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CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

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SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Natural Gas based Power Generation Project at Gujarat Glass Limited, India

Version: 01

Date: 17/03/2008

A.2. Description of the small-scale project activity:

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Gujarat Glass Limited (GGL) is a leading manufacturer of glass packaging (bottles & vials) for pharmaceutical, cosmetic & perfumery products. GGL enjoys a leadership position in the niche pharmaceutical packaging segment that it operates in. Gujarat Glass Limited is ISO-9000 & ISO-18000 certified from M/s. BVQI.

GGL had undergone expansion of their plant and to meet the requirement of additional power, GGL had to consider various options for meeting the power requirement. GGL management had considered various options for power generation at the Kosamba Plant. GGL management decided to install gas engine in two phases at the plant to meet the electricity requirement of the plant.

GGL had option of installing lignite based captive power plant which would have lead to more greenhouse gas emissions in comparison to natural gas. The basic objective of the project is to produce electricity from less carbon intensive fuel. The project utilizes Natural Gas (NG), a cleaner fuel, for electricity generation.

Gujarat Glass Ltd had a contract with GAIL under Administrative Pricing Mechanism (APM) for its earlier installed 2 x 2.5 MW gas engines and process. The GAIL gas was contracted at rate of Rs 6.05 per SCM. GGL faced supply constraint of this gas supply as GAIL gas field had depleted and GGL was denied supply of additional gas for the project activity. GGL had to contract supply of gas from new party i.e; Gujarat Gas Company Limited (GGCL) for the project activity. The price fixed for gas supply by GGCL is very costly and the management evaluated various options before going ahead with the project. The management had option of either installing coal based system that has lower efficiency as compared to gas engine. The management went ahead with the decision of investing costlier power generation option as compared to coal based system keeping in mind source of carbon revenue available under Kyoto Protocol.

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The initiative undertaken by GGL is developed under Kyoto Protocol (Clean Development Mechanism – CDM) guidelines. For a CDM project activity is required to demonstrate its contribution to sustainable development through Social, Economic, Environment and Technology indicators. The project activity contribution towards each indicator above mentioned is explained briefly below in ***sustainable development indicator*** section

Social well being:

During the implementation of the measure additional workforce was employed, which resulted in income generation sources for lower most employee section of the society. This has spurred development in local populace and therefore proved socially friendly and promoted sustainable development.

Economical well being:

The project has opened up business opportunities for the material distributors, local industries and other ancillary businesses for local people.

Environmental well being:

The project activity generates power using cleaner fuel natural gas at a higher efficiency and thus reduces GHG emissions. The project activity substitutes coal fossil fuel and reduces CO_2 and other emissions well below Gujarat State Pollution Control Board (GPCB) norms. Therefore, the project is an environmentally friendly initiative by project proponent.

Technological well being:

The project activities involve captive power generation using efficient gas engine technology. This helps primarily in generating reliable power by using cleaner fuel. The advantages of the Gas engines are summarized below to demonstrate technological well being:

- Complete combustion of the gaseous fuel.
- Energy efficient power generation.
- Environmentally friendly technology, implemented with local technological know-how.

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Therefore, the project helps "Host Country" ***India*** to fulfill its goals of promoting sustainable development.

A.3. Project participants:

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Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Gujarat Glass Ltd (GGL) – Private Entity	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1.	Host Party(ies):

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India

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

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Gujarat

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A.4.1.3. City/Town/Community etc:

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Kosamba, Surat District

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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The site is located in Tarsadi village, Mangrol – taluka and Surat District in the state of Gujarat. The nearest airport is Vadodara at distance of 120 km. The nearest railway station is Kosamba (RS) at distance of 1.5 km and nearest city railway station of Surat is at distance of 45 kms. The site is accessible to National Highway No. 8. The locational details of the site are given below:

Latitude : 21°-29' North

Longitude : 72°-57' East

Altitude: 29 m

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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As per 'Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories', the project activity falls under

Main Category: Type II – ***Energy Efficiency Improvement Projects***

Sub Category: "D" ***Energy Efficiency and fuel switching measures for industrial facilities***

Version 11; Sectoral Scope 04; EB 35

Technology

GGL have installed 1.96 MW and 3.9 MW NG based engines. The Gas Engines operate on basis of 4 Stroke Cycle. In principle, mechanical energy is developed through the piston movement caused by combustion of a mixture of Natural Gas and air. The gas engine is coupled with alternator, which in turn generates electrical energy. The power is further distributed through adequate distribution and switching network at individual project activity. Gas engines are operated on lean burn fuel technology for complete combustion. During the compression stroke, the air/fuel mixture in the cylinder enters holes in the spark plug's precombustion chamber. The secondary circuit of the transformer provides an initial voltage to the

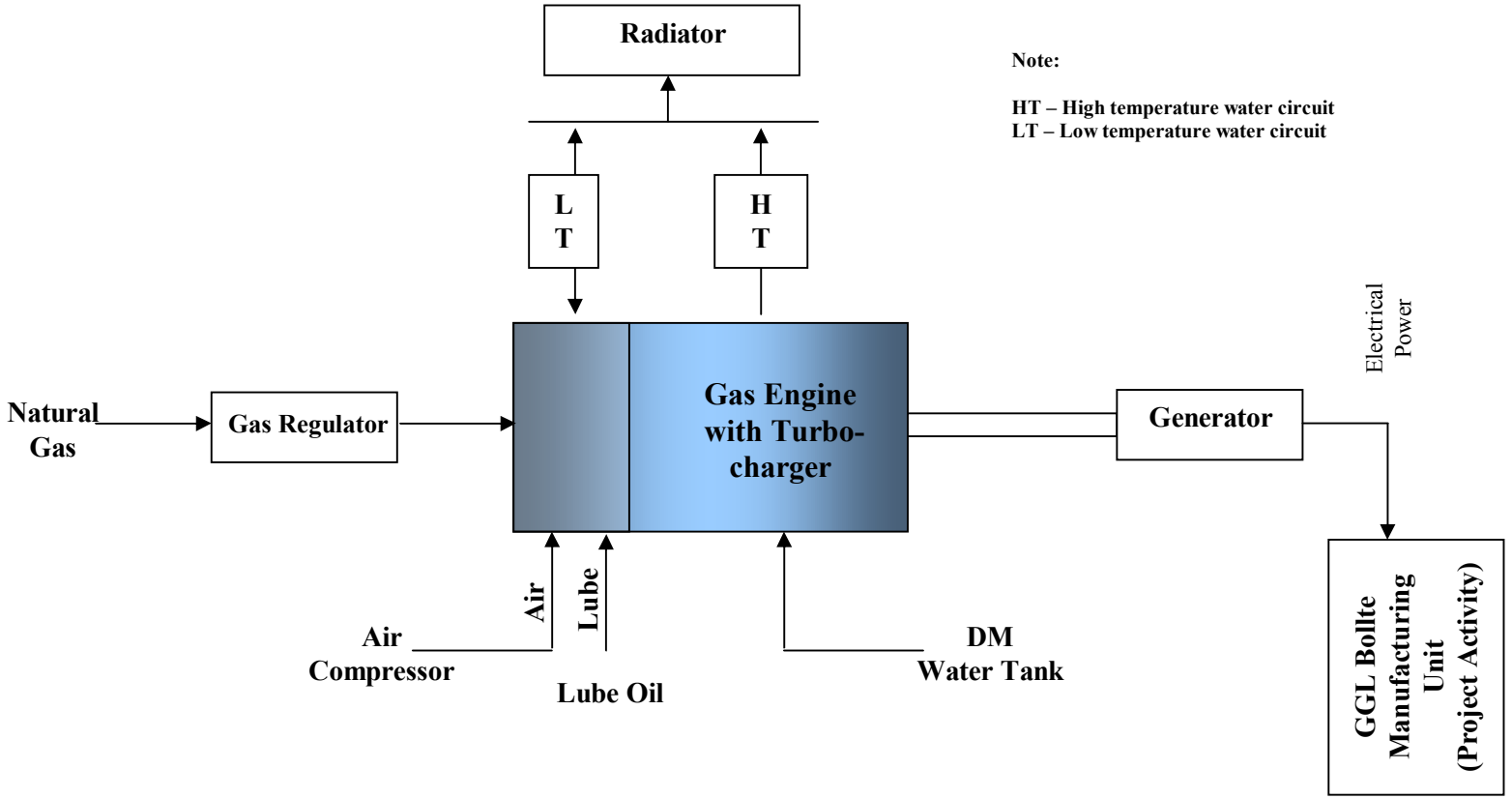
spark plug in order to create a spark. The air/fuel mixture ignites in the spark plug's precombustion chamber. A pattern of multiple flames exits the spark plug's precombustion chamber through the holes in order to ignite the air/fuel mixture in the cylinder. This avoids detonation, increases the efficiency and reduces emissions. Engine technology specifications of individual gas engines are given in table below.

