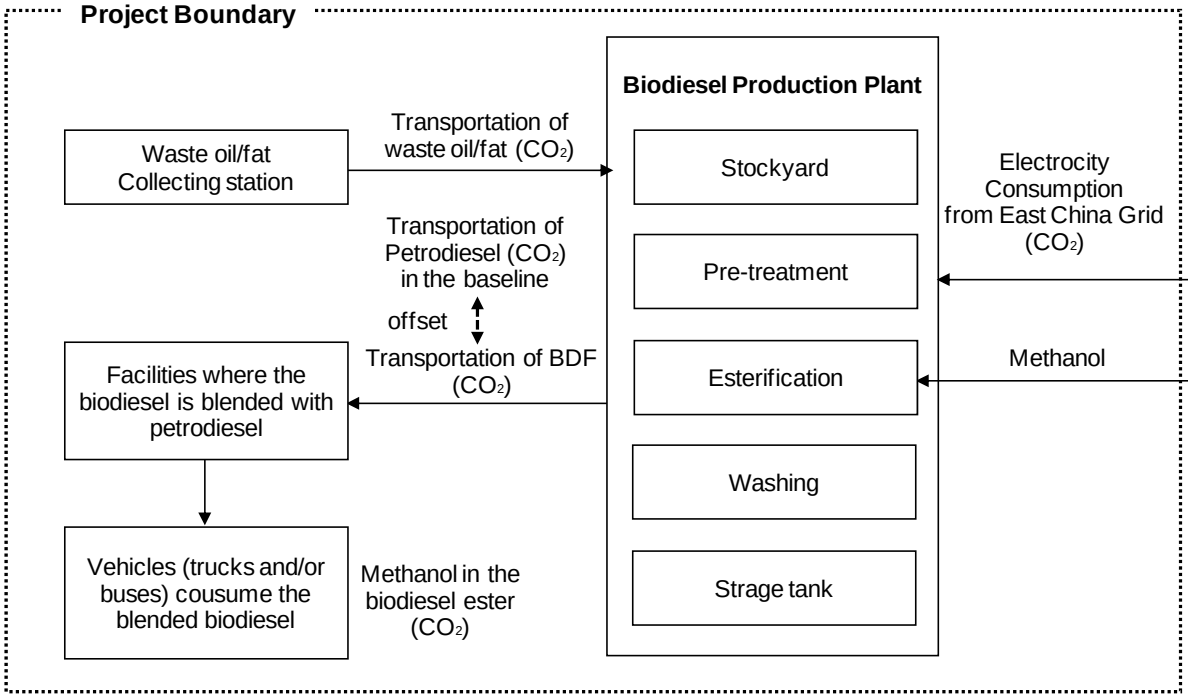

Figure B.3.1 Flow diagram of the project boundary

Table B.3.1 : Summery of gases and sources included in the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Vehicles and stationary combustion installations consuming biodiesel	CO_2	**Yes**	Main source of baseline emissions
		CH_4	No	Excluded for simplification. CH_4 and N_2O emissions are assumed to be very small. No systematic difference to project activity
		N_2O	No	
Project Activity	On site energy consumption at biodiesel production plant and, if applicable, the oil production plant(s)	CO_2	Yes	May be a significant emissions source. Electricity will be consumed at the biodiesel production plant when it operates.
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Combustion of fossil fuel derived methanol in the biodiesel ester	CO_2	**Yes**	May be a significant emissions source. Methanol will be used for esterification.
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Transportation of waste oil/fat	CO_2	**Yes**	May be a significant emissions source.
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small
	Transportation of biodiesel to blending facility	CO_2	No	Not considered. Transportation of petrodiesel in the baseline case to be replaced by biodiesel in the project activity would be offset emission.
		CH_4	No	Excluded for simplification. CH_4 emissions are assumed to be very small
		N_2O	No	Excluded for simplification. N_2O emissions are assumed to be very small

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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According to the methodology, the baseline scenario would be separately determined and identified for the following three (3) elements:

(a) Production of fuels (P)	:	What would have happened at the production level in the absence of the CDM project activity?
(b) Consumption (C)	:	Which fuel would have been consumed in the absence of the CDM project activity?
(c) Material (M)	:	What would have happened to the material used as input for production of biofuel in the absence of the CDM project activity?

The methodology stipulates that the most likely baseline scenario among all realistic and credible alternatives is identified by applying steps of the latest approved version of the "Tool for the demonstration and assessment of additionality".
Note that the methodology recommends that Step 3 "Barrier analysis" in the tool should be used to assess which of these alternatives is to be excluded from further consideration and that Step 2 "Investment analysis" in the tool should be applied for all remaining alternatives.

Step 1: Identification all realistic and credible alternatives

(a) Production of fuels (P)

The following alternatives are considered for the production level. Closely relating to consumption

P1:	Continuation of current practices with no investment in biodiesel production capacity; (New biodiesel process will not be introduced and the present biodiesel production plant will not be able to produce biodiesel that meets the quality standard for vehicle use)
P2:	The project activity implemented without the CDM; and
P3:	Investment in any other alternative fuel replacing partially or totally the baseline fuel. (such as CNG or LPG)

(b) Consumption (C)

The following alternatives with respect to the intended consumer of blended biodiesel would be considered. In the project activity, intended consumers are to be bus/taxi companies and logistic companies own trucks for transportation.

C1:	Continuation of petroleum diesel consumption (continuation of current practice)
C2:	Consumption of biodiesel from other producers;
C3:	Consumption of other single alternative fuel such as CNG or LPG, etc;
C4:	Consumption of mix of above alternative fules;
C5:	Consumption of biodiesel from the proposed project plant.

(c) Material (M)

The following alternatives would be considered for the material (M) level. Material is waste oil/fat generated in Shanghai.

M1:	Use of material for production of biofules (by the project proponent or by others);
M2:	Use for material production of substance other than fuel;
M3:	Incineration of material for the purpose of energy recovery;
M4:	Incineration of material without energy recovery;
M5:	Dispose of material in an anaerobic or aerobic manner.
M6:	Combination of M2 to M5

Step 2: Eliminate alternatives that are not complying with applicable laws and regulations

All realistic and credible alternatives to (P), (C) and (M) identified in Step 1 are analyzed if they are in compliance with mandatory legislation and regulations taking into account the enforcement in Shanghai or P.R. China and EB decision on national and/or sectoral polices and regulations.

Step 3: Eliminate alternatives that face prohibitive barriers

Determine whether the all remaining alternatives in the previous Step 2 face barriers

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity

The following barriers are identified as the realistic and credible barriers that would prevent the implementation of the proposed project activity from being carried out, in a CDM project activity.

(a) Investment barriers, other than the economic/financial barriers in Step 4 in this PDD
(b) Technological barriers
(c) Barrier due to prevailing practice
(d) Other barriers

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives.

Any alternative that would be prevented by the barrier identified in Sub-step 3a above is not a viable alternative, and shall be eliminated from consideration.

Step 4: Compare economic attractive of remaining alternatives

Compare the economic attractiveness for all the remaining alternatives by applying Step 2 of the latest approved version of the "Tool for the demonstration and assessment of additionality".

Sub-step 4a: Determine appropriate analysis method

According to the latest version of the "Tool for the demonstration and assessment of additionality", three options can be applied to conduct the investment analysis. These are the simple cost analysis (Option I), the investment comparison analysis (Option II) and the benchmark analysis (Option III).

Since this project and the alternatives will generate financial/economic benefits other than CDM-related income, through the sale of biodiesel, Option I (Simple Cost Analysis) is not applicable.

According to the additionality tool, if the alternative to the CDM project activity does not include investments of comparable scale to the Project, then Option III must be used.

Given that the project owner does not have alternative and comparable investment choices, benchmark analysis (Option III) is more appropriate than investment comparison analysis (Option II) for assessing the financial attractiveness of the Project activity.

Sub-step 4b: Option III. Apply benchmark analysis

(1) Identify the financial/economic indicator

The financial Investment rate of return (FIRR) would be used for the analysis.

(2) Discount rates and benchmarks

The benchmark chosen is 13%, which is defined in "Parameter for construction investment 2006 by National Development and Reform Commission of P.R China.

Sub-step 4c: Calculation and comparison of financial indicators

Assumptions for benchmark analysis would be as follows:

(1) Initial Cost for the project

Construction cost (civil and equipment) and other project cost such as land acquisition and required cost for EIA are to be considered.

(2) Operation Cost for the project

Variable cost (Feedstock, Chemicals and Utility), Fixed cost (Labour, Overhead and Maintenance cost) and Other cost (Depreciation and tax) are to be considered.

Sub-step 4d: Sensitivity analysis

Main parameter such as feedstock cost (such as waste oil/fat) and product (such as biodiesel) sales price would be used and conduct a sensitivity analysis.

