CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

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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>.

SECTION A. General description of the small-scale project activity

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

>> Energy efficiency and fuel switch project based on technology up-gradation at Apollo Tyres, Vadodara, India.
Version 02
22/12/2005.

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

>> The project activity the installation of energy efficient dual fuel fired turbine with waste heat recovery boiler in the Vadodara tyre manufacturing site of ATL. The project activity primarily aims at reducing green house gas (GHG) emissions through increase in efficiency and fuel switch in power and steam production.

Prior to project implementation, electricity and steam were generated at the industrial site using 2 no. of furnace oil (FO) based diesel generating (DG) sets of 4.2 MW each & 5 No. of boilers (4 no 10 TPH and 1 no 20 TPH). With this configuration, the plant meets all its requirements for steam and most of its electricity needs. The remaining electrical demand fulfilled by the Gujarat state electricity board (SEB).

The project activity is to reduce the fossil fuel consumption by installing the dual fuel fired gas turbine and using the cleaner fuel for power generation. ATL has installed a dual fuel fired gas turbine based power generation system, in place of furnace oil fired reciprocating engine-cum-generating set. The overall efficiency of the system is better than the existing set. The gas turbine is using the natural gas for the power and steam generation; which is a cleaner fuel. The power and steam generation from the gas turbine has replaced the use of furnace oil (FO) in the boilers which were used for the steam generation. The project activity covers replacement of furnace oil with the natural gas in boilers. For the fuel switch project proponent used dual fuel fired burners which can use the Re-gassified Liquefied Natural Gas (RLNG) as a fuel. Therefore, the project activity reduces the GHG emissions, which were occurring from the use of FO in the system.

The project activity is helping in sustainable development in by GHG emission reduction. Project activity is using more efficient system and replacing the FO with the cleaner fuel and thus reducing the emissions in the atmosphere. The erection and commissioning of project has led to direct/ indirect employment to contactors/ sub-contactors and contract labours.

View of project participants on the contribution of the project activity to sustainable development:
Apollo Tyres Limited (ATL), which is the owner of the project activity, believes that the project activity has contributed and further potential to shape the economic, environmental and social life of the people in

the region. Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines[1] for CDM projects.

- Social well being
- Economic well being
- Environmental well being
- Technological well being

Social well being:

- Generated employment opportunities for the local people, both during construction and operation phases.

Economical well being:

- The project has created a business opportunity for local stakeholders such as suppliers, manufacturers, contractors etc.

Environmental well being:

- Since, the project uses clean fuel and efficient technology for power generation; it is leading to reduce emissions in the environment.
- The project activity is a step towards environmental sustainability by saving exploitation and depletion of a natural, finite and non-renewable resource like coal/gas.

Technological well being:

- The technology selected for the power project is the efficient gas turbine technology; which is a well proven technology.

A.3. Project participants:

>>

Table 1: Project participants of the CDM project activity

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)	Apollo Tyres Limited (ATL) (Private entity)	No

Corporate Office: Apollo Tyres Ltd.
Apollo House, 7 Institutional area, Sector-32,
Gurgaon, Harayana- 122002, India

[1] Ministry of Environment and Forest web site: http://envfor.nic.in/cdm/host_approval_criteria.htm