Engine Technology specification:

S.No	Technology Specification	1.96 MW	3.9 MW
1.	Gas engine technology provider	Caterpillar	Deutz
2.	Gas Engine type	G3520C series	TCG 2032 V16
3.	Name plate power generation capacity	1.960 MW	3.904 MW
4.	Gas Engine efficiency	41%	42.85%

Therefore the technology implemented is advance and proves to be environmentally safe. Process flow diagram of the technology implemented is presented in Fig. below.

Fig: Schematic diagram of power generation using Natural Gas at GGL



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

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Years	Annual estimation of emission reductions in (tonnes of CO_2 e)		Total Emission Reduction of bundled project activity (tonnes of CO_2 e)
	1.96 MW	3.9 MW	
2008-09	12,719	26,579	39,299
2009-10	12,719	26,579	39,299
2010-11	12,719	26,579	39,299
2011-12	12,719	26,579	39,299
2012-13	12,719	26,579	39,299
2013-14	12,719	26,579	39,299
2014-15	12,719	26,579	39,299
2015-16	12,719	26,579	39,299
2016-17	12,719	26,579	39,299
2017-18	12,719	26,579	39,299
Total Estimated Reductions (tCO_2 e)	**1,27,190**	**2,65,790**	**3,92,990**
Total no of crediting period	10 years	10 years	10 years
Annual average over the crediting period of estimated reduction (tCO_2 e)	**12,719**	**26,579**	**39,299**

A.4.4. Public funding of the small-scale project activity:

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No public funding is available in this project activity from Annex 1, countries of UNFCCC.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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According to appendix C of simplified modalities and procedures for small-scale CDM project activities, 'debundling' is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities. The two small scale projects are being presented as one project activity. However they are not part of any other large project activity.

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According to para 2 of appendix C[1]

A proposed small-scale project activity shall be deemed to be a de-bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

1. With the same project participants;
2. In the same project category and technology/measure;
3. Registered within the previous 2 years; and
4. Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point

The project activity under discussion is the first climate change initiative developed under Clean Development Mechanism by project participant. There is no similar project technology implemented by the project proponent in the vicinity or within 1 km radius of the project boundary at GGL project activity sites. Therefore the project activity is not a de-bundled component of a large scale project activity and has been considered under the small scale category.

[1] Appendix C to the simplified M&P for the small-scale CDM project activities, http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf

SECTION B. Application of a baseline and monitoring methodology

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

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Title: *II. –"Energy Efficiency Improvement Projects" D -"Energy Efficiency and fuel switch measures for industrial facilities"*

Reference: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities, version 11, EB 35.

B.2 Justification of the choice of the project category:

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Applicability criteria:

Para 1: This category comprises any energy efficiency and fuel switching measure implemented at a single industrial or mining and mineral production facility. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B. Examples include energy efficiency measures (such as efficient motors), fuel switching measures (such as switching from steam or compressed air to electricity) and efficiency measures for specific industrial or mining and mineral production processes (such as steel furnaces, paper drying, tobacco curing, etc.). The measures may replace, modify or retrofit existing facilities or be installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 60 GWhe per year. A total saving of 60 GWhe per year is equivalent to a maximal saving of 180 GWhth per year in fuel input.

The project activity involves implementation of an NG based higher efficiency power generating system instead of a coal based lower efficiency system. Apart from the key applicability criteria stated above, the project activity is required to meet the following conditions in order to apply the baseline methodology.

The project activity is new facility, which is installed in the GGL plant premises, thus meeting the applicability criteria.

The aggregate annual energy savings for the project activity is 68.86 $GWh_{thermal}$ which is less than 180 GWh_{th} limit of small scale project activity of this category. The project activity is within the small scale

limit as per AMS.II.D and will be applicable for the same production in future also and qualify all applicability criteria.

Para 2: This category is applicable to project activities where it is possible to directly measure and record the energy use within the project boundary (e.g. electricity and/or fossil fuel consumption).

The energy produced ie; the electricity will be directly measured and recorded within the project boundary.

Para 3: This category is applicable to project activities where the impact of the measures implemented (improvements in energy efficiency) by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal to noise ratio).

There project activity will not be influenced by other variables.