B.5. 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 (assessment and demonstration of additionality):

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Baseline scenario for the production of fuels (P)

For the production of fuels (P), the most likely baseline scenario among all realistic and credible alternatives is identified by applying steps of the latest approved version of the "Tool for the demonstration and assessment of additionality".

Step 1: Identification all realistic and credible alternatives for the production of fuels (P)

P1:	Continuation of current practices with no investment in biodiesel production capacity; (New biodiesel process will not be introduced and the present biodiesel production plant will not be able to produce biodiesel that meets the quality standard for vehicle use)
P2:	The project activity implemented without the CDM; and
P3:	Investment in any other alternative fuel replacing partially or totally the baseline fuel. (such as CNG or LPG)

Step 2: Eliminate alternatives that are not complying with applicable laws and regulations

All alternatives scenarios are in compliance in existing laws and regulations of P.R. of China. There are no laws or regulations preventing the use of petrodiesel by the target consumers, nor are there laws that prohibit the establishment of biodiesel refineries.

The main sectoral policy relevant to this project is the "Renewable Energy Law of the People's Republic of China", which came into effect on 1 January 2006 and aims to promote renewable energy in P.R. China. This law demonstrates the Chinese government's commitment to the development of renewable energy as part of the overall energy development strategy.
And "China technology policy outline for Energy saving" mentioned promoting biodiesel according to local conditions.

Step 3: Eliminate alternatives that face prohibitive barriers

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity

The following barriers are identified as the realistic and credible barriers that would prevent the implementation of the proposed project activity from being carried out, in a CDM project activity.

(a) Investment barriers, other than the economic/financial barriers in Step 3 in this PDD
(b) Technological barriers
(c) Barrier due to prevailing practice

Sub-step 2b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives.

P1:	Continuation of current practices with no investment in biodiesel production capacity (New biodiesel process will not be introduced and the present biodiesel production plant will not be able to produce biodiesel that meets the quality standard for vehicle use)

	Barrier	Explanation
(a)	Investment barriers	There is no barrier to prevent the continuation of current practices with no investment in biodiesel production capacity.
(b)	Technological barriers	
(c)	Barrier due to	

	prevailing practice	

P2: The project activity implemented without the CDM

	Barrier	Explanation
(a)	Investment barriers	While fuel ethanol producers are subsidized by the Chinese government, biodiesel producers still don't enjoy any kind of preferential policies as the industry is still its infancy stage. In fact, the present biodiesel production plant was constructed without any financial support from the Shanghai city nor the Chinese government. Thus no subsidy or related finance source would be expected for the investment. There are no direct incentives such as higher tariffs for biodiesel nor tax exemption. There is no guaranteed off-take agreement in place, which is a major barrier to investment in biodiesel production capacity.
(b)	Technological barriers	Technology to produce biodiesel in China is under developing. Many projects have launched using vegetable oil as feedstock but there are still few projects using waste oil/fat as feedstock. The quality of waste oil/fat collected is very bad, with high fatty acid and impurity, which makes it difficult to produce biodiesel to meet the quality standard for vehicle use or else. In addition, Acton method to be introduced in the project activity is the first of its kind technology in China. The project owner that operates the present biodiesel production plant faces the technological barrier apparently.
(c)	Barrier due to prevailing practice	As mentioned above, there are many projects have launched but very few projects is in commercially success. Although the biodiesel production capacity is 300 thousand ton/year, actual production in 2008 was almost 30 thousand tons. Especially no project using waste oil/fat as feedstock had been succeeded commercially so far in China.

P3: Investment in any other alternative fuel replacing partially or totally the baseline fuel. (such as CNG or LPG)

	Barrier	Explanation
(a)	Investment barriers	Investment in capacity for another alternative fuel is not an option because the project owner is not in a position to invest in other alternative fuels (i.e. lack of expertise, outside the scope of business operations).
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	

From the barrier analysis, only Scenario P1 will not face any barrier.

Step 4: Compare economic attractive of remaining alternatives

According to the methodology, Step 2 “Investment analysis” in the “Tool for the demonstration and assessment of additionaty” should be applied for all remaining alternatives in the previous steps. Only scenario P1 remains in the previous step and no comparison of alternative is needed, so this step 3 is not carried out.

Step 5: Common practice analysis

As mentioned above, there are many projects have launched but very few projects is in commercially success. Although the biodiesel production capacity is 300 thousand ton/year, actual production in 2008 was almost 30 thousand tons. Especially no project using waste oil/fat as feedstock had been succeeded commercially so far in China.
In addition, there is no project under operation in Shanghai to use waste oil/fat as feedstock for biodiesel production.

There have been announcements of potential biodiesel projects (Brown 2006; Annon. 2005; Le Roux2006; Financial Mail 2005) possibly being developed, but there is as yet no actual investment or capacity in place.
Note from methodology, "In assessing whether the project activity represents common practice in the host country, project proponents shall verify whether there are any policies or targets for introducing biodiesel in the host country. If there are any such policies, the project proponents shall demonstrate whether these targets have been achieved (i.e. the penetration of biodiesel versus stated policy targets)." While the Draft Biodiesel Strategy does propose a national target for biodiesel blending with petrodiesel, this strategy is still in draft form, subject to public comment and revision. Furthermore, it is not clear whether and how the implementation mechanisms for this target will be enforced, since immediate enforcement of a blending ratio, when no production capacity is in place, would require importing biofuels. Therefore it is unlikely even in the short term to medium term that the blending ratio will be enforced. Currently there is no commercial biodiesel production or consumption.

Baseline scenario for consumption of fuel (C)

Step 1: Identification all realistic and credible alternatives for the fuel used by end consumers

According to the methodology, the following alternatives with respect to the intended consumer of blended biodiesel should be considered.
In the project activity, intended consumers are bus/taxi companies and logistic companies own trucks for transportation.

C1:	Continuation of petroleum diesel consumption (continuation of current practice)
C2:	Consumption of biodiesel from other producers;
C3:	Consumption of other single alternative fuel such as CNG or LPG, etc;
C4:	Consumption of mix of above alternative fules;
C5:	Consumption of biodiesel from the proposed project plant.

Step 2: Eliminate alternatives that are not complying with applicable laws and regulations

All alternatives identified in above Step 1 are in compliance with all applicable legal and regulatory requirements in the People's Republic of China. Therefore, no alternative is eliminated in this step.

Step 3: Eliminate alternatives that face prohibitive barriers

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity

The following realistic and credible barriers would prevent the implementing of the proposed project activity from being carried out if the project was not registered as a CDM activity:

(a) Investment barriers
(b) Technological barriers
(c) Barrier due to prevailing practice

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives.

C1: Continuation of petroleum diesel consumption (continuation of current practice)

	Barrier	Explanation
(a)	Investment barriers	There is no barrier to prevent the continuation of petrodiesel consumption in Shanghai. Petrodiesel is still the main fuel source for the vehicles such as truck, bus and taxi in Shanghai.
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	

C2: Consumption of biodiesel from other producers;

	Barrier	Explanation
(a)	Investment barriers	The biodiesel market in China is yet immature. It means that the market for biodiesel is still limited to local distribution, direct sale and purchase, due to the low output and for not yet having unlimited market access to the main network of the three Chinese leading petrol companies, SINOPEC, PETROCHINA and CNOOC.
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	In Shanghai, there is no truck and bus using biodiesel in commercial base. The barrier to engage in a "first-of-its-kind" project is considerably high without the support of the CDM framework provided by the project proponent.

C3: Consumption of other single alternative fuel such as CNG or LPG, etc;

	Barrier	Explanation
(a)	Investment barriers	Fuel switching from petrodiesel to other fuels such as CNG or LPG etc. requires consumers to modify vehicles or to purchase new vehicles. There is no incentive policy to encourage consumers to use such fuels.
(b)	Technological barriers	There are some trials to use CNG for public bus in Shanghai but no private consumer is found to use such other fuels other than petrodisel currently. The possible consumers that the project owner has been contacted for biodiesel sales are not in
(c)	Barrier due to prevailing practice	

C4: Consumption of mix of above alternative fules;

	Barrier	Explanation
(a)	Investment barriers	From the analysis of C2 and C3, this scenario faces the same barriers.
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	

C5: Consumption of biodiesel from the proposed project plant.

	Barrier	Explanation
(a)	Investment barriers	As demonstrated in for the production of fuel (P), The proposed project plant without CDM framework will not be the baseline and is eliminated so it causes logically conflict. No biodiesel will be produced in the baseline at the production level (P), therefore, any consumption of biodiesel from the proposed project plant would be occurred.
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	

All scenarios other than C1 face the barriers and are eliminated in this step.

Step 4: Compare economic attractive of remaining alternatives

Only scenario C1 remains in the previous step so this step 4 is not carried out.

Baseline scenario for Material (M)

Step 1: Identification all realistic and credible alternatives for the material (M)

According to the methodology, the following alternatives should be considered for the material (M) level.

