

## **CDM EXECUTIVE SUMMARY**

### **1 General Description of the Proposed Project**

#### **1.1 Title of the Project**

Green Power Asia Pte. Ltd. - Fuji Oil (S) Pte. Ltd. Cogeneration Project

#### **1.2 Objective of the project**

The objective of the project is to reduce the emission of Greenhouse Gases (GHG) by increasing the overall efficiency of the plant and by fuel switching to a less carbon intensive fuel, and thus contribute to the sustainable development in Singapore.

#### **1.3 Location of the Project**

The project is located at 45 Senoko Road, Singapore 758114, the northern most region of Singapore.

#### **1.4 Description of the Project**

Fuji Oil (Singapore) Pte Ltd (Fuji Oil) is a subsidiary of Fuji Oil Co. Ltd, Japan, a world leader in innovative technologies and materials for food products.

Currently, Fuji Oil purchases electricity from the national grid of Singapore and operates 5 **H**igh **P**ressure **B**oilers (HPB) and 3 **M**edium **P**ressure **B**oilers (MPB) on Light Fuel Oil (LFO) and diesel to generate steam. Upon completion of this project, Fuji Oil will consume electricity and medium pressure steam generated from this proposed gas turbine cogeneration system. Nevertheless, 5 HPBs and 3 MPBs will have a fuel switching to **n**atural **g**as (NG).

The annual output of gas turbine cogeneration system is expected to reach 52.178 GWh<sub>e</sub>, and 313,728 tons of steam. The excess electricity generated will be exported to national grid. HPBs will continue to be in operation to supply high pressure steam while MPBs will be used as standby unit.

#### **1.5 Activities of the Project**

This project consists of two activities:

- A. Installation of NG-based cogeneration plant in order to generate electricity and medium pressure steam.
- B. Fuel switching modification on 5 HPBs and 3 MPBs from LFO and Diesel to NG.

The project activity A consists of 1 unit Kawasaki GPB80D gas turbine generator set with low NOx DLE system, and 1 unit Heat Recovery Steam Generator (HRSG), which will enable the cogeneration plant to deliver 6.32 MW of electric power and 38 tons per hour of medium pressure saturated steam. The efficiency of the cogeneration plant is 91.95%

A brief summary of the technical specifications of the project activity A is provided below.

Operational life cycle of plant	30 years
Annual operating hours	8,256 hrs
Maximum electric power generated	6,320 kW
Annual production	52,178 MWh
Steam supply rate (HRSG)	38 tons per hour
Annual steam demand	313,728 tons

The project activity B consists of installation of SAACKE burner unit to the existing boilers. This modification will result in fuel switching from LFO and diesel to NG. Fuel switching to NG will result in a lower level of CO<sub>2</sub> emission due to lower carbon emission factor in NG.

### 1.6 Project Schedule

No.	Name of equipment	Expected date for commissioning
	<b>Project activity A</b>	
1.	GPB 80D KAWASAKI Gas Turbine Generator Set	End of April 2011
2.	Heat Recovery Steam Generator (HRSG)	End of April 2011
	<b>Project activity B</b>	
1.	Fuel switching modification on 3 MPBs	End of October 2010
2.	Fuel switching modification on 5 HPBs	End of April 2011

### 1.7 Category of Project Activity

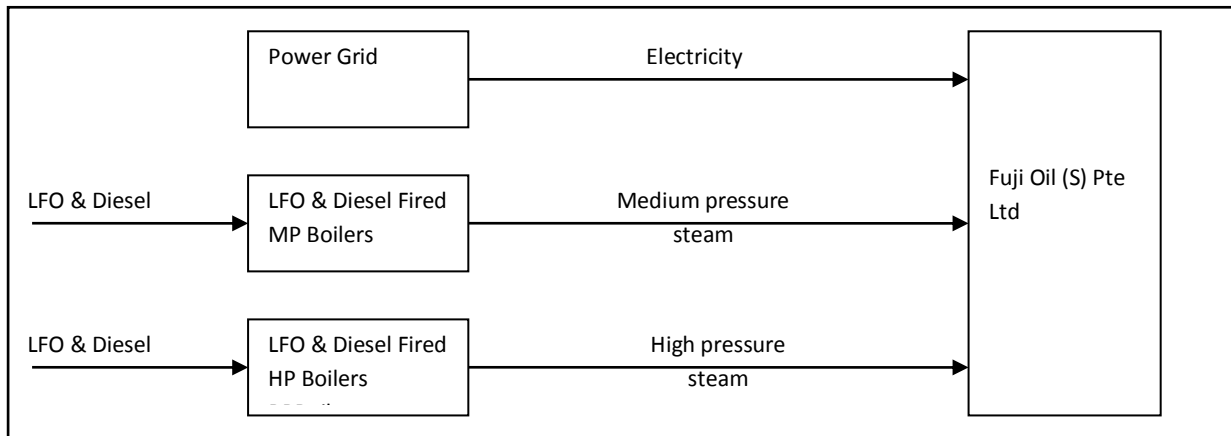
The project activity A and B fall under the following type and category as per the UNFCCC CDM website.