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B.3. Description of the project boundary:

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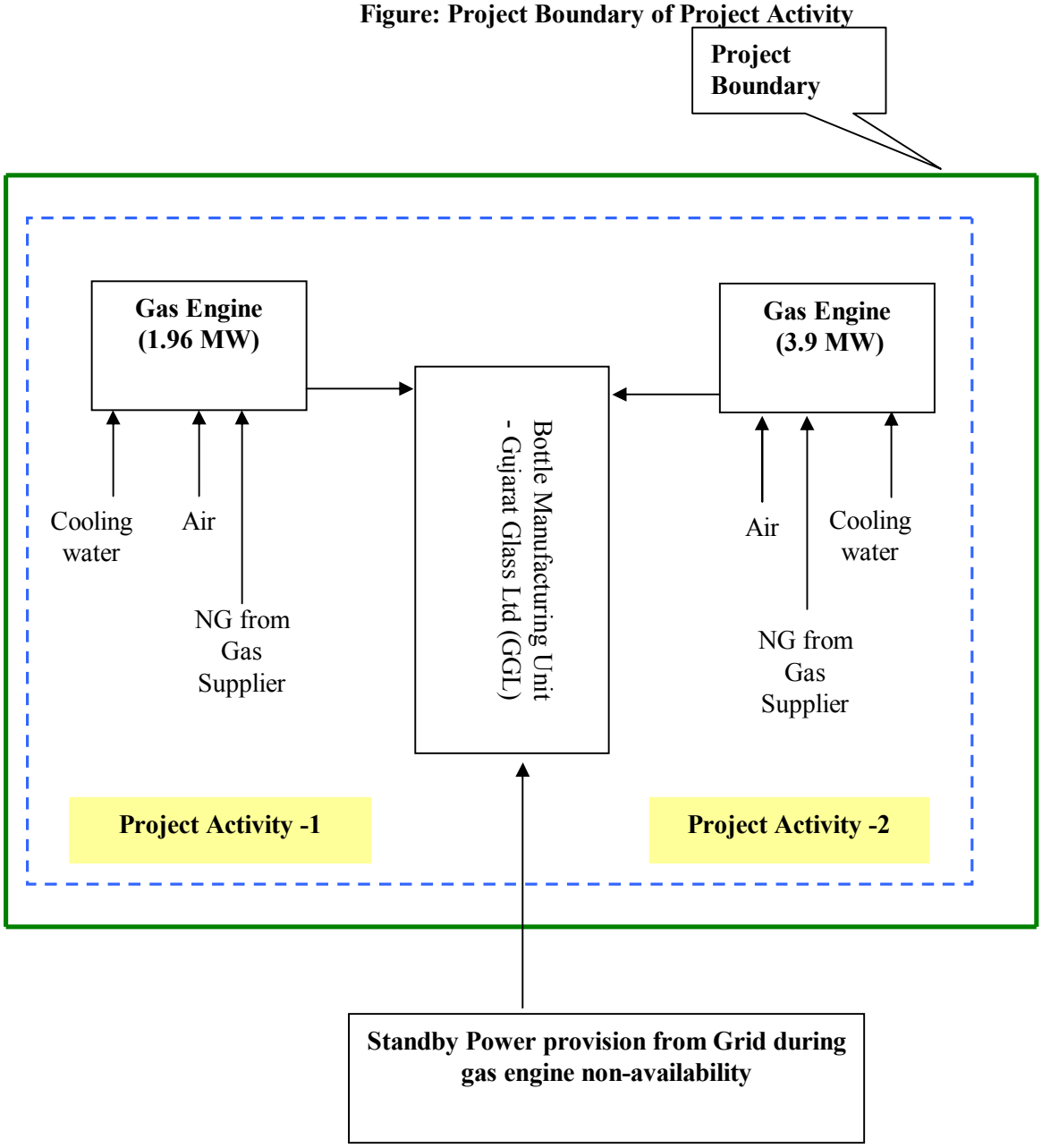
As per AMS II.D small scale methodology, "The project boundary is the physical, geographical site of the industrial or mining and mineral production facility, processes or equipment that are affected by the project activity." As per stated boundary definition the gas engine facilities at GGL are only components on the boundary. A standby power arrangement from State Electricity Board is available only in case of power non-availability from Gas engine.

Figure: Project Boundary of Project Activity



B.4. Description of baseline and its development:

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The small scale methodology AMS.II.D/version 11, EB 35, states

Para 5: In the case of replacement, modification or retrofit measures, the baseline consists of the energy baseline of the existing facility or sub-system that is replaced, modified or retrofitted. In the case of a new facility the energy baseline consists of the facility that would otherwise be built.

The project activity involves implementation of a new NG based higher efficiency power generating system instead of a coal based lower efficiency system.

Para 6: In the absence of the CDM project activity, the existing facility would continue to consume energy (ECbaseline, in GWh/year) at historical average levels (EChistorical, in GWh/year), until the time at which the industrial or mining and mineral production facility would be likely to be replaced, modified or retrofitted in the absence of the CDM project activity (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline energy consumption (ECbaseline) is assumed to equal project energy consumption (ECy, in GWh/year), and no emission reductions are assumed to occur.

ECbaseline = EChistorical until DATEBaselineRetrofit

ECbaseline = ECy on/after DATEBaselineRetrofit

In order to estimate the point in time when the existing equipment would need to be replaced in the absence of the project activity (DATEBaselineRetrofit), project participants may take the following approaches into account:

(a) The typical average technical lifetime of the equipment type may be determined and documented, taking into account common practices in the sector and country, e.g. based on industry surveys, statistics, technical literature, etc.

(b) The common practices of the responsible industry regarding replacement schedules may be evaluated and documented, e.g. based on historical replacement records for similar equipment.

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The point in time when the existing equipment would need to be replaced in the absence of the project activity should be chosen in a conservative manner, i.e. if a range is identified, the earliest date should be chosen.

The project activity is installation of a new NG based gas engine which has lifetime of 15 years.

The equipment is likely to be replaced in the process of the CDM project activity at January 2022 which is the DATEBaselineRetrofit.

Thus from January 2022 onwards, the ECbaseline would be assumed to equal project activity energy consumption ECy and no emission reductions are assumed to occur after January 2022.

Para 7: Each energy form in the emission baseline is multiplied by an emission coefficient (in kg CO2e/kWh). For the electricity displaced, the emission coefficient is calculated in accordance with provisions under category I.D. For fossil fuels, the IPCC default values for emission coefficients may be used.

The baseline and its development have been carried out on the basis of criteria's provided as per AMS II.D/version 11. The project proponent has identified plausible project options for baseline scenario, which include all possible courses of actions that could be adopted in order to generate power.

Further an assessment was conducted for each alternative to project activity with respect to the risks/barriers associated to implementation. The energy baseline was determined, which consists of the facility that would otherwise be built. The performance of the project activity and its associated emission reductions were evaluated with respect to the energy baseline scenario. Following are different alternatives which were assessed for determining baseline scenario at GGL:

Alternative 1- Power from State Electricity Board

In absence of CDM project activity, the GGL unit could have drawn power from a licensee power producer to meet its annual requirement. The grids are suffering from shortages to meet their energy demand and in particular the peak demand. The monthly average peak deficit for the year 2006-07 is shown in table below:

Peak Demand/ Peak Met by Different Regions during the year 2006-07

State / System / Region	Peak Demand	Peak Met	Surplus / Deficit (-)	
	(MW)	(MW)	(MW)	%
Northern Region	31,516	26,644	-4,872	-15.5
Western Region	36,453	27,463	-8,990	-24.7
Southern Region	26,176	24,350	-1,826	-7.0
Eastern Region	10,491	10,058	-433	4.1
All India	100,715	86,818	-13,897	-13.8

The operation of GGL manufacturing lines depends upon continuous supply of power and cannot rely on intermittent and fluctuating power supply. As observed in the table above the western region grid has the highest deficit of 24.7 percent in the last year. In addition it has been observed that there are very frequent trippings and black out observed in past which may affect the IS Machine performance and these machine performance is very critical for the overall performance of the plant. Thus this alternative cannot be considered as plausible alternative and as baseline scenario.