M1:	Use of material for production of biofules (by the project proponent or by others);
M2:	Use for material production of substance other than fuel;
M3:	Incineration of material for the purpose of energy recovery;
M4:	Incineration of material without energy recovery;
M5:	Dispose of material in an anaerobic or aerobic manner.
M6:	Combination of M2 to M5

Step 2: Eliminate alternatives that are not complying with applicable laws and regulations

All alternatives identified in above ***Step 1*** are in compliance with all applicable legal and regulatory requirements in the People's Republic of China. Therefore, no alternative is eliminated in this step.

The main laws and regulations relevant to waste oil/fat management are as follows:

National level

- Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste to be effective as of April 1, 1996.

Provincial level

- Regulations on city appearance and environmental sanitation
- Provisions on administration on waste oil produced by food enterprises

City Level

- Shanghai Administrative regulations on city appearance and environmental sanitation
- Shanghai Administrative regulations on household/restaurant rubbish
- Shanghai administrative rules for the implementation on waste oil
- To further standardize the administrative work on treatment of waste oil in Shanghai
- Shanghai administrative regulation on collection and disposal of household/restaurant rubbish by the producer
- Shanghai administrative embodiment of administration on household/restaurant rubbish

Step 3: Eliminate alternatives that face prohibitive barriers

M1:	Use of material for production of biofules (by the project proponent or by others);

	Barrier	Explanation
(a)	Investment barriers	As demonstrated in for the production of fuel (P), The proposed project plant without CDM framework will not be the baseline and is eliminated so it causes a logical conflict. No biodiesel will be produced from waste oil/fat in the baseline at the production level (P), therefore, any waste oil/fat will not use for the production of biofuels.
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	

M2:	Use for material production of substance other than fuel;
M3:	Incineration of material for the purpose of energy recovery;
M4:	Incineration of material without energy recovery;
M5:	Dispose of material in an anaerobic or aerobic manner.

	Barrier	Explanation
(a)	Investment barriers	There is no barrier for M2 to M5 in single. Therefore, M6 would be selected for remaining scenario
(b)	Technological barriers	
(c)	Barrier due to prevailing practice	

Step 4: Compare economic attractive of remaining alternatives

This step is not carried out as M2 to M5 are inclusive in M6 (Combination of M2 to M5) and to compare each other in economic attractive is not suitable.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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According to the methodology ACM0017 Ver.01, the emission reductions of the project activity are calculated as follows:

Baseline Emissions

Baseline emissions from displaced petrodiesel are determined using the following equation :

$$BE_y = BD_y * NCV_{BD,y} * EF_{CO2,PD,y} \quad (1)$$

Where:

BE_y	=	Baseline emissions during the year y (tCO_2/yr)
BD_y	=	Quantity of biodiesel eligible for crediting in year *y*
$NCV_{BD,y}$	=	Net calorific value of biodiesel produced for the year *y*
$EF_{CO2,PD,y}$	=	Carbon dioxide emission factor for petrodiesel

➢ ***Determination of Quantity of biodiesel eligible for crediting (BD_y)***

$$BD_y = min\ (P_{BD,y}\ ,\ f_{PJ,y} * C_{BBD,y}\ ) - P_{BD,on\text{-}site,y} - P_{BD,other,y} \quad (2)$$

Where:

$P_{BD,y}$	=	Production of biodiesel in the project plant in year *y* (tons)
$C_{BBD,y}$	=	Consumption of (blended) biodiesel from the project plant by the captive consumer(s) in year *y*
$P_{BD,on\text{-}site,y}$	=	Quantity of biodiesel consumed at the project biodiesel production plant in year y
$P_{BD,other,y}$	=	Quantity of biodiesel that is either produced with other alcohols than methanol from fossil origin or that is produced using other oil seeds or waste oil(s)/fat(s) than those eligible under this methodology according to the applicability conditions.
$f_{PJ,y}$	=	Fraction of blending in year y (ratio)

Project Emissions

As per the methodology, the project emissions within the project boundary are given as follows:

$$PE_y = AF_{1,y} * (PE_{BPF,y} + PE_{MeOH,y} + PE_{Tr,y}) \quad (3)$$

Where :

PE_y	=	Project emissions in year *y* (tCO_2)
$PE_{BPF,y}$	=	Project emissions at the biodiesel production plant in year y
$PE_{MeOH,y}$	=	Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin in year *y*
$PE_{Tr,y}$	=	Project emissions from transportation in year *y* (tCO_2)
$AF_{1,y}$	=	Allocation factor for the production of biodiesel in year *y* (fraction)

1. Project emissions at the biodiesel production plant ($PE_{BPF,y}$)

$$PE_{BPF,y} = \sum_j PE_{FC,j,y} + PE_{EC,y} \quad (4)$$

Where :

PE_{BPFy}	=	Project emissions at the biodiesel production plant in year *y*
$PE_{FC,j,y}$	=	Project emissions from combustion of fuel type j in the biodiesel production plant in year *y* (tCO_2)
$PE_{EC,y}$	=	Project emissions from electricity consumption in the biodiesel production plant in year *y* (tCO_2)

1.1 Emissions from fossil fuel consumption ($PE_{FC,j,y}$)

No fossil fuel will be consumed in the biodiesel production plant therefore no emissions from combustion of fossil fuel.

1.2 Emissions from electricity consumption ($PE_{EC,y}$)

Emissions from electricity consumption from the grid to the biodiesel production plant would be taken into consideration. The project emissions from electricity consumption ($PE_{EC,y}$) will be calculated following the latest version of "Tool to calculate project emissions from electricity consumption (version 01)"
Electricity to be consumed by the project activity will be purchased from the East China (Huadong) Power Grid. In this PDD, Scenario A "Electricity consumption from the grid" applies to the source of electricity consumption.

$$PE_{EC,y} = \sum_{j} EC_{pj,j,y} + EF_{EL,i,y} * (1+TDL_{j,y}) \quad (5)$$

Where :

$PE_{EC,y}$	=	Project emissions from electricity consumption in the biodiesel production plant in year *y* (tCO_2/yr)
$EC_{pj,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source *j* in year y (MWh/yr)
$EF_{EL,i,y}$	=	Emission factor for electricity generation for source *j* in year y (tCO_2/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*
j	=	Sources of electricity consumption in project (East China Power Grid)

➢ ***Determination of the emission factor for electricity generation ($EF_{EL,i,y}$)***

To determine the emission factor, this PDD select Option A1 of "tool Tool to calculate project emissions from electricity consumption (version 01)", that is, calculating the combined margin emission factor of the applicable electricity system. ($EF_{EL,i,y} = EF_{grid,CM,y}$)
Combined margin emission factor is determined in the following equation:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM} \quad (6)$$

Where :

$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor in year *y* (tCO_2/MWh) (=$EF_{EL,i,y}$)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM}	=	Weighing of operating margin emissions factor, which is 0.5 by default
w_{BM}	=	Weighing of build margin emissions factor, which is 0.5 by default

This PDD uses "China's Regional Grid Baseline Emission Factors 2009" which is published by the DNA of P. R. China to determine the Operating Margin (OM) emission factor and the Build Margin (BM) emission factor using the most recent data available.

2. Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin ($PE_{MeOH,y}$)

Methanol of fossil origin will be used for the esterification of waste oil/fat in the project activity. In the esterification process, the carbon from the methanol remains in the esters. Thus, a fraction of the carbon

in the biodiesel is of fossil origin and to be accounted as project emissions. These emissions are calculated as follows:

$$PE_{MeOH,y} = MC_{MeOH,y} * EF_{C,MeOH} * \frac{44}{12} \quad (7)$$

Where:

$PE_{MeOH,y}$	=	Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin in year *y* (tCO_2)
$MC_{MeOH,y}$	=	Quantity of methanol consumed in the biodiesel plant, including spills and evaporations in year *y* (tonnes)
$EF_{C,MeOH}$	=	Carbon emissions factor of methanol, based on molecular weight (tC/tMeOH) (= 12/32)
44/12	=	Molecular weight ratio to convert tonnes of carbon into tonnes of CO_2 (tCO_2/tC)

3. Project emissions from transportation ($PE_{Tr,y}$)

According to the methodology, if distance of transportation is more than 50km are covered, project emissions from transportation have to be accounted. The proposed

Project emissions from transportation include the following sources :

- Any transportation of waste oil/fats to the biodiesel production plant; and
- Any transportation of the biodiesel to the site where it is blended with petrodiesel.

Transportation of biodiesel is not considered for the project emission. Transportation of petrodiesel in the baseline to be replaced by biodiesel in the project activity would be offset emission.

