Improve Energy Efficiency and Reduce Greenhouse Gas Emission

Fuji Oil Cogeneration Plant

Development Activities
Background as EPC contractor, equipment supply owners and consultants come together to focus on emission and sustainable energy solutions

An investment entity for biomass and natural gas power projects to provide low emission, low cost utilities for various industries

In depth knowledge in development activities from more than 4 decades of success, supply chain mgmt, technical and operational capabilities
GPA Unique Energy Services

- Industry knowledge
- Participation/ regulatory/ market intelligence
- Expertise in Varius Commercial Contracts

GPA’s Services

Long/Short Term Contracts
- Develop/ Project Inv/ Service
- BOT/BOO/BLT/CFD/Gas toll
- Equity/Bond/Project Finance
- Utility Pricing Structures

Emission Reduction Program
- G’teed Energy efficiency
- Performance operation
- CDM develop/M&V/trade

Consultancy Services
- Commercial/Financial
- Environment
- Technical/ Operational
- Market regulation/compliance
Cogeneration Project Activities

- The Project Activity Overview
- Baseline Scenario of Existing Manufacturing Facility
- Improvement Activities
  - Activity A: Installation of a cogeneration plant
  - Activity B: Fuel switching of the existing boilers
- Overall CO$_2$ Emission Reduction
- Sustainable Development Qualifications
Project Activity Overview

• **Objective**
  To reduce emission by implementing a more efficient generation of utilities & fuel switching to a low carbon fuel as way of contribution to sustainable development

• **Existing Business Activities**
  Fuel oil fired package boilers and grid connected electricity to generate utilities and operate process

**Location**

Senoko Road, northern part of Singapore
Existing Manufacturing Facility

- **Project Facility**
  - Fuji Oil Singapore manufacturing facility of food products

- **Existing Equipment**
  - HV, MV Electricity distribution, grid supply retail contract
  - 3 units of medium pressure boilers (MPB) (avg over 10 yr old)
  - 5 units of high pressure boilers (HPB) (avg over 12 yr old)
  - Fueled boilers by using Light Fuel Oil (LFO) & Diesel
Fuji Oil – Advanced Food Products Manufacturer
Existing Equipment Configuration

Activity-A

Power Grid

- LFO & Diesel
- Medium Pressure Boilers

Medium Pressure Steam

- LFO & Diesel
- High Pressure Boilers

High Pressure Steam

Fuji Oil

Activity-B
A Gas Turbine Cogeneration Plant

- Installation of Cogeneration plant to replace the existing oil fired boilers and less dependent on grid electricity
- Generated electricity for in house use, excess electricity export to grid so as to maintain highest efficiency
- Recovering all exhaust heat from gas turbine by Heat Recovery Steam Generator (HRSG)
- Existing medium boilers will be acting as a standby
I. Cleaner feature of a cogeneration plant

- A gas turbine with NOx DLE system, on natural gas
- A waste heat recovery system, 14 bar, efficiency 92%
- State of the art operating control system

II. Performance of the cogeneration plant

- Electric power output: 6.32 MW
- Steam generation of HRSG: 38 TPH
- Combined Heat & Power efficiency: 91.95%
Activity-A (Existing Configuration)

- Power Grid
- Electricity
- LFO & Diesel
- Medium Pressure Boilers
- Medium Pressure Steam
- Fuji Oil
Activity-A (Improved Configuration)

- Power Grid
- Gas Turbine
- HRSG (Supplementary Firing)
- Medium Pressure Steam
- Fuji Oil
- Electricity
- NG
Activity-A (Emission Reduction)

- Existing emission base line: **85,171 Ton CO2**
- Activity-A Emission Reduction: **35%**

**Existing Emission: 85,171 Ton CO2**

**Cogen Emission: 54,966 Ton CO2**

- Gird + MP Boilers Emission: 85,171 ton
- Reduction: 30,205 Ton
- Cogen Emission: 54,966 Ton
Activity-B (Carbon density comparison)

Fuel switching of medium and high pressure boilers

a) Fuel switching from LFO and diesel to Natural Gas by using dual fuel burner

b) CO$_2$ emission based line: equivalent to Ton CO2/TJ

![Graph showing CO$_2$ emissions for LFO, Diesel, and Natural Gas]
Activity-B (Existing HP Boilers- Using LFO)

LFO & Diesel → High Pressure Boilers → Fuji Oil

High Pressure Steam
Activity-B (Improved HP Boilers-Natural Gas)
Activity-B (Emission Reduction)

- Existing emission base line: 9,765 Ton CO2
- Activity-B Emission Reduction: 27%
Activity A + B (Emission Reduction)

- Existing emission base line: **94,936 Ton CO2**
- Activity A+ B Emission Reduction : **34.5%**
Sustainable Development Targets

- In line with Singapore Sustainable Development Blueprint

- Contribute to the following targeted sustainability:
  1. Environmental
  2. Economic
  3. Social
1) Environmental Sustainability

- In line with National Environment Agency’s environmental protection requirements, standards and regulations

- Produces measurable & verifiable reduction in GHG emissions

- Promote awareness of lower emission technologies thereby encourages other providers to adopt of cleaner energy utilisation
2) Economic Sustainability

- Utilizes more efficient and/or environment-friendly technology than common industrial practices
- Long term results on energy cost saving for user
- Helps the reduction of the energy consumption at the same time demonstrating economic opportunities for other energy consumers to adopt the similar success story
Existing energy based line: 124.55 GWh
Cogen energy saving: 29%
3) Social Sustainability

- Through the installation of the gas turbine, the accumulated demand on the national grid will be reduced.
- Project helps to improve quality of life for employees by creating opportunities for skilled jobs, on job training, etc.
- New jobs will be created through project activity

**Skilled Job Creation:** 11 Employees
Social Sustainability-related activities

- Jobs opportunities for maintenance of the gas turbine for the outsourced companies
- Training and enhance knowledge for the employees
- Providing know how in socially acceptable practices and standards for ourselves and other participants
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