Project Activity	Type	Category
A	II. Energy efficiency improvement projects	AMS-II.D. Energy efficiency and fuel switching measures for industrial facilities
B	III. Other project activities	AMS-III.B. Switching fossil fuels

## 2 Greenhouse Gas Reduction

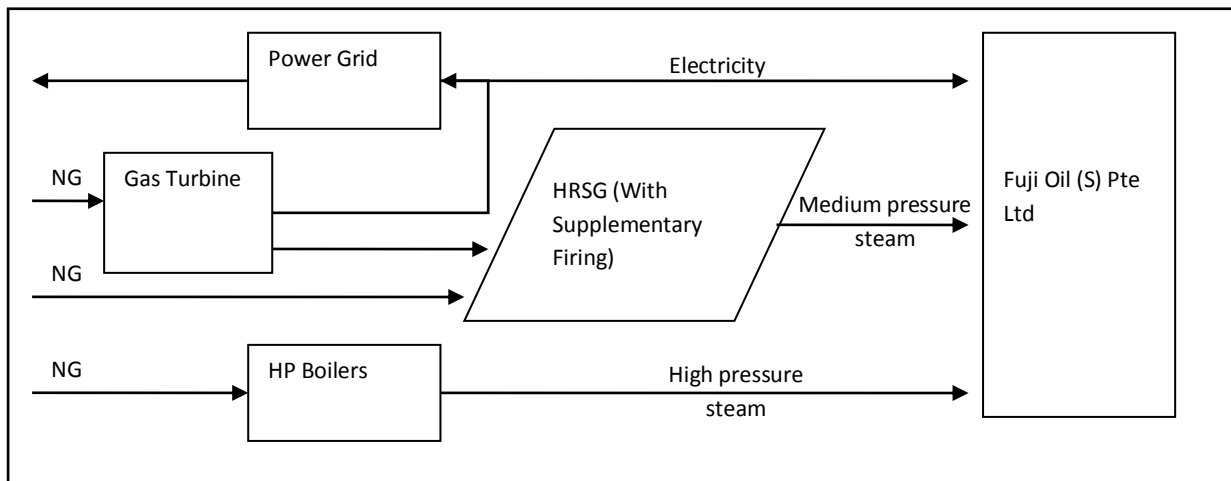
### 2.1 Baseline Scenario and Project Scenario

The baseline scenario for the project activity is Fuji Oil would purchase electricity from Singapore national grid and operate the LFO and diesel-fired HPBs and MPBs. Figure (1) shows the energy system in baseline scenario.



**Figure (1) Baseline scenario**

Figure (2) shows the project scenario. Electricity generated from gas turbine will be routed to Fuji oil and excess electricity will be exported to national grid. The MPBs will be replaced by HRSG to generate steam. The fuel sources for HPBs and MPBs will be changed from LFO and diesel to natural gas (NG).



**Figure (2) Project scenario**

## 2.2 Estimate of Greenhouse Gases Abated

Baseline emissions for project activity A = 85,748 tons CO<sub>2e</sub> per year

Project emissions for project activity A = 54,794 tons CO<sub>2e</sub> per year

Estimated emission reduction from project activity A = 30,954 tons CO<sub>2e</sub> per year

Baseline emissions for project activity B = 9,765 tons CO<sub>2e</sub> per year

Project emissions for project activity B = 7,138 tons CO<sub>2e</sub> per year

Estimated emission reduction from project activity B = 2,627 tons CO<sub>2e</sub> per year

Total amount of emission reduction from project activity A and project activity B

= 33,581 tons CO<sub>2e</sub> per year

Estimated Amount of Certified Emission Reduction (CER) per year for the proposed project

= 33,581 CER per year

## 2.3 CER Crediting Period

The CER crediting period of the proposed project activity is ten years.

## 3 Sustainable Development Criteria

### 3.1 Environmental Sustainability

*(i) Project meets Singapore's Environmental Protection requirements, standards and regulations*

*(ii) Project produces real and measurable reductions in GHG emissions.*

### 3.2 Economic Sustainability

*(i) Project utilizes more efficient technology (e.g. energy efficient, resource efficient) than common industrial practice.*

*(ii) Project results in technology transfer and/or capacity building in greenhouse gas emission reduction technologies*

### 3.3 Social Sustainability

*Project helps to improve quality life by creating opportunities for jobs, job enhancement, etc.*