Telehone: +91 (124) 2383002-18
e-mail: info@apollotyres.com

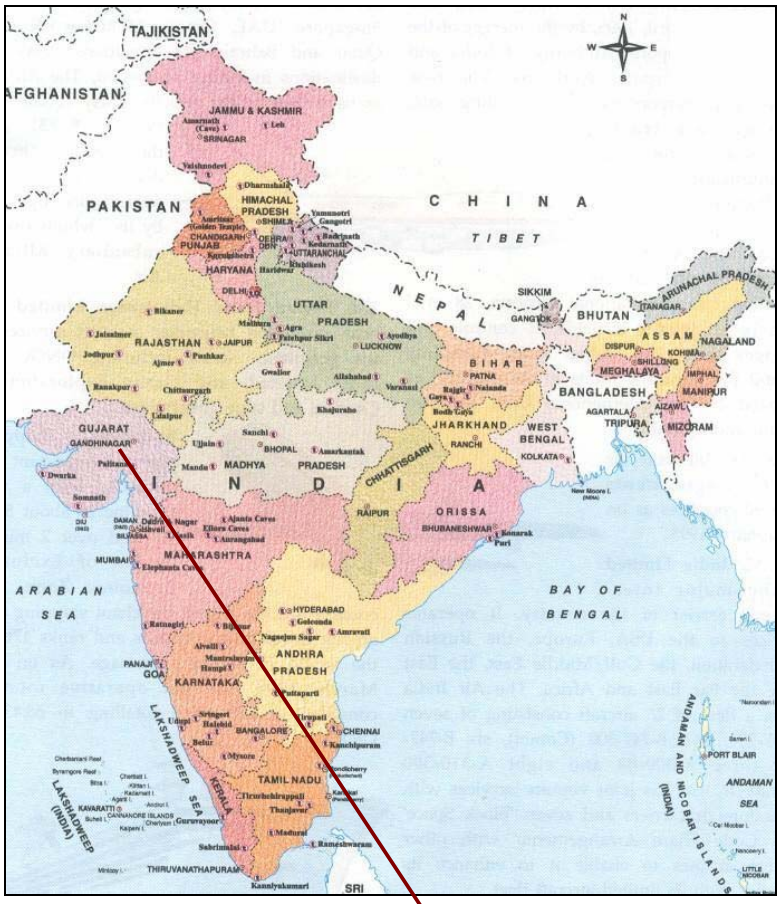
A.4. Technical description of the small-scale project activity:

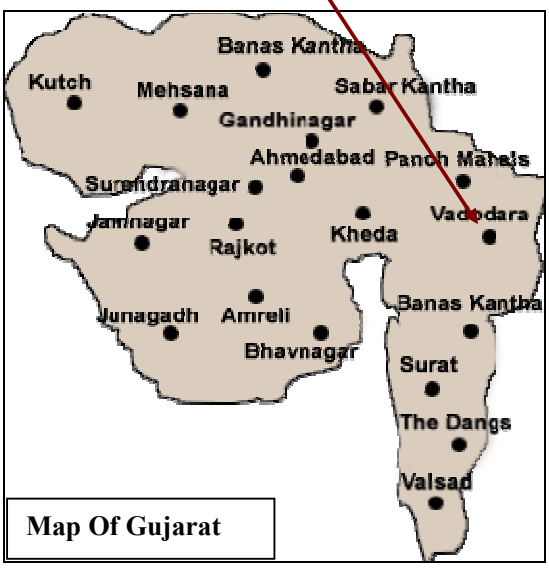
>>

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

>> The map, showing the physical location, is given on next page.

Location of project activity





Map Of Gujarat

A.4.1.1. Host Party(ies):

>> India

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

>> Gujarat

A.4.1.3. City/Town/Community etc:

>> Vadodara

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

>> The project activity is installed in the existing facility of ATL. The project activity is located at Limda, 25 km from the Vadodara city in Gujarat, India. Vadodara is located between latitude of 21°49' N to 22°49'N and longitude of 72°51' E to 74°17'E.

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

>> Type and Category of Project Activity

The project meets the applicability criteria of the small-scale CDM project activity category, Type-II: energy efficiency improvement projects (D: Energy efficiency and fuel switching measures for industrial facilities) of the 'Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories'.

Main Category: Type II – Energy efficiency improvement project

Sub Category: D Energy efficiency and fuel switching measures for industrial facilities

As per the provisions of appendix B of simplified modalities and procedures for small scale CDM project activities (version 07), Type II D "Comprises any energy efficiency and fuel switching measure implemented at a single industrial 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 processes (such as steel furnaces, paper drying, tobacco curing, etc.). The measures may replace existing equipment or be installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh_e per year. A total saving of 15 GWh_e per year is equivalent to a maximal saving of 45 GWh_{th} per year in fuel input."