This PDD selected Option 1 “Emissions are calculated on the basis of distance and the average truck load” for calculation of project emissions from transportation.

$$PE_{tr,y} = \sum_{m} \left(\frac{MT_{m,y}}{TL_m} * AVD_m * EF_{km} \right) \quad (8)$$

Where :

$PE_{tr,y}$	=	Project emissions from transportation in year *y* (tCO_2)
$MT_{m,y}$	=	Material *m* transported in year *y* (tonnes)
TL_m	=	Average truck load for vehicles transporting material *m* (tonnes)
AVD_m	=	Average distance travelled by vehicles transporting material *m* (km), including the return trip/s
EF_{km}	=	Carbon dioxide emissions factor for vehicles transporting material (tCO_2/km)
m	=	Material transported (waste oil/fat)

Leakage Emissions

The methodology takes into account the following sources of leakage:

- Emissions associated with the production of the methanol used for esterification;
- If the biodiesel is produced from waste oil/fat, displacement of existing uses of waste oil/fat that may result in increased demand for fossil fuels elsewhere;
- Positive leakage associated with the avoided production and transportation of petrodiesel.

Leakage emissions are determined in the following equation:

$$LE_y = LE_{meOH,y} + LE_{WOF,y} - LE_{PD,y} \quad (9)$$

Where :

LE_y	=	Leakage emissions in year *y* (tCO_2/yr)
$LE_{meOH,y}$	=	Leakage emissions associated with production of methanol used in biodiesel production in year *y* (tCO_2/yr)
$LE_{WOF,y}$	=	Leakage emissions from displacement of existing utilization of waste oil/fat in year *y* (tCO_2/yr).
$LE_{PD,y}$	=	Leakage related to the avoided production of petrodiesel (tCO2/yr)

1. Leakage from methanol production

Emissions from production of methanol that are used in the esterification process to produce the biodiesel are estimated as follows:

$$LE_{meOH,y} = MC_{meOH,y} * EF_{MeOH,PC} \quad (10)$$

Where :

$LE_{meOH,y}$	=	Leakage emissions associated with production of methanol used in biodiesel production in year *y*
$MC_{meOH,y}$	=	Mass of methanol consumed in the biodiesel plant, including spills and evaporation on site, in year *y* (tonnes)
$EF_{MeOH,PC}$	=	Pre-combustion (i.e. upstream) emissions factor for methanol production (tCO2/t MeOH)

2. Leakage from the displacement of existing uses of waste oil/fat

The methodology requires that the total quantity of waste oil/fat used by the project activity does not result in increased fossil fuel use elsewhere.
The methodology defines that “surplus” is the quantity of available waste oil/fat generated in the region (Shanghai in this PDD) should be at least 25% larger than the quantity of waster oil/fat that is recovered.

The balance of waste oil/fat in Shanghai is examined as follows:

(1) The quantity of waste oil/fat generated in Shanghai

There is no statistic data on the quantity of waste oil/fat generated in Shanghai. In this PDD, such quantity is estimated by the interview with related parties and with the plausible generation rate against the consumption of vegetable cooking oil.

Waste oil/fat in Shanghai is generated approximately 150,000 ton/year, according to the interviews with Shanghai authority (Shanghai waste management bureau), waste colleting companies in Shanghai and the Project owner, which was carried out in February 2010.

The consumption of edible vegetable oil for cooking in shanghai has reached 704,300 ton/year in 2006. It increased around 28% compared with that in 2003. Generation rate of waste oil/fat against consumption of cooking oil in china is about 17.5% according to the Feasibility analysis of waste oils and fats a s biodiesel feedstock by Lu fan (2006). Therefore, the estimated waste oil/fats can be approximately 123,000 ton/year. This estimated quantity may be conservative because the data of consumption is in 2006.

Taking the above analysis into account, the quantity of waste oil/fat generated in Shanghai is estimated as ***123,000 ton/year*** (conservative) in this PDD.

(2) The quantity of waste oil/fat collected in Shanghai

There is an official date on waste oil/fat collected in Shanghai. According to the Shanghai waste management bureau, the waste oil/fat collected under the city management in 2008 was around **10,100tons/year.**

In addition, the interview with waste oil/fat collection companies was carried out by Shanghai University. There are 19 waste oil/fat collecting companies authorized by Shanghai authority as of February 2010. Still illegal collection remains but such collection should not be considered. One of the purposes is to reduce such illegal collection by establishment of proper treatment system.

Interview was made to 9 of 19 companies and total quantity of waste oil/fat collected by 9 companies in 2009 was 6,670tons/year. And the quantity of waste oil/fat after removing the impurity was 4,050tons/year. The end-use of waste oil/fat is fuel for boilers, soup and solvent. Therefore, the estimated quantity of collected waste oil/fat would be about ***14,081tons/year*** in 2009.

Judging from the above (1) and (2), there are still enough waste oil/fat not collected in Shanghai and the project activity will not result in increased fossil fuel use elsewhere. And penalty calculation specified in the methodology is not applied.
These data (consumption, generation and collection) will be monitoring and update every year.

3. Leakage related to the avoided production of petrodiesel

The substitution of biodiesel for petrodiesel reduces indirect ("upstream") emissions associated with the production of petrodiesel. For the purpose of this methodology, these include the following emission sources:

(1) Production of crude oil. These include emissions from venting, flaring and energy uses;
(2) Oil refinery. These include emissions from energy uses, production of chemicals and catalysts, disposal of production wastes (including flaring) and direct emissions;
(3) Long distance transport.

Emissions related to infrastructure are not to be taken into account either for the production of crude oil (e.g. drilling and maintenance of the oil wells) or for the oil refinery (e.g. construction of the refinery), to keep consistency with the estimation of project emissions from biodiesel production where these emission sources are also ignored.
Emissions from the distribution to filling stations are not be taken into account, as it is assumed that these emissions balance with the emissions of transport of the biodiesel to the blending facility.

$$LE_{PD,y} = LE_{PROD,y} + LE_{REF,y} - LE_{LDT,y} \quad (11)$$

Where :

$LE_{PD,y}$	=	Leakage related to the avoided production of petrodiesel (tCO_2/yr)
$LE_{PROD,y}$	=	Leakage related to the production of crude oil (tCO_2/yr)
$LE_{REF,y}$	=	Leakage related to refining crude oil (tCO_2/yr)
$LE_{LDT,y}$	=	Leakage related to the long distance transport (tCO_2/yr)

3.1 Leakage related to the production of crude oil ($LE_{PROD,y}$)

$$LE_{PROD,y} = BDy * \frac{NCV_{BD,y}}{NCV_{PD,y}} * EF_{PROD} \quad (12)$$

Where :

$LE_{PROD,y}$	=	Leakage related to the production of crude oil (tCO_2/yr)
BD_y	=	Quantity of biodiesel eligible for crediting in year *y* (tons/yr)
$NCV_{BD,y}$	=	Net calorific value of biodiesel (GJ/tonne)
$NCV_{PD,y}$		Net calorific value of petrodiesel (GJ/tonne)
EF_{PROD}	=	Emission factor for production of crude oil (tCO_2e/t petrodiesel)

3.2 Leakage related to refining crude oil ($LE_{REF,y}$)

$$LE_{REF,y} = BDy * \frac{NCV_{BD,y}}{NCV_{PD,y}} * EF_{REF} \quad (13)$$

Where :

$LE_{REF,y}$	=	Leakage related to refining crude oil (tCO_2/yr)
BD_y	=	Quantity of biodiesel eligible for crediting in year *y* (tons/yr)
$NCV_{BD,y}$	=	Net calorific value of biodiesel (GJ/tonne)
$NCV_{PD,y}$	=	Net calorific value of petrodiesel (GJ/tonne)
EF_{REF}	=	Emission factor related to oil refining (tCO_2e/t petrodiesel)

3.3 Leakage related to the long distance transport ($LE_{LDT,y}$)

$$LE_{LDT,y} = BDy * \frac{NCV_{BD,y}}{NCV_{PD,y}} * EF_{LDT} \quad (14)$$

Where :

$LE_{LDT,y}$	=	Leakage related to the long distance transport (tCO_2/yr)
BD_y	=	Quantity of biodiesel eligible for crediting in year *y* (tons/yr)
$NCV_{BD,y}$	=	Net calorific value of biodiesel (GJ/tonne)
$NCV_{PD,y}$	=	Net calorific value of petrodiesel (GJ/tonne)
EF_{LDT}	=	Emission factor related to long distance transportation (tCO_2e/t petrodiesel)

Emission Reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (15)$$

Where:

ER_y	=	Emission reductions during the year *y* (tCO_2)
BE_y	=	Baseline emissions during the year *y* (tCO_2)
PE_y	=	Project emissions in year *y* (tCO_2)
LE_y	=	Leakage emissions in year *y* (tCO_2)

B.6.2. Data and parameters that are available at validation:

Baseline Emissions

Data / Parameter:	**NCV_{PD}**
Data unit:	GJ/tonne
Description:	Net calorific value of petrodiesel
Source of data used:	2006 IPCC Guidelines for GHG Inventories
Value applied:	43
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**$EF_{CO2,PD}$**
Data unit:	tCO_2/GJ
Description:	Carbon dioxide emission factor for petrodiesel
Source of data used:	Default value of 2006 IPCC Guidelines for GHG Inventories
Value applied:	0.0741
Justification of the choice of data or description of measurement methods and procedures actually	No national statistics is available so IPCC default value is used.