Therefore the Alternative 1 cannot be considered further for arriving at the baseline scenario.

Alternative 2- Captive Coal based Power generation

In absence of CDM project activity, GGL units could have produced power from captive coal fired power plant to meet its annual requirement. However the power generated efficiency would be again in the tune of 28 %[2]. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline.

[2] Guaranteed Power generation efficiency is as per detailed quotation from Coal based power plant manufacturer and the same is provider to the validator.

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Therefore the Alternative 2 is considered further for arriving at the baseline scenario.

Alternative 3- Power generation using Natural Gas based Gas engines

In absence of CDM project activity, one of the plausible alternatives with the project proponent would be using cleaner NG fuel and generate power at higher efficiency to the tune of 35 to 45%. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline.

Therefore the Alternative 3 is considered further for arriving at the baseline scenario.

Alternative 4- Power generation using biomass

In absence of CDM project activity, the project activity could have generated power using renewable biomass to meet its power requirement. This alternative is in compliance with all applicable legal and regulatory requirements. However this alternative would not be a credible and realistic alternative available with the proponent as uncertainties in the biomass availability are extremely high.

Therefore the Alternative 4 may be excluded from further consideration.

Evaluation of the Alternatives based on their economic attractiveness and other critical considerations are tabulated in Table.

The project proponent carried out a complete analysis among the credible and realistic alternatives (as mentioned above) based on the flowing key parameters:

- Power generation cost
- Other important considerations in order to determine the baseline and additionality.

Table: Assessment of all the realistic and credible alternatives in absence of the project activity

Parameters	Alternative 2 Captive Coal based Power	Alternative 3 Natural Gas Engine based power
Power plant generation efficiency	28%	1.96 MW - 41 % 3.9 MW - 42.85%
Levelized Power generation cost	Low 6 MW – Rs.3.038/kWh[3]	Higher 1.96 MW – Rs.3.64/kWh 3.9 MW - Rs 3.89 /kWh

[3] Offer provided by Cethar Vessels

Other Considerations	1. Coal is available in abundance and at a cheaper. 2. Consistent power generation required for process requirement.	There are risks associated with [4] • Availability of NG • Unregulated Gas allocation • Demand Supply gap • Fluctuations in Calorific Values • Fluctuation in NG prices Availability and pricing is highly uncertain and dependent on domestic market which is still not well defined. GGL has gas contract in place from GAIL under Administrative Price Mechanism (APM) for its earlier installed 2 x 2.5 MW gas engine & others. The gas supply from GAIL will be terminated soon and GAIL will no longer be the source of NG for GGL. In that case GGL have to either depend on Gujarat Gas for NG or depend on the grid for power. Dependency on the grid for power is not reliable because of frequent trippings and black out. The GAIL gas is available for GGL at Rs 6.01 per SCM which is much cheaper than the Gujarat Gas Company Ltd (GGCL) contracted gas supply for project activity at Rs 12.32 per SCM. Another option for power generation is a

[4] http://www.infraline.com/ong/default.asp?URL1=/ong/naturalgas/ngdefault.asp&idCategory=1236

		coal based power plant, which is a cheaper option as compared to NG based power from GGCL. GGL has no incentive for producing electricity from costlier natural gas but the management only decided to go ahead with costlier fuel with respect to coal considering environmental benefits and also anticipation of revenues available in form of carbon finance. Under these circumstances GGL have taken a challenge to invest in the project activity and use NG to meet its power requirement.
Conclusion	This alternative option is the Baseline Scenario	Hence without the CDM revenue, this alternative was not being a feasible option for GGL to adopt. Therefore t*his alternative is additional since the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activit*y.

From the assessment of possible alternative we may state that Alternative 2 would have been our baseline scenario for power generation. In-spite Alternative 2 being the most economic alternative, the project proponent has opted for power generation using efficient Gas engines. The project also substitutes fossil fuel with cleaner fuel NG, this help in reducing GHG emissions and promoting sustainable development.

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Section B.5 will describe the additionality and barrier faced in the project activity and towards its implementation.

The project activity implemented will generate energy at higher efficiency and substitute fossil fuel with cleaner fuel NG. The emission coefficients and data required for estimation of baseline are provided in this section

Emission coefficient of fuel used in the baseline scenario

The fuel that would have been used in the baseline scenario Alternative 2 would have be coal whose emission factor as per the IPCC 2006 Stationary Combustion GHG emission guidelines is 96.1 tCO_2/ TJ and the Net calorific value (NCV) is 5,085 kcal/kg[5] which is as per NCV test report for coal as per IS:1350, from a government approved a laboratory

Emission coefficient of fuel used in the project activity

The fuel that will be used in the project scenario is the Natural gas, whose emission coefficient as per the IPCC 2006 Stationary Combustion GHG emission guidelines is 56.1 tCO_2/ TJ and the net calorific value (NCV) of the same is 8350 kcal/SCM[6].

To estimate the baseline emissions, the quantity of coal that would have been used to generate power in the absence of the project activity would be determined based on the conservative plant efficiency of 28% of captive coal based power plant. The project emissions have been estimated on the basis of equivalent power generation by gas engines at a plant efficiency[7] of at 41% (1.96 MW) and 42.85% (3.9 MW). Key information required establishing baseline in baseline and project scenario is given below:

Table B.4.1(b): Representation of key information and data sources to establish the baseline scenario:

No	Key information and data used for baseline	Source of information/ data
Baseline		
1	Quantity of coal consumed	The annual coal quantity is Estimated and source is detailed offer of Coal based power plant (CPP) Technology by supplier)
2	Net Calorific Value (NCV) of coal	Net calorific value of coal as per NCV test report as per IS:1350 which is (5085 kcal/kg)
3	Emission Factor of coal	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion

[5] Source is Net calorific value of coal as per NCV test report as per IS:1350 which

[6] Source of NCV-Natural Gas is NG supplier contract copy

[7] Performance guarantee report from supplier.

4	Power units generated	As per detailed quotation from CPP supplier
6	Plant Efficiency	As per detailed quotation from CPP supplier
Project activity		
1	Quantity of NG consumed	Based on log book records
2	Net Calorific Value (NCV) of NG	As per Gas supply contract document
3	Emission Factor of NG	IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
4	Power units generated	Based on log book records
5	Auxiliary power consumption	Based on log book records
7	Plant Efficiency	Based on empirical formulae and monitored project activity log book records

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 small-scale CDM project activity:

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The implementation of the project activity is a voluntary step undertaken by with no direct or indirect mandate by law. In accordance with paragraph 3, 4, 6 and 7 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in Appendix B may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in Attachment A of Appendix. B. These barriers are:

- Investment barrier
- Technological barrier
- Barrier due to prevailing practice
- Other Barriers

The project proponent has considered Investment analysis (Levelised unit cost analysis) to compare different alternative options that were available during implementation of the project activity.