As per paragraph 1 of II. D. of appendix B of the UNFCCC defined simplified modalities and procedures for small-scale CDM project activities, 'The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh_e per year. A total saving of 15 GWh_e per year is equivalent to a maximal saving of 45 GWh_{th} per year in fuel input'. The project activity will reduce the input thermal energy to the tune of 22 GWh, which is below the limit of small scale project activity of this category. The project proponent will be within the small scale limit for the same production in future also.

The baseline and emission reduction calculations from the project would be based on paragraphs 3 and 4 of appendix B (Version 07, dated 28th November 2005) and the monitoring methodology would be based on guidance provided in paragraph 6, 7 and 8 of II D of the same appendix B.

Project Activity with technology details

The ATL plant has substantial consumption of electrical energy and thermal energy in form of steam. The daily requirement of electricity is 0.22 million units and process steam requirement is 26 TPH.

Before the CDM project activity, the power requirement was partially fulfilled by the operation of two Diesel Generating (DG) Sets of 4200 kW rated capacity, fuelled by Furnace Oil (residual oil). The heat recovery boilers are installed on the exhaust gases of DG use to produce steam to the tune of about 1 Tones per Hour (TPH) each.

The CDM project was initiated with a view to upgrade the power generation technology with state-of-the-art energy efficiency and environment protection features. For this, one of the DG set was replaced with state-of-the-art Gas Turbine Generator (GTG) of 5500 kW rated capacity. The GTG is equipped with a heat recovering unit on its exhaust gases, which produces 11.6 TPH steam. Therefore, as a good environmental practice, the waste heat is recovered.

The technology employed is the dual fuel fired Gas Turbine Generator in cogeneration mode with the rated capacity of 5.5 MW. The GTG can be fired by fuels RLNG and High Speed Diesel (HSD). The gas turbine is operating with the RLNG since the commissioning of the project activity. The overall efficiency of this system is higher as compared to DG set based co-generation plant. The dual fuel fired Weishaupt burners have been installed in all boilers for the use of RLNG. These are the large burners with very good technical capabilities. The project activity is the installation of energy efficient gas based power generation technology with the dual fuel fired burners in the power and steam generation process.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

>> The project activity is reducing GHG emissions by using the higher efficiency power generation system with the additional steam available for the process application. The project activity will reduce the emission from the power generation due to high efficiency and less GHG fuel usage. The additional steam from the gas turbine will reduce the fuel consumption in the boiler which would have been used for the same steam production.

Apart from the energy efficiency the project activity will save the emission from the fuel switch i.e. from FO to RLNG. The FO is highly carbon intensive fuel with respect to RLNG; Using RLNG as fuel will reduce the equivalent emissions from the process.

In absence of project activity the pre-project scenario will prevail i.e. electricity generation by 2 nos. DG sets & steam generation by FO boilers. Therefore, on account of power production will high efficiency system with heat recovery to generate the steam and the fuel switch in existing boilers, the reduction in GHG emissions occurs in ATL.

Though the Ministry of Environment and Forest (MoEF), Ministry of Power (MoP) and Bureau of energy efficiency (BEE) in India encourage energy efficient operations, they do not require manufacturing industries to use specific technologies for power production or use of specific fuel. The project proponent has implemented the project activity over and above the national or sectoral requirements. The GHG reductions achieved by the project activity are additional to those directed by the governmental policies and regulations. The other "additionality" criteria of the project activity are dealt with in section B.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

>> The GHG emission reductions for a 10 year crediting period for ATL are provided in Tables 2.

Table 2 Emission reductions at ATL

Year	Annual estimation of emission reduction in tones of CO_2 e
2005	22627
2006	22627
2007	22627
2008	22627
2009	22627
2010	22627
2011	22627
2012	22627
2013	22627
2014	22627
Total estimated reductions (tonnes of CO_2 e)	**226270**
Total number of crediting years	**10 years**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**22,627**

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

>> There is no public funding available in this project.