applied :	
Any comment:	

Project Emissions

Data / Parameter:	**$EF_{C,MeOH}$**
Data unit:	tC/tMeOH
Description:	Carbon emissions factor of methanol, based on molecular weight
Source of data used:	Default value provided in the methodology
Value applied:	12/32
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Leakage Emissions

Data / Parameter:	**$EF_{C,MeOH\ PC}$**
Data unit:	tCO_2/tMeOH
Description:	Pre-combustion (i.e. upstream) emissions factor for methanol production
Source of data used:	Default value provided in the methodology Apple 1998 : http://edj.net/sinorSFR4-99art7.html 2006 IPCC Guidelines
Value applied:	1.95
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**EF_{PROD}**
Data unit:	tCO_2e/t petrodiesel
Description:	Emission factor for production of crude oil
Source of data used:	Default value provided in the methodology A global value was calculated with the assumption that upstream emissions with respect to crude oil production in Annex I is zero
Value applied:	0.073
Justification of the choice of data or description of measurement methods and procedures actually	

applied :	
Any comment:	

Data / Parameter:	**EF_{REF}**
Data unit:	tCO_2e/t petrodiesel
Description:	Emission factor related to oil refining
Source of data used:	Default value provided in the methodology
Value applied:	0.233
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no country specific data, so a global average figure is used.
Any comment:	

B.6.3. Ex-ante calculation of emission reductions:

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Baseline Emissions

$$BE_y = BD_y * NCV_{BD,y} * EF_{CO2,PD,y} \quad (1)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
BE_y	**tCO_2/yr**	**29,736**	
BD_y	Ton/yr	10,000	Result from the calculation (2)
$NCV_{BD,y}$	GJ/tonne	40.13	*> To be monitored*
$EF_{CO2,PD,y}$	t/CO_2/GJ	0.0741	*> Not monitored*

- ***Quantity of biodiesel eligible for crediting (BD_y)***

$$BD_y = min\ (P_{BD,y}\ ,\ f_{PJ,y} * C_{BBD,y}\ ) - P_{BD,on\text{-}site,y} - P_{BD,other,y} \quad (2)$$

Values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$P_{BD,y}$	Ton/yr	10,000	*>To be monitored*
$C_{BBD,y}$	Ton/yr	200,000	*>To be monitored*
$P_{BD,on\text{-}site,y}$	Ton/yr	0	No biodiesel will be consumed at the biodiesel production plant.
$P_{BD,other,y}$	t/CO_2/GJ	0	No alcohols than methanol to be used in the production plant.
$f_{PJ,y}$	%	5	Blending portion with petrodiesel will be 5% (B5)

Project Emissions

$$PE_y = AF_{1,y} * (PE_{BPF,y} + PE_{MeOH,y} + PE_{Tr,y}) \quad (3)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
PE_y	**tCO_2/yr**	**3,520**	**Result obtained**
$PE_{BPF,y}$	tCO_2/yr	1,690	Result from the calculation (5)
$PE_{MeOH,y}$	tCO_2/yr	1,568	Result from the calculation (7)
$PE_{Tr,y}$	tCO_2/yr	262	Result from the calculation (4)
$AF_{1,y}$	tCO_2/yr	0	Not considered in this Draft

1. Project emissions at the biodiesel production plant ($PE_{BPF,y}$)

$$PE_{BPF,y} = \sum_j PE_{FC,j,y} + PE_{EC,y} \quad (4)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
PE_{BPFy}	tCO_2/yr	1,690	
$PE_{FC,j,y}$	tCO_2/yr	0	No fossil fuel will be consumed in the biodiesel production plant
$PE_{EC,y}$	tCO_2/yr	1,690	Result from the calculation (5)

1.1 Emissions from electricity consumption ($PE_{EC,y}$)

$$PE_{EC,y} = \sum_j EC_{pj,j,y} + EF_{EL,i,y} * (1+TDL_{j,y}) \quad (5)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$PE_{EC,y}$	tCO_2/yr	1,690	
$EC_{pj,j,y}$	MWh/yr	1,800	300kW*20hrs*300days >*To be monitored*
$EF_{EL,i,y}$	tCO_2/MWh	0.78225	Result from the calculation (7)
$TDL_{j,y}$	-	0.2	Default value provided in the methodology
j	-	-	East China Power Grid

➢ ***Determination of the emission factor for electricity generation ($EF_{EL,i,y} = EF_{grid,CM,y}$)***

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM} \quad (6)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$EF_{grid,CM,y}$	tCO_2/MWh	0.78225	Combined margin
$EF_{grid,OM,y}$	tCO_2/MWh	0.8825	From "China's Regional Grid Baseline Emission Factors 2009" which is published by the DNA of P. R. China. >*To be revised every year*
$EF_{grid,BM,y}$	tCO_2/MWh	0.6826	
w_{OM}	-	0.5	Default value provided in the methodology
w_{BM}	-	0.5	Default value provided in the methodology

2. Project emissions from fossil carbon in the biodiesel due to esterification with methanol of fossil origin ($PE_{MeOH,y}$)

$$PE_{MeOH,y} = MC_{MeOH,y} * EF_{C,MeOH} * \frac{44}{12} \quad (7)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$PE_{MeOH,y}$	tCO_2/yr	1,568	
$MC_{MeOH,y}$	Ton/yr	1,140	9.9% of feedstock (waste oil/fat without impurity = 11,400ton/y) >*To be monitored*
$EF_{C,MeOH}$	tC/tMeOH	0.375	Carbon emissions factor of methanol, based on molecular weight (12/32) > *Not monitored*

3. Project emissions from transportation ($PE_{Tr,y}$)

$$PE_{tr,y} = \sum_{m} \left(\frac{MT_{m,y}}{TL_m} * AVD_m * EF_{km} \right) \quad (8)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$PE_{tr,y}$	tCO_2/yr	262	
$MT_{m,y}$	ton	30,000	Feedstock (waste oil/fat with impurity= 30,000ton/y) to be transported >*To be monitored*
TL_m	ton	5	Average truck load > *To be monitored*
AVD_m	km	50	Average distance travelled >*To be monitored*
EF_{km}	tCO_2/km	0.000873	Default value of IPCC > *To be monitored*
m	-	-	Transportation of waste oil/fat

Leakage Emissions

$$LE_y = LE_{meOH,y} + LE_{WOF,y} - LE_{PD,y} \quad (9)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
LE_y	**tCO_2/yr**	**-539**	**Result obtained**
$LE_{meOH,y}$	tCO_2/yr	2,223	Result from the calculation (10)
$LE_{WOF,y}$	tCO2/yr	0	No penalty calculation to be applied > *To be monitored*
$LE_{PD,y}$	tCO_2/yr	2,762	Result from the calculation (11)

1. Leakage from methanol production

$$LE_{meOH,y} = MC_{meOH,y} * EF_{MeOH,PC} \quad (10)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks

$LE_{meOH,y}$	tCO_2/yr	2,223	Result obtained
$MC_{meOH,y}$	ton/yr	1,140	9.9% of feedstock (waste oil/fat = 11,400ton/y) *> To be monitored*
$EF_{MeOH,PC}$	tCO_2/tMeOH	1.95	Default value provided in the methodology

2. Leakage from the displacement of existing uses of waste oil/fat

As explained in B.4, the project activity will not result in increased fossil fuel use elsewhere. And penalty calculation specified in the methodology is not applied.

These data (consumption, generation and collection) will be monitoring and update every year.

3. Leakage related to the avoided production of petrodiesel

$$LE_{PD,y} = LE_{PROD,y} + LE_{REF,y} + LE_{LDT,y} \quad (11)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$LE_{PD,y}$	tCO_2/yr	2,762	Result obtained
$LE_{PROD,y}$	tCO_2/yr	681	Result from the calculation (12)
$LE_{REF,y}$	tCO_2/yr	2,081	Result from the calculation (13)
$LE_{LDT,y}$	tCO_2/yr	0	Not considered due to uncertainty (Conservative)

3.1 Leakage related to the production of crude oil ($LE_{PROD,y}$)

$$LE_{PROD,y} = BDy * \frac{NCV_{BD,y}}{NCV_{PD,y}} * EF_{PROD} \quad (12)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$LE_{PROD,y}$	tCO_2/yr	681	Result obtained
BD_y	ton/yr	10,000	Result from the calculation (2)
$NCV_{BD,y}$	GJ/tonne	40.13	*> To be monitored*
$NCV_{PD,y}$	GJ/tonne	43.00	*> Not monitored*
EF_{PROD}	tCO_2e/t petrodiesel	0.073	Default value provided in the methodology *> Not monitored*

3.2 Leakage related to refining crude oil ($LE_{REF,y}$)

$$LE_{REF,y} = BDy * \frac{NCV_{BD,y}}{NCV_{PD,y}} * EF_{REF} \quad (13)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
$LE_{REF,y}$	tCO_2/yr	2,081	Result obtained
BD_y	ton/yr	10,000	Result from the calculation (2)
$NCV_{BD,y}$	GJ/tonne	40.13	*> To be monitored*
$NCV_{PD,y}$	GJ/tonne	43.00	*> Not monitored*
EF_{REF}	tCO_2e/t petrodiesel	0.233	Default value provided in the methodology *> Not monitored*

3.3 Leakage related to the long distance transport ($LE_{LDT,y}$)

$$LE_{LDT,y} = BDy * \frac{NCV_{BD,y}}{NCV_{PD,y}} * EF_{LDT} \quad (14)$$

This leakage would not be considered due to uncertainty.