Investment Barrier

Levelized cost comparison analysis

The management compared the levelized power generation unit cost of coal based captive power generation and NG based captive power generation. A levelized cost analysis included variable cost component and fixed cost components.

Source	Unit Cost (Rs/kWh)
Alternative 2: Coal based Power	
6 MW	3.038
Alternative 3: Natural Gas Engine based power	
1.96 MW	3.64
3.9 MW	3.89

The levelized cost analysis of the above alternatives, indicate that the energy generation cost in Alternative 3 is higher than Alternative 2. Even in this scenario GGL management have opted for advance technology at higher operating unit cost[8].

Along with the cost analysis the project activity always faces an uncertainty in NG availability and high price variation at which gas can be available in small and medium scale industry sector. In-spite of this fact being a potential barrier to the project activities and which could result in non-operation and investment loss, the project proponent has gone ahead and implemented gas engine project.

Price of Fuel (Natural gas)

GAIL supplies around 49,900 SCM/day of Compressed Natural Gas to GGL at a variable price of 6.01 Rs/SCM. GGL had already 2 x 2.5 MW Gas engines in the same plant utilizing gas supplied by GAIL. GGL had planned expansion at their Kosamba plant which resulted in increase in demand of natural gas for furnace as well as power generation.

GGL management has signed contract of natural gas supply @ 12.32 Rs/SCM with GGCL. Even though the gas supply for the project activity was 2.05 times costlier than the APM gas supply by GAIL, the management had agreed to go ahead with the costlier gas considering the environmental benefits of using gas instead of coal for power generation.

Technological barrier: Even though having experience of running two gas engines earlier the technological barriers faced by GGL, considering imported genset, were enormous. The lack availability of proper spares and service was always an issue considering the plant is operational throughout the year. Deutz model

[8] A detailed levelised unit cost analysis excel sheet is enclosed and provided to the validator with all required references.

TCG 2032 V16 has been installed for the first time in India. As the technology, there is no service set up available in India for Caterpillar / Deutz gas engines.

Other barriers: The project requires uninterrupted availability of consistent quality gas supply. GGL, after the project conceptualization, faced a barrier as GGCL expressed their sudden inability to ensure the gas supply. In case of any break down of genset, gas consumption can go below 80% of contracted quantity and in this case heavy penalties have to be paid to GGCL.

In-spite of all these barriers the board of GGL chose to develop the project activity under the Clean Development Mechanism of Kyoto Protocol in order to obtain CDM revenue and proceed with the project investment, with the sole purpose of promoting GHG Abatement projects.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The procedure followed for estimating the emissions reductions from this project activity during the crediting period are as per the following steps which corresponds with AMS II.D / version 11, EB 35.

Steps	Description	Equation Used	Methodological Choices

1.	Procedure followed for calculation baseline emissions (BE,y)	The simplified baseline emissions in the absence of the project activity are determined of the applicable small scale methodology II.D. The energy baseline is determined on the basis of amount fossil fuel that would have been consumed times its emission factor for total power requirement per annum. The baseline equations are common for 1.96 MW and 3.9 MW coal based power plant of equivalent capacity. $PG_{Coal} = \frac{\frac{NU_{coal}}{1-AU_{coal}} x\, OP_{coal}}{1000000}$ Where PG_{coal} Power generation from Coal power plant in Million Units (MU) NU_{coal} Net Power demand from coal power plant (kW) AU_{coal} Auxiliary percentage of coal power plant (13%) OP_{coal} Coal power plant operation days x 24 hours 1000000 Conversion factor for MU Now, $Q_{coal} = \frac{PG_{coal}\, x 1000000\, x \frac{860}{\eta_{coal}}}{NCV_{coal}\, x 1000}$ Where Q_{coal} Annual coal consumed by coal power plant, MT 1000000 Conversion from MU to kWh 860 Conversion factor for electrical to thermal unit η_{coal} Power generation efficiency of coal power plant, (28%) NCV_{coal} Net calorific value of coal as per NCV test report as per IS:1350 which 5085 kcal/kg	The baseline emissions are calculated on the basis paragraph 5 of AMS II.D, which states 1. In the case of replacement, modification or retrofit measures, the baseline consists of the energy baseline of the existing facility or sub-system that is replaced, modified or retrofitted. In the case of new facility the energy baseline consists of the facility that would otherwise be built 2. Each energy form in the emission baseline is multiplied by an emission co-efficient (in kg CO_2e/kWh). For the electricity displaced, the emission coefficient is calculated in accordance with provision under category I.D. For fossil fuels, the IPCC default values for emission coefficients may be used.

1.	Contd…	$$BE = Q_{coal}\, x 1000\, x\, NCV_{coal}\, x \frac{4.1868}{1000000000} x \left(EF_{coal}\, x \frac{44}{12} \right) x\, OX_{coal}$$ where, BE — Baseline Emissions in tCO_2e EF_{coal} — Emission factor of coal, tC/TJ which is 26.2 as per IPCC 2006 guidelines for GHG emissions in Stationary Combustion 44/12 — Conversion factor from tC to tCO_2 OX_{coal} — Oxidation factor for coal which is 1.00 as per IPCC 2006 guidelines for GHG emissions in Stationary Combustion Therefore applying equations we find baseline emissions per year as: **1.96 MW – 20,438 tCO_2e** **3.9 MW – 41,213 tCO_2e**	-

2.	Procedure followed for estimating emissions from project activity (PE,y)	The basis for project emission estimation is power demand for GGL. $$PG_{ng} = \frac{\frac{NU_{ng}}{1-AU_{ng}} x\, OP_{ng}}{1000000}$$ Where PG_{ng} Power generation from Natural gas (NG) power plant in Million Units (MU) NU_{ng} Net Power demand from NG power plant (kW) AU_{ng} Auxiliary percentage of NG power plant (3%) OP_{ng} NG power plant operation days x 24 hours 1000000 Conversion factor for MU Now, $$Q_{ng} = \frac{PG_{ng}\, x1000000\, x\frac{860}{\eta_{ng}}}{NCV_{ng}\, x1000}$$ Where Q_{ng} Annual NG consumed by NG power plant, Standard Cubic Metre (SCM) 1000000 Conversion from MU to kW 860 Conversion factor for electrical to thermal unit η_{ng} Power generation efficiency of coal power plant, (28%) NCV_{ng} Net calorific value of NG which is 8350 kcal/kg as per gas supply contract document	-

		$PE = Q_{ng}\ x1000xNCV_{ng}\ x\frac{4.186}{1000000000}\left(EF_{ng}\ x\frac{44}{12}\right)x\,OX_{ng}$ where, PE — Project Emissions in tCO_2e EF_{coal} — Emission factor of NG, tC/TJ which is 15.3 as per IPCC 2006 guidelines for GHG emissions in Stationary Combustion 44/12 — Conversion factor from tC to tCO_2 OX_{coal} — Oxidation factor for coal which is 1.00 as per IPCC 2006 guidelines for GHG emissions in Stationary Combustion Therefore applying equations we find project emissions per year as: **1.96 MW – 7,535 tCO_2e** **3.9 MW – 14,633 tCO_2e**	
3.	Procedure followed for estimating leakage (L,y)	Leakage as per stated criteria are not considered as there is no transfer of existing equipment from one activity to another ∴ Leakages = 0	As per AMS.II.D of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity, paragraph 7 states No leakage calculation is required.