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

>> 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.

According to para 2 of appendix C[2]

A proposed small-scale project activity shall be deemed to be a debundled 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:

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

According to above-mentioned points of de-bundling, ATL's project activity does not comply with above, therefore, considered as small scale CDM project activity.

[2] 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 methodology:

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

>> Main Category: **Type II – Energy efficiency improvement projects**

Sub Category: **II. D-Energy efficiency and fuel switching measures for industrial facilities**

The reference has been taken from the list of the small-scale CDM project activity categories contained in 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 7 (28th November 2005)'.

B.2 Project category applicable to the small-scale project activity:

>> The project activity fits under Type II.D – Energy efficiency and fuel switching measures for industrial facilities under Appendix B as it uses an efficient power generation system with the fuel switching measures for steam and power generation. The indicative simplified baseline and monitoring methodology applicable to category II.D has been used for the project including baseline calculations. The emission reduction calculation is based on specific emissions per unit of power generated or steam generated before and after the project activity. For the calculation of emissions related to steam use, IPCC values are used to estimate GHG emissions from fossil fuel used to produce steam. For estimation of emissions from the electricity generated by the GTG and DG set the IPCC emission factors are used.

For estimating emissions from grid electricity use, the electricity used is multiplied by an emission coefficient (measured in kg CO2equ/kWh) for the electricity displaced calculated in accordance with provisions of paragraphs 6 or 7 for category I.D projects[3], as per which the emission coefficient (measured in $kgCO_2/kWh$) is calculated in a transparent and conservative manner as under:

The average of the "approximate operating margin" and the "build margin", where,

i) The "approximate operating margin" is the weighted average emissions (in $kgCO_2equ/kWh$) of all generating sources surviving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

ii) The "build margin" is the weighted average emissions (in $kgCO_2equ/kWh$) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of the most recent[4] 20% of existing plants or the 5 most recent plants;

OR

The weighted average emissions (in $kgCO_2equ/kWh$) of current generation mix.

[3] Refer AMS II.C (ver 07, 28th November 2005)
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

[4] Generation data available for the most recent year

To assess the applicability of the relevant baseline methodology, a complete analysis of western regional electricity grid was carried out along with the study of various related issues like technology scenario, policy matters, which can further be used for preparation of baseline scenario and calculation of baseline emission factor of the grid. The information regarding baseline and project data is presented in the table below:

Table 3: Baseline and project activity data requirement and data source

S. No.	Parameter	Data source
Baseline Scenario		
1	Amount of Electricity imported from grid	Plant
2	Electricity emission factor	Published report for the quantity generated and IPCC emission factor
3	Amount of electricity generated from DG	Plant
4	Fuel consumption in DG	Plant
5	Calorific value of fuel	Plant /supplier
6	Emission factor of fuel used in DG	IPCC
7	Quantity of steam generated from boilers	Plant
8	Quantity of fuel used in boiler	Plant
9	Calorific value of fuel	Plant /supplier
10	Fuel emission factor	IPCC
11	Quantity of steam generated from DG waste heat recovery	Plant
Project Scenario		
12	Amount of Electricity imported from grid	Plant
13	Electricity emission factor	Published report for the quantity generated and IPCC emission factor
14	Amount of electricity generated from DG	Plant
15	Fuel consumption in DG	Plant
16	Calorific value of the fuel used	Plant/supplier
17	Emission factor of fuel used in DG	IPCC
18	Quantity of steam generated from boilers	Plant
19	Quantity of fuel used in boiler	Plant
20	Calorific value of fuel used	Plant /supplier
21	Fuel emission factor	IPCC
22	Quantity of steam generated from DG waste heat recovery	Plant
23	Quantity of electricity generated in GTG	Plant
24	Quantity of fuel used	Plant
25	Calorific value of fuel used	Plant /supplier

26	Fuel emission factor	IPCC
27	Quantity of steam produced from GTG	Plant

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

>> In accordance with paragraph 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 implementation of the project activity is a voluntary step undertaken by with no direct or indirect mandate by law.