Emission Reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (15)$$

Result obtained and values given for calculation as per the above equation:

Parameter	Unit	Value/Amount	Remarks
ER_y	**tCO_2/yr**	**26,755**	**Result obtained**
BE_y	tCO_2/yr	29,736	Result from the calculation (1)
PE_y	tCO_2/yr	3,520	Result from the calculation (3)
LE_y	tCO_2/yr	-539	Result from the calculation (9)

B.6.4 Summary of the ex-ante estimation of emission reductions:

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Table B.6.4 Summary of ex-ante estimation of emission reductions

Year	Estimation of Baseline emissions (tCO_2e)	Estimation of Project activity emissions (tCO_2e)	Estimation of Leakage (tCO_2e)	Estimation of Overall emission reductions (tCO_2e)
2012	29,736	3,520	-539	26,755
2013	29,736	3,520	-539	26,755
2014	29,736	3,520	-539	26,755
2015	29,736	3,520	-539	26,755
2016	29,736	3,520	-539	26,755
2017	29,736	3,520	-539	26,755
2018	29,736	3,520	-539	26,755
2019	29,736	3,520	-539	26,755
2020	29,736	3,520	-539	26,755

2021	29,736	3,520	-539	26,755
Total (tCO_2e)	**297,360**	**35,200**	-7,190	**267,550**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Applicability Conditions

Data / Parameter:	$f_{PJ,y}$ *and* $f_{PJ,i,y}$
Data unit:	%
Description:	Fraction of biodiesel in the blended diesel in the project scenario in year *y* and fraction of biodiesel in the blended diesel from the project activity, with blending ratio i, in year *y*
Source of data to be used:	Records from blending operations
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5 (B5)
Description of measurement methods and procedures to be applied:	Recoding volumes or flows calibrated meters for every produced blend
QA/QC procedures to be applied:	During the process of creating the blended biodiesel at the blending station, the blending operation shall be monitored to assure adequate mixing of the products in the correct proportions. For automotive purposes the blending ratio must not exceed 20%. This includes measuring and recording the volumes and blend levels as verified through bills of lading, meter printouts or other auditable records of both the biodiesel and diesel fuel, which comprise the blend.
Any comment:	See "BQ-9000 Quality Assurance Program Requirements for the Biodiesel Industry" for further information

Data / Parameter:	$f_{req,y}$
Data unit:	%
Description:	Fraction of biodiesel in the blended diesel bounded by regulation in year *y*
Source of data to be used:	Regulations in the Host Country (P.R. China)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5 (B5)
Description of measurement methods	Check the regulation relating blending portion of biodiesel annually

and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**Various parameters; Compliance of biodiesel produced with national regulations**
Data unit:	Various data units
Description:	Compliance of produced biodiesel with national regulation, biofuel properties
Source of data to be used:	Various measurements based on national or international standards
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Various methods of measurement and uncertainty analysis. According to national regulation, monitored at least annually.
QA/QC procedures to be applied:	According to national or international standards
Any comment:	

Data / Parameter:	**$MP_{Glyc,y}$**
Data unit:	
Description:	Amount of byproduct glycerol produced during plant operation
Source of data to be used:	Measured (volumetric or weighed) values
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,004Tonnes/year 9.3% of feedstock input (10,800ton)
Description of measurement methods and procedures to be applied:	Volumetric flow meter including a volume integrator or load cell to measure the weight of produced glycerol
QA/QC procedures to be applied:	Volumetric flow meter and integrator calibrated periodically Load cell calibrated periodically. Measured amounts to be crosschecked against mass balance of the biodiesel production unit
Any comment:	This data is not required for emission reductions calculations.

Data / Parameter:	**$MU_{Glyc,y}$**
Data unit:	Tonnes (t)
Description:	Amount of byproduct glycerol sold or used
Source of data to be	Sales data and internal records in case of use inside the plant

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	All produced glycerol must be tracked via sales data or internal records or its mode of disposal checked by DOE (incl. visual inspection of facilities and record of incineration or disposal if any)
QA/QC procedures to be applied:	DOE to check the produced glycerol was marketed
Any comment:	This data is not required for emission reductions calculations.

Baseline Emissions

Data / Parameter:	**$P_{BD,y}$**
Data unit:	Tonnes (t)
Description:	Quantity of produced biodiesel from waste oil/fat that is used by host country (P.R. China) consumers to substitute for petrodiesel
Source of data to be used:	Metering system at production site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10,000 Estimated production amount (rounded for simplification) (Feedstock Input * yield rate = 11,400ton * 90% = 10,260)
Description of measurement methods and procedures to be applied:	All produced biodiesel shall be metered with calibrated measurement equipment that is maintained regularly and checked for proper functioning.
QA/QC procedures to be applied:	Cross check production and consumption data with sales records
Any comment:	Measured for reference purposes to ensure consumption of biodiesel does not exceed production of biodiesel

Data / Parameter:	**$C_{BD,y}$**
Data unit:	Tonnes (t)
Description:	Quantity of biodiesel from waste oil/fat consumed by host country consumers to substitute for petrodiesel.
Source of data to be used:	Metering system at consumer site (Bus, Logistic company)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	10,000
Description of measurement methods	Continuous recording of filling consumers' vehicles using calibrated measurement equipment that is maintained regularly and checked for proper

and procedures to be applied:	functioning.
QA/QC procedures to be applied:	Cross check production and consumption data with sales records
Any comment:	Consumption of biodiesel will be determined as the consumption of blended biodiesel ($\mathbf{C_{BBD,y}}$) times the blending fraction of the respective blend

Data / Parameter:	$\mathbf{C_{BBD,y}}$
Data unit:	Tonnes (t)
Description:	Quantity of blended biodiesel from waste oil/fat consumed by host country consumers to substitute for petrodiesel.
Source of data to be used:	Metering system at fuelling stations of Bus, Logistic company
Value of data applied for the purpose of calculating expected emission reductions in section B.5	200,000
Description of measurement methods and procedures to be applied:	Continuous recording of filling consumers' vehicles using calibrated measurement equipment that is maintained regularly and checked for proper functioning.
QA/QC procedures to be applied:	Cross check production and consumption data with sales records
Any comment:	

Data / Parameter:	$\mathbf{NCV_{BD,y}}$
Data unit:	GJ/tonne
Description:	Net calorific value of biodiesel for the year y
Source of data to be used:	Laboratory analysis
Value of data applied for the purpose of calculating expected emission reductions in section B.5	40.13
Description of measurement methods and procedures to be applied:	Laboratory test will be done at Shanghai University every year. Measured according to relevant national or international standards regulating determination of NCV by calibrated equipment.
QA/QC procedures to be applied:	Check consistency of measurements and local national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measure
Any comment:	Analysis has to be carried out by accredited laboratory. A sample is representative if uncertainty of the NCV does not exceed ±5% at 95% confidence level

Project Emissions

Data / Parameter:	$PE_{EC,y}$
Data unit:	tCO2
Description:	Emissions from consumption of electricity in the project case in year y
Source of data to be used:	Calculated as per the "Tool to calculate project emissions from electricity Consumption". When using the tool $PE_{Elec,y} = PE_{EC,y}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	As per the "Tool to calculate project emissions from electricity consumption"
QA/QC procedures to be applied:	As per the "Tool to calculate project emissions from electricity consumption"
Any comment:	

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor in year y
Source of data to be used:	"China's Regional Grid Baseline Emission Factors 2009" which is published by the DNA of P. R. China
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.8825
Description of measurement methods and procedures to be applied:	Annually check the latest publication by the DNA of P.R. China
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data to be used:	"China's Regional Grid Baseline Emission Factors 2009" which is published by the DNA of P. R. China
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.6826
Description of measurement methods	Annually check the latest publication by the DNA of P.R. Chin

and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**$EC_{PJ,j,y}$**
Data unit:	MWh/yr
Description:	Quantity of electricity consumed at the biodiesel production site by the project electricity consumption source *j* year *y*
Source of data to be used:	Onsite measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,800MWh (= 300kW * 20hrs * 300)
Description of measurement methods and procedures to be applied:	Measured continuously by an electricity meter
QA/QC procedures to be applied:	Calibrated to manufacturers standard regularly
Any comment:	