4.	Procedure followed for calculating Emission Reductions (ER,y)	The equation used to calculate emission reductions is $ER_{,y} = BE_{,y} - PE_{,y} - L_{,y}$ The project emissions are zero for the project. Therefore the emission reduction is calculated as per the give formula: ER,y = BE,y – PE,y – Ly ER,y Emission Reductions (tCO_2) BE,y Baseline emissions (tCO_2) PE,y Project emissions (tCO_2) L,y Leakage emissions (tCO_2) Emission reduction for the bundled activity is: **1.96 MW – 12,903 tCO_2e** **3.9 MW – 26,579 tCO_2e**	-

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

>>

Baseline data and parameters for 1.96 MW equivalent fossil fuel fired power plant

Data / Parameter:	NCV_{coal}
Data unit:	kcal/kg
Description:	Net calorific value of coal
Source of data used:	NCV test report
Value applied:	5085
Justification of the choice of data or description of measurement methods and procedures actually applied :	Net calorific value of coal as per NCV test report as per IS:1350 from government approved laboratory
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	EF_{coal}
Data unit:	tCO_2/TJ
Description:	Emission factor of fossil fuel
Source of data used:	2006 IPCC guidelines
Value applied:	96.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	η_{coal}
Data unit:	%
Description:	Generation efficiency of captive coal power plant
Source of data used:	The data parameter is provided by the technology provider.
Value applied:	28
Justification of the choice of data or description of measurement methods and procedures actually applied :	Guarantee from CPP plant supplier
Any comment:	Data will be kept for crediting period + 2 years.

Project Activity data and parameters for 1.96 MW Natural Gas fired engine plant

Data / Parameter:	NCV_{ng}
Data unit:	Kcal/SCM
Description:	Net calorific value of Natural gas
Source of data used:	Gas supplier contract document
Value applied:	8350
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per Gas supply contract document based on daily measurement by both GGL and gas supplier

Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	EF_{ng}
Data unit:	tCO_2/TJ
Description:	Emission factor of Natural gas
Source of data used:	2006 IPCC guidelines
Value applied:	56.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion.
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	η_{ng}
Data unit:	%
Description:	Generation efficiency of Natural gas based power plant
Source of data used:	Plant
Value applied:	42
Justification of the choice of data or description of measurement methods and procedures actually applied :	Contract document between GMMCO and GGL. The guarantee data reference is available in Annexure A-1 of the contract document.
Any comment:	Data will be kept for crediting period + 2 years.

Baseline data and parameters for 3.9 MW equivalent fossil fuel fired power plant

Data / Parameter:	NCV_{coal}
Data unit:	kcal/kg
Description:	Net calorific value of coal
Source of data used:	NCV test report
Value applied:	5,085
Justification of the choice of data or description of measurement methods and procedures actually applied :	Net calorific value of coal as per NCV test report as per IS:1350 from government approved laboratory
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	EF_{coal}
Data unit:	tCO_2/TJ
Description:	Emission factor of coal
Source of data used:	2006 IPCC guidelines
Value applied:	96.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion.
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	η_{coal}
Data unit:	%
Description:	Generation efficiency of captive coal power plant
Source of data used:	The data parameter is provided by the technology provider.
Value applied:	28
Justification of the choice of data or description of measurement methods and procedures actually applied :	Guaranteed CPP plant supplier
Any comment:	Data will be kept for crediting period + 2 years.

Project Activity data and parameters for 3.9 MW Natural gas fired engine plant

Data / Parameter:	NCV_{ng}
Data unit:	kcal/SCM
Description:	Net calorific value of Natural gas
Source of data used:	NG gas supply contract
Value applied:	8350
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per Gas supply contract document based on daily measurement by both GGL and gas supplier
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	EF_{ng}
Data unit:	tCO_2/TJ
Description:	Emission factor of Natural gas
Source of data used:	2006 IPCC guidelines
Value applied:	56.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion.
Any comment:	Data will be kept for crediting period + 2 years.

Data / Parameter:	η_{ng}
Data unit:	%
Description:	Generation efficiency of Natural gas based power plant
Source of data used:	Plant
Value applied:	42.85
Justification of the choice of data or description of measurement methods and procedures actually applied :	Contract document between Deutz and GGL. The guarantee data reference is available in Annexure A-1 of the contract document.
Any comment:	Data will be kept for crediting period + 2 years.

B.6.3 Ex-ante calculation of emission reductions:

>>

Baseline Calculations: 1.96 MW

Description	Units	Calculations
Net power demand from Coal based power plant	kW	1880
Auxiliary Consumption	%	10
Coal Power plant Operation	Days	330
Power Generation from coal power plant per annum	MU	16.5
Efficiency of coal based power plant	%	28.0
Net Calorific value (NCV) of coal	kcal/kg	5,085
Annual coal quantity required	MT	8,915
Total Energy Content from coal	TJ	212.74
Emission factor of coal	TC/TJ	26.2
	tCO_2/TJ	96.1
Oxidation factor	%	1.00
Baseline Emissions	**tCO_2**	**20,438**

Project Emission Calculations: 1.96 MW

Description	Units	Calculations
Net power generation from NG based Engine	kW	1880
Auxiliary Consumption	%	4
Gas engine Operation days	Days	333
Power Generation from NG engine plant per annum	MU	15.67
Efficiency of NG engine plant	%	41.00

Net Calorific value of NG	kcal/SCM	8,350
Annual NG required	SCM	3,935,543.55
Energy Content	TJ	137.58574
Emission factor of NG	TC/TJ	15.30
	tCO_2/TJ	56.1
Oxidation factor	%	1.00
Project Emissions	**tCO_2**	**7,719**

Leakages:

LE = 0 tCO_2e

Emission Reduction Calculations:

Emission Reductions = **12,719** tCO_2 e

Baseline Calculations: 3.9 MW

Description	Units	Calculations
Net power demand from Coal based power plant	kW	3791
Auxiliary Consumption	%	10
Coal Power plant Operation	Days	330
Power Generation from coal power plant per annum	MU	33.4
Efficiency of coal based power plant	%	28
Net Calorific value (NCV) of coal	kcal/kg	5,085
Annual coal quantity required	MT	20,151
Total Energy Content from coal	TJ	430
Emission factor of coal	TC/TJ	26.20
	tCO_2/TJ	96.1

Oxidation factor	%	1.00
Baseline Emissions	**tCO_2**	**41,213**

Project Emission Calculations: 3.9 MW

Description	Units	Calculations
Net power generation from NG based Engine	kW	3791
Auxiliary Consumption	%	2.3
Gas engine Operation days	Days	333
Power Generation from NG based Engine	MU	31.0
Efficiency of NG engine plant	%	42.85
Net Calorific value of NG	kcal/SCM	8,350
Annual NG required	SCM	7,461,228.79
Energy Content	TJ	260.84292
Emission factor of NG	TC/TJ	15.30
	tCO_2/TJ	56.1
Oxidation factor	%	1.00
Project Emissions	**tCO_2**	**14,633**