The main driving force to this 'Climate change initiative' is:

- GHG reduction due to higher efficiency, enhanced waste heat recovery and low carbon intensive fuel
- the reduction in the fossil fuel quantities on account of better efficiencies

However, the project proponent was aware of the various barriers associated to project implementation. But it is realised that the availability of carbon financing against a sale consideration of carbon credits generated due to project activity would help to overcome these barriers. Some of the key barriers are discussed below:

Investment barrier

Alternatives to the project activity:

The other options for power generation for ATL were:

1. Power & steam generation by diesel generating (DG) sets (Current practice)
2. Power and steam Generation with GT using Natural Gas as fuel (CDM Project Activity)
3. Power and steam Generation with boiler and steam turbine using Indian coal as fuel.
4. Power and steam Generation with boiler and steam turbine using Petcoke and imported coal as fuel

Investment comparison analysis

Internal Rate of Return (IRR) of the CDM project activity and its two alternatives is calculated and comparison is made.

Calculation and comparison of financial indicators

The result of IRR calculations are as following.

IRR	*Power and steam Generation with GT using Natural Gas as fuel (CDM Project Activity)*	*Power and steam Generation with boiler and steam turbine using Indian coal as fuel.*	*Power and steam Generation with boiler and steam turbine using Petcoke and imported coal as fuel.*
IRR without CDM funds	44.36%	47.85%	46.85%
IRR with CDM funds	48.41%		

The detailed calculations can be referred from Excel Worksheet in Enclosure-1, Enclosure-2 and Enclosure-3. The assumptions taken for above CDM calculations are as follows.

1. The trend of fuel prices are assumed as follows.
   - Initial price of furnace oil Rs. 12000/MT with 10% escalation in Furnace oil (FO) price.
   - Initial price of NG Rs. 8.2/NM^3 with 10% Escalation in the price of NG for later five years of credit period.
   - Indian coal price Rs. 2700/MT, Petcoke price Rs. 3000/MT with 6% escalation in price of both fuels.
   - Initial price of grid power Rs. 5.3/kWh with price escalation 10% p.a.
2. Operation and Maintenance cost (3% of capital cost) is assumed to increase at 5% p.a..
3. Life of project is considered as 15 years.
4. CDM funds are available at the rate of 5.5 Euro/CER.

The IRR calculations are carried out for equivalent amount of electricity generation by all the power project alternatives. This means that a case for similar capacity Gas Turbines is considered for comparing with equivalent amount of electricity generation. Though, ATL has gone ahead with implementation of one project at the moment, the implementation of second gas turbine is also under active consideration of ATL management.

Sensitivity analysis:

Change in Assumptions related to fuel price	*IRR*	*Power and steam Generation with GT using Natural Gas as fuel (CDM Project Activity)*	*Power and steam Generation with boiler and steam turbine using Indian coal as fuel.*	*Power and steam Generation with boiler and steam turbine using Petcoke and imported coal as fuel.*

NG price rise in later 5 years: 12% p.a. Grid power price rise: 8% p.a. Indian coal /Petcoke price rise: 8% p.a. Furnace Oil Price rise : 8% p.a.	IRR without CDM funds	41.27%	44.41%	42.90%
	IRR with CDM funds	45.60%		
CER price of 6 Euro	IRR without CDM funds	44.36%	47.85%	46.85%
	IRR with CDM funds	48.79%		

Please refer Enclosure-4, Enclosure-5, Enclosure-6 and Enclosure-7 for sensitivity analysis.

The sensitivity analysis shows that in-spite of change in assumptions the CDM project remains a less attractive options. The results are interpreted as follows.

First Sensitivity Analysis shows that in spite of unfavorable deviation in fuel price trend, the CDM project remains less attractive as compared to coal based and petcoke based power generation projects. CDM funds help to improve the IRR of CDM project beyond petcoke based power generation project.

Second Sensitivity Analysis shows that the expected improvement in CER price will further improve the viability of CDM project over other alternatives.