Data / Parameter:	**$EC_{EL,j,y}$ (=$EF_{grid,CM,y}$)**
Data unit:	tCO2/MWh
Description:	Combined margin emission factor for the East China Gird in year $_y$
Source of data to be used:	Calculate the combined margin emission factor, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system" "China's Regional Grid Baseline Emission Factors" which is published by the DNA of P. R. China
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.78225
Description of measurement methods and procedures to be applied:	Measured continuously by an electricity meter
QA/QC procedures to be applied:	Calibrated to manufacturers standard regularly
Any comment:	

Data / Parameter:	**$TDL_{j,y}$**

Data unit:	-
Description:	Average technical transmission and distribution losses for providing electricity to source *j* in year y
Source of data to be used:	According to the "Tool to calculate project emissions from electricity consumption", select one of the following options: (a) Use resent, accurate and reliable data available within the host country; (b) Use as default values 20%
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.2
Description of measurement methods and procedures to be applied:	Monitored annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years. For estimation using recent, accurate and reliable data available in host country, $TDL_{j,y}$ should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**$MC_{MeOH,y}$**
Data unit:	Tonnes(t)
Description:	Mass of methanol consumed in the biodiesel plant
Source of data to be used:	Mass meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,140 Methanol input (consumed) = required input – methanol recovered from the process 9.9% of feedstock (waste oil/fat = 11,400ton/y)
Description of measurement methods and procedures to be applied:	Measured continuously using calibrated measurement equipment that is maintained regularly and checked for proper functioning. The methanol consumption should be net of any water content. Methanol spilled and evaporated on the project site should be considered as consumption for estimating the emissions.
QA/QC procedures to be applied:	Crosscheck against methanol purchase receipts and calculated stochiometric requirements
Any comment:	Adjust for stock changes when comparing purchase data with consumption data; also used for leakage calculations. Use most conservative values. Any spills onsite and evaporation are accounted as consumption. Please note that data should also report the source of methanol - from fossil fuel or non-fossil fuel sources. As per the applicability only biofuel produced using fossil fuel based methanol can be credited

Data / Parameter:	$MT_{m,y}$
Data unit:	Tonnes (t)
Description:	Material m(waste oil/fat and biodiesel) transported in year y
Source of data to be used:	Plant record, Records of truck operators
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Material m= waste oil/fat = 30,000 (including impurity)
Description of measurement methods and procedures to be applied:	Mass or volumetric (including quantity integrator) meters (e.g. load cell)
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	AVD_m
Data unit:	Km
Description:	Average distance travelled by vehicles transporting material m (waste oil/fat and biodiesel)
Source of data to be used:	Records of truck operator
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Material m = waste oil/fat = 50
Description of measurement methods and procedures to be applied:	Monitored annually using vehicle odometer
QA/QC procedures to be applied:	Check consistency of distance records provided by the truck operators by comparing recorded distances with other information from other sources (e.g. maps)
Any comment:	Material m (waste oil/fat and biodiesel) are supplied from different sites, therefore, this parameter corresponds to the mean value of km travelled by trucks that supply the biodiesel plant

Data / Parameter:	TL_m
Data unit:	Tonnes (t)
Description:	Average truck load for vehicles transporting material m (waste oil/fat and biodiesel)
Source of data to be used:	Records of truck operator; plant records, vehicle manufacturer information
Value of data applied	Material m = waste oil/fat = 5

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Monitored annually
QA/QC procedures to be applied:	Cross check against vehicle manufacturer's capacity rating
Any comment:	

Data / Parameter:	**EF_{km}**
Data unit:	tCO2/km
Description:	Carbon dioxide emission factor for vehicles transporting material m (waste oil/fat and biodiesel)
Source of data to be used:	Measurements or local / national data should be preferred. Default values from the IPCC may be used alternatively
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0011
Description of measurement methods and procedures to be applied:	Monitored annually
QA/QC procedures to be applied:	Check consistency of measurements and local/national data with default values from IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements.
Any comment:	

Data / Parameter:	**$AF_{1,y}$**
Data unit:	Fraction
Description:	Allocation factor for the production of biodiesel in year y
Source of data to be used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	n.a at this stage
Description of measurement methods and procedures to be applied:	Monitored and check annually Estimated as per the "Guidance on apportioning of emissions to co-products and by-products"
QA/QC procedures to be applied:	

Any comment:	

Leakage Emissions

Data / Parameter:	**$WOF_{DS,y}$**
Data unit:	Tonnes
Description:	Formal and informal market demand for waste oil/fat , including the project activity, in the defined region. Statistical mean value obtained from surveys or other sources for the demand for waste oil/fat , including the project activity, in Shanghai
Source of data to be used:	Demand by the project activity is known. Other demand can be determined by: reliable official data from authorities; scientific publications; market data from waste collection companies and companies utilizing waste oil/fat ; third party statistically representative surveys that shall include a list of potential uses of waste oil/fat, interviews with collection companies or companies using waste oil/fat, etc.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	-
Description of measurement methods and procedures to be applied:	Annually conducting a survey by designated consultant or else
QA/QC procedures to be applied:	The calculated demand for waste oil/fat shall be based on at least 2 of the above mentioned data sources and associated uncertainties. The most conservative result considering the most conservative uncertainty limit should be adopted.
Any comment:	

Data / Parameter:	**$WOF_{SS,y}$**
Data unit:	Tonnes
Description:	Supply for waste oil/fat in Shanhai. Statistical mean value obtained from surveys or other sources for the supply of waste oil/fat in Shanghai.
Source of data to be used:	Reliable official data from authorities; scientific publications; market data from waste collection companies; third party statistically representative survey that shall include oil consumption data, information about fat absorption data of cooked food, etc; compare with data from other countries
Value of data applied for the purpose of calculating expected emission reductions in section B.5	--
Description of measurement methods and procedures to be applied:	Annually conducting a survey by designated consultant or else
QA/QC procedures to be applied:	The calculated supply for waste oil/fat shall be based on at least 2 of the above mentioned data sources and associated uncertainties. The most conservative

	result considering the most conservative uncertainty limit should be adopted.
Any comment:	

Data / Parameter:	u_D
Data unit:	Tonnes
Description:	Uncertainty for waste oil/fat demand
Source of data to be used:	Demand by the project activity is known. Other demand can be determined by: reliable official data from authorities; scientific publications; market data from waste collection companies and companies utilizing waste oil/fat ; third party statistically representative surveys that shall include a list of potential uses of waste oil/fats, interviews with collection companies or companies using waste oil/fats, etc
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually conducting a survey by designated consultant or else
QA/QC procedures to be applied:	The calculated demand for waste oil/fat shall be based on at least 2 of the above mentioned data sources and associated uncertainties. The most conservative result considering the most conservative uncertainty limit should be adopted.
Any comment:	Surveys must be realized with a 95% confidence interval. This confidence interval corresponds to the guidelines issued by the EB in its 22nd meeting Annex 2 (EB 22 report Annex 2, D, page 3): "Methodologies employing sampling to derive parameters in estimating emissions reductions shall quantify these parameter uncertainties at the 95% confidence level.

Data / Parameter:	u_S
Data unit:	Tonnes
Description:	Uncertainty for waste oil/fat supply
Source of data to be used:	Supply of waste oil/fat in Shanghai defined by the project can be determined by: reliable official data from authorities; scientific publications; market data from waste collection companies and companies utilizing waste oil/fat ; third party statistically representative surveys that shall include a list of potential uses of waste oil/fat, interviews with collection companies or companies using waste oil/fat, etc
Value of data applied for the purpose of calculating expected emission reductions in section B.5	--
Description of measurement methods and procedures to be applied:	Annually conducting a survey by designated consultant or else
QA/QC procedures to	The calculated supply for waste oil/fat shall be based on at least 2 of the above

be applied:	mentioned data sources and associated uncertainties. The most conservative result considering the most conservative uncertainty limit should be adopted.
Any comment:	Surveys must be realized with a 95% confidence interval. This confidence interval corresponds to the guidelines issued by the EB in its 22nd meeting Annex 2 (EB 22 report Annex 2, D, page 3): "Methodologies employing sampling to derive parameters in estimating emissions reductions shall quantify these parameter uncertainties at the 95% confidence level.

B.7.2. Description of the monitoring plan:

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In order to collect the reliable data for monitoring, all monitoring equipment will be set up by experts and monitoring organization will be formed with training such appointed staff by technology provider.

1. CDM Monitoring Organisation

Roles and responsibilities will be defined for the relevant staff involved in CDM monitoring, and the prospect of nominating a CDM Manager will be considered. If appointed, the CDM Manager will have the overall responsibility for the monitoring system on this project. All staff involved in the collection of data and records will be coordinated by him.

2. Training of staff

Training is conducted on site to ensure that staff are capable of performing their designated tasks to a high standard. This will include CDM specific training to warrant that they understand the importance of complete and accurate data and records for CDM monitoring.