CDM – Executive Board

Leakages:

LE = 0 tCO_2e

Emission Reduction Calculations:

Emission Reductions = **26,579** tCO_2 e

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

>>

Project Activity 1 – 1.96 MW

Year	Estimation of project Activity Emissions (tCO_2e)	Estimation of baseline Emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2008-09	7,719	20,438	0	12,719
2009-10	7,719	20,438	0	12,719
2010-11	7,719	20,438	0	12,719
2011-12	7,719	20,438	0	12,719
2012-13	7,719	20,438	0	12,719
2013-14	7,719	20,438	0	12,719
2014-15	7,719	20,438	0	12,719
2015-16	7,719	20,438	0	12,719
2016-17	7,719	20,438	0	12,719
2017-18	7,719	20,438	0	12,719
Total	**77,1900**	**2,04,380**	**0**	**1,27,190**

Project Activity 2 - 3.9 MW

Year	Estimation of project Activity Emissions (tCO_2e)	Estimation of baseline Emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2008-09	14,633	41,213	0	26,579
2009-10	14,633	41,213	0	26,579
2010-11	14,633	41,213	0	26,579
2011-12	14,633	41,213	0	26,579
2012-13	14,633	41,213	0	26,579

2013-14	14,633	41,213	0	26,579
2014-15	14,633	41,213	0	26,579
2015-16	14,633	41,213	0	26,579
2016-17	14,633	41,213	0	26,579
2017-18	14,633	41,213	0	26,579
Total	**1,46,330**	**4,12,130**	0	**2,65,790**

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

>>

B.7.1 Data and parameters monitored:

>>

Project Activity data and parameters for 1.96 MW Natural Gas engine

Data / Parameter:	Q_{ng}
Data unit:	SCM
Description:	Annual quantity of natural gas consumed
Source of data to be used:	Gas Engine log book
Value of data	3.9 MMSCM
Description of measurement methods and procedures to be applied:	Monitoring: Monitoring and Measurement with NG flow meter on the natural gas line of the gas engine Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Daily Responsibility: Shift In charge would be responsible for monitoring and checks for periodic calibration of measuring instruments. Calibration Frequency: Calibration is carried out annually by the competent agency
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	PG_{ng}
Data unit:	MU
Description:	Power generated by gas engine
Source of data to be used:	Gas Engine log book
Value of data	15.67
Description of measurement methods and procedures to be	Monitoring: Energy meter of the power generated by Genset is sealed by electricity authority to prevent tampering

applied:	Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Daily Responsibility Shift In charge would be responsible for monitoring and checks for periodic calibration of measuring instruments. Calibration Frequency: The Energy meter is calibrated annually by government approved laboratory or agency
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	AU_{ng}
Data unit:	MU
Description:	Auxiliary power units consumed by gas engine
Source of data to be used:	Gas Engine log book
Value of data	0.4
Description of measurement methods and procedures to be applied:	Monitoring: Energy meter of the Auxiliary power consumed by Genset is sealed by electricity authority to prevent tampering Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Daily Responsibility Shift In charge would be responsible for monitoring and checks for periodic calibration of measuring instruments. Calibration Frequency: The Energy meter is calibrated annually by government approved laboratory or agency
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	NCV_{ng}
Data unit:	kcal/SCM
Description:	Net calorific value of Natural gas
Source of data to be used:	Gas Engine log book
Value of data	8350
Description of measurement methods and procedures to be applied:	Monitoring: NG supplier Contract Value document and measurement / analysis at supplier end Data type: Measured Archiving procedure: Paper / Electronic

	Recording Frequency: Available from NG supplier on fortnightly basis Responsibility: Section Head would be responsible for monitoring and checks. Calibration Frequency: Not applicable
QA/QC procedures to be applied:	
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	EF_{ng}
Data unit:	tCO_2/TJ
Description:	Emission Factor of Natural Gas
Source of data to be used:	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion.
Value of data	56.1
Description of measurement methods and procedures to be applied:	Monitoring: Not applicable Data type: Estimated Archiving procedure: Paper / Electronic Recording Frequency: Once in a year Responsibility: Section Head would be responsible for checking update in emission factor as per IPCC guidelines for GHG emissions. Calibration Frequency: Not applicable
QA/QC procedures to be applied:	
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	η_{ng}
Data unit:	%
Description:	Generation efficiency of Natural gas based power plant
Source of data to be used:	Contract document between Caterpillar and GGL.
Value of data	41
Description of measurement methods and procedures to be applied:	Monitoring: Actual and calculated based on efficiency formulae using heat rate of gas engine Data type: Calculated Archiving procedure: Paper / Electronic Recording Frequency: Once in 15 days Responsibility: Section Head Calibration Frequency: Not applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Project Activity data and parameters for 3.9 MW Natural Gas engine

Data / Parameter:	Q_{ng}
Data unit:	SCM
Description:	Annual quantity of natural gas consumed
Source of data to be used:	Plant log book
Value of data	7.4 MMSCM
Description of measurement methods and procedures to be applied:	Monitoring: Monitoring and Measurement with NG flow meter on the natural gas line of the gas engine Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Daily Responsibility: Shift In charge would be responsible for monitoring and checks for periodic calibration of measuring instruments. Calibration Frequency: Calibration is carried out annually by the competent agency
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	PG_{ng}
Data unit:	MU
Description:	Power generated by gas engine
Source of data to be used:	Plant log book
Value of data	31
Description of measurement methods and procedures to be applied:	Monitoring: Energy meter of the power generated by Genset is sealed by electricity authority to prevent tampering Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Daily Responsibility Shift In charge would be responsible for monitoring and checks for periodic calibration of measuring instruments. Calibration Frequency: The Energy meter is calibrated annually by government approved laboratory or agency

QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	AU_{ng}
Data unit:	MU
Description:	Auxiliary power consumed by gas engine
Source of data to be used:	Gas Engine log book
Value of data	0.86
Description of measurement methods and procedures to be applied:	Monitoring: Energy meter of the Auxiliary power consumed by Genset is sealed by electricity authority to prevent tampering Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Daily Responsibility Shift In charge would be responsible for monitoring and checks for periodic calibration of measuring instruments. Calibration Frequency: The Energy meter is calibrated annually by government approved laboratory or agency
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	NCV_{ng}
Data unit:	Kcal/SCM
Description:	Net calorific value of Natural gas
Source of data to be used:	Plant log book
Value of data	8350
Description of measurement methods and procedures to be applied:	Monitoring: NG supplier Contract Value document and measurement / analysis at supplier end Data type: Measured Archiving procedure: Paper / Electronic Recording Frequency: Available from NG supplier on fortnightly basis Responsibility: Section Head would be responsible for monitoring and checks. Calibration Frequency: Not applicable
QA/QC procedures to be applied:	
Any comment:	Data archived: Crediting period + 2 yrs