3. Management of data collection and data record

The procedure and manual including forms for record required for monitoring will be provided the CDM manager is responsible for overseeing the collecting and recording of the monitoring data.

As for the monitoring for consumptions of blended biodiesel, the project proponent ask the consumers for their cooperation for monitoring and to appoint the person in charge. All date collected and recorded to be double checked by both Chinese participant and Japanese participant of the project activity.

Regarding the market information on waste oil/fat demand and supply, necessary survey to get reliable data will be outsource to the designated consultant.

4. Maintenance of monitoring equipment/apparatus

Monitoring equipment/apparatus will be properly maintained in accordance with the manual prepared by the Project proponent.

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

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The application of the baseline and monitoring methodology and the current version of this PDD was completed on 26th of March, 2010 by Environment Business Consultants Co.,Ltd ("EBC") as a CDM advisor on behalf of the project participants listed in Annex 1.

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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:

>
On the date when the construction contract will be entered.

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

>>
15 years

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

Fixed crediting period is selected.

C.2.1. Renewable crediting period:

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

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
After the date of registration

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

>>

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

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The project owner already analyzed the environmental impacts of the preset biodiesel production plant in accordance with the Environmental Evaluation Law of the P.R. China. and the EIA report was approved for the construction of the plant. As the project activity is to retrofit and renovate the present biodiesel plant without increasing the production capacity, no EIA would be required.

In addition, there is no transboundary impact related to the project activity, so social and environmental influences are checked and examined in this PDD for reference purpose.

Water pollution

Construction period	✓ There is no water pollution source during the construction.
Operational period	✓ Effluent from the washing (cleansing) process would be the pollutant source. The wastewater contains alkali and high level of fatty acid. The present plant has the wastewater treatment facility, which treats the effluent properly in compliance with the required effluent standard.

Air pollution

Construction period	✓ Low emission vehicle would be considered for transportation and other heavy equipment.
Operational period	✓ No burning process (No exhausted will be adopted. New process will use only electricity from the national grid, therefore, there is no emission source leasing air pollution.

Solid waste

Construction period	✓ No civil work would be expected and solid waste during the construction will be minimal. If any, to the specified landfill.
Operational period	✓ Waste oil/fat delivered to the project site contains much impurity. In the pre-treatment of the plant, such impurity is removed as solid waste. Such solid waste will be properly treated: some are used as raw material for animal feed and others are brought to the specified landfill area. ✓ Glycerol is produced as by-product will be used for boiler fuel in the industrial park where the plant is located. Some can be sold for chemical use. ✓ Sludge from the wastewater treatment facility will be used as compost, bringing to the farmer in the suburban of Shanghai.

Noise pollution

Construction period	✓ Low noise equipment will be chosen. Construction will not be implemented in the evening.
Operational period	✓ There is no facility causes the high level of noise, and the present plant clears

	the noise level.

Resettlement

✓ As the Project owner has owned the project site for the plant and it is located in the industrial park, no resettlement issue will occur in the future.

D.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:

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No significant environmental impacts would be recognized in the project activity. In contract, the project activity will contribute to the sustainable development for the local and national level, which is described in A.2. of this PDD.

SECTION E. Stakeholders' comments

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

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The workshop on the proposed project was held on 11th of March, 2010 at Shanghai, inviting the person in charge of ministry of the environment Japan, Shanghai authority (Shanghai waste management bureau), the participants of both Japanese and Chinese side and Shanghai University. The explanation of the proposed project was made unofficially to the related governmental agencies at Beijing on 12th of March, 2010. There is no negative comment on the proposed project so far through the above

The formal stakeholder consultation for the project activity will take place after the detailed engineering has completed.
The local stake holder will be invited to submit comments on the project activity by completing a questionnaire prepared by the project participant. The questionnaire would include a technical description of the project as well as a explanation of how the project activity will contribute to the sustainable development in the region and mitigate climate change through the CDM framework.

E.2. Summary of the comments received:

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There is no negative comment through the workshop and the interviews so far. They understand the importance and necessity of the project activity, and expressed the support to the proposed project.

After the formal stakeholder consultation to be completed, this section would be revised.

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

>>

After the formal stakeholder consultation to be completed, this section would be revised.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project activity has received financial support from Ministry of the Environment of Japan (J-MOE) to carry out the feasibility study including preparation of the draft project design document, and is expected to utilize the public funding facility of J-MOE for the initial project cost partially.
The Japanese government will certify that the support for the project does not result in the diversion of ODA.

Information on the expecting funding facility, refer to

Annex 3

BASELINE INFORMATION

1. Production of biodiesel in China and biodiesel market

There are many biodiesel projects have launched but very few projects is in commercially success. Although the biodiesel production capacity is approximately 300 thousand ton/year, actual production in 2008 was almost 30 thousand tons. Especially no project using waste oil/fat as feedstock had been commercially succeeded so far in China.

2. Consumption of petrodiesel for vehicles

The consumption of petrodiesel in China was 124 million tons in 2007. （http://xmecc.xmsme.gov.cn/2008-2/200821145245.htm）
Of them, approximately 30million tons (24%) is consumed in transportation sector. The demand of petrodiesel is increased rapidly in accordance with the expansion of motorization and the demand in 2020 is estimated 213million tons. Petrodiesel would be the major fuel for vehicles-use in China.

3. Waste oil/fat market in Shanghai

The consumption of edible oil/fat in Shanghai is increasing year by year and has reached 70 million in 2007 as shown in table below. Accordingly, the generation of waste oil/fat would be increasing. It is said that 150 thousand tons of waste oil/fat is generated in Shanghai currently.

Generation rate of waste oil/fat against consumption of cooking oil in china is about 17.5% according to the Feasibility analysis of waste oils and fats as biodiesel feedstock by Lu fan (2006). Therefore, the estimated waste oil/fats can be approximately 123,000 ton/year in 2006. This estimated quantity may be conservative because the data of consumption is in 2006. It should be more at present.

Table 3.1 Edible oil/fat consumption in Shanghai

	2003	2004	2005	2006
Consumption of edible oil/fat(10thousand)	54.53	59.44	64.15	70.43
Year to year comparisons	—	9.0%	7.9%	9.8%
Population in Shanghai(10thousand)	1,711	1,724	1,778	1,815
Consumption per capita (kg/head)	31.87	34.48	36.08	38.80

(source : Shanghai statistic book)

In order to grasp the market of waste oil/fat in Shanghai, the interview to the collection companies in Shanghai was conducted by Shanghai University. Total quantity of waste oil/fat collected by 9 collecting companies was 6,670ton/year in 2009. There are 19 collection companies authorized by Shanghai authority. It is estimated that the quantity of waste oil/fat collected by all companies was 14,081ton/year in Shanghai.

It is concluded that the recovery rate of waste oil/fat in Shanghai is around 11.4%, and there are still enough potential to recover the waste oil/fat for the project activity.

Table 3.2 Quantity of waste oil/fat collected by the collection companies in Shanghai

Company name	Address	Amount collected in 2009
上海申傑保清潔有限公司	盧湾区合肥路 271 号	750t
上海三益実業公司	閘北区沪太支路 928 弄 4 号 閘北区少年村路 409 号甲	570t
上海昀達環境工程有限公司	浦東新区毕升路 289 弄 8 号 402 室	850t
上海康誉実業有限公司	浦東新区瓦屑鎮陸弄村	650t
上海長泾油脂工場	嘉定区外岡鎮長泾村 458 号	800t
上海環盛廃油回收利用有限公司	嘉定区南翔镇陳翔路 2411 弄 8 号	850t
上海清潔環保科技有限公司	嘉定区封浜鎮祝家村	650t
上海奥欣油品加工工場	松江区洞泾镇花橋村 20 队	750t
上海金山江東油脂工場	金山区亭林鎮新巷村 14 組	800t
Total		**6,670t**
Average per company		**741t**

To be revised after a detail survey to finalize this PDD.

Annex 4

MONITORING INFORMATION

As for the project emission from electricity consumption ($PE_{EC,y}$), the below China's official statement "2009 Baseline Emission Factors for Regional Power Grids in China" is used in order to determine the combined margin CO_2 emission factor in year *y* (tCO_2/MWh) (*=$EF_{EL,i,y}$)*.

Table 4.1 Emission factors for regional power grids in China

	$EF_{grid,OM,y}$ (tCO_2/MWh)	$EF_{grid,BM,y}$ (tCO_2/MWh)
华北区域电网	1.0069	0.7802
东北区域电网	1.1293	0.7242
华东区域电网	0.8825	0.6826
华中区域电网	1.1255	0.5802
西北区域电网	1.0246	0.6433
南方区域电网	0.9987	0.5772
海南省电网	0.8154	0.7297

注：表中 OM 为 2005-2007 年电量边际排放因子的加权平均值；BM 为截至 2007 年的容量边际排放因子。