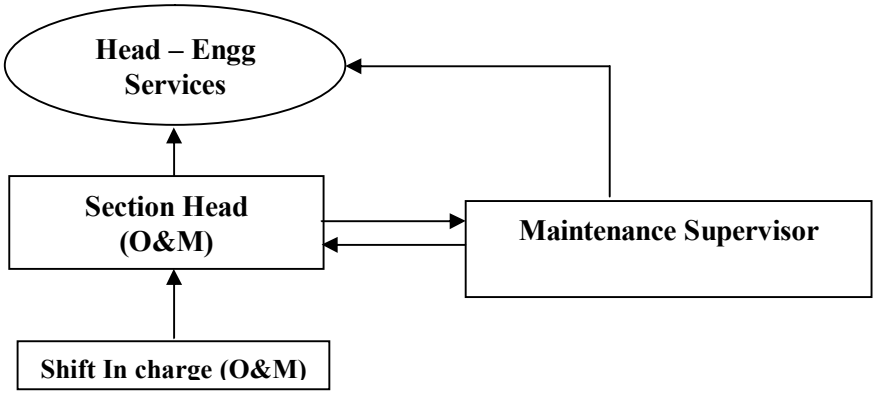
Data / Parameter:	EF_{ng}
Data unit:	tCO_2/TJ
Description:	Emission Factor of Natural Gas
Source of data to be used:	The emission factor data will be applied as per latest IPCC 2006 guidelines for National Greenhouse Gas Inventories for Stationary Combustion.
Value of data	56.1
Description of measurement methods and procedures to be applied:	Monitoring: Not applicable Data type: Estimated Archiving procedure: Paper / Electronic Recording Frequency: Once in a year Responsibility: Section Head would be responsible for checking update in emission factor as per IPCC guidelines for GHG emissions. Calibration Frequency: Not applicable
QA/QC procedures to be applied:	
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	η_{ng}
Data unit:	%
Description:	Generation efficiency of Natural gas based power plant
Source of data to be used:	Contract document between Deutz and GGL.
Value of data	42.85
Description of measurement methods and procedures to be applied:	Monitoring: Actual and calculated based on efficiency formulae using heat rate of gas engine Data type: Calculated Archiving procedure: Paper / Electronic Recording Frequency: Once in 15 days Responsibility: Section Head Calibration Frequency: Not applicable
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site

Any comment:	Data archived: Crediting period + 2 yrs

B.7.2 Description of the monitoring plan:

>>



Roles and Responsibilities:

Head – Engineering Services :

1. Ensuring implementation of monitoring procedures lay down for monitoring.
2. Internal audits and project conformance reviews.
3. Organizing and conducting training program on CDM and related activities for staff.
4. Implementing all monitoring control procedures
5. Associating with Section Head (O&M) towards O&M of NG engine and related measurement instruments
6. Reviewing records and monitored data.
7. Overall responsibility for correcting NOC and implementing corrective actions before verification.

Section Head (O&M):

1. To discuss and sort out matter related to engine and connected system with Head – Engineering Services.
2. Checks data logged by the Shift In charge.

3. Interacts with Shift In-charge engineers (O&M) and Maintenance Supervisor for smooth operation of Gas engine.
4. Maintain calculations, record handling and monitored data verification.
5. To look primarily in operation and maintenance cycle of the NG engine.

Shift In charge (O&M):

1. To monitor and ensure smooth operation of gas engine generator and connected system as per the guide lines provided by Section Head (O & M)
2. To follow the routine and schedule maintenance under the supervision of maintenance supervisor. To check data logged by the engine officer (O &M)
3. All shifts records to be forwarded to Section Head (O & M) for further processing.

Appropriate logbook and electronic system has been developed to maintain monitoring data parameters. A CDM team will be responsible for measuring and monitoring every given parameter in section B.7.1. Procedures for measurement of individual parameter, is a part of Good Management Practice[9] which GGL will follow. Training on operation and maintenance of gas engine has been regularly provided to the operators and Engineer is present during maintenance schedule and emergency as per the O&M requirements. The data is stored in log book and electronic form to keep transparency and quality in CDM data monitoring and management.

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

>>

Date of completing the final draft of this baseline and monitoring methodology:
31/12/2007

Name of person/entity determining the baseline and monitoring methodology:
Gujarat Glass Limited (GGL) and its associated consultants.

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:

>>
19/10/2005

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

>>
15 years 0 months

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

C.2.1. Renewable crediting period

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

>>
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:

>>
10 years and 0 months

C.2.2.2. Length:

>>
01/04/2008 or date of registration whichever is earlier

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

The Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S.O. 60(E) dated 14/09/2006 has listed a set of industrial activities in Schedule I of the notification which for setting up new projects or modernization/ expansion will require environmental clearance and will have to conduct an Environment Impact Assessment (EIA) study.

The project proponent does not require conducting EIA as the total investment including both gas engines is less than five hundred million Indian rupees.

The project does not have any major environmental impacts nor is the execution of an Environmental Impact Assessment required. However the beneficial aspects of the project are as follows: -

The project activity results in

- Greenhouse Gas Abatement
- Finite fossil fuel Resource Conservation
- Promoting sustainable development

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:

>>

There were no negative impacts envisage by the implementation of the project activity.

SECTION E. Stakeholders' comments

>>

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

>>

The project activity measure implemented at GGL utilises NG to generate power used in process requirement. The stakeholders for the project activity were identified and the stakeholders were duly informed of the consultation.

Important stakeholders identified are:

1. Nagar Palika representing local community
2. GGL Employees
3. Contractor
4. Gas Engine suppliers
5. Gas Supplier

The stakeholder consultation process was conducted by sending comment invitation letter to all the above identified stakeholders.

E.2. Summary of the comments received:

>>

The project activity was implemented inside the boundaries of GGLs Kosamba plant and did not require any displacement of local population. GGL has completed the necessary consultation with the relevant stakeholders and received positive comments.

GGL has received comments from companies supplying equipments and local Nagar Palika regarding the fuel shift from more carbon intensive fuel to less carbon intensive fuel. All the stakeholders have lauded the efforts made by GGL in quest towards reduced pollution and saving of fossil fuels.

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

>>

The local stakeholders have appreciated the CDM initiatives and applauded the effort towards clean energy generation at GGL. The stakeholders viewed GGL as a reputed company contributing to local environmental benefits and socio-economy through such initiatives. Overall there was unanimous agreement that the project activity was really a proactive initiative by the proponent, which contributes, to the sustainable development. Positive feed backs and comments have been received from different stakeholders listed above for GGL project activity. The PDD was web hosted for a period of one month for

global stakeholder comments. Clarifications for comments received have been addressed and a copy is provided to the validator.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Gujarat Glass Limited
Street/P.O.Box:	Ganpatrao Kadam Marg
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URL:	
Represented by:	
Title:	Vice President
Salutation:	Mr
Last Name:	Subramaniam
Middle Name:	S
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding received for the project activity.

Annex 3

BASELINE INFORMATION

As per section B

Annex 4

MONITORING INFORMATION

As per section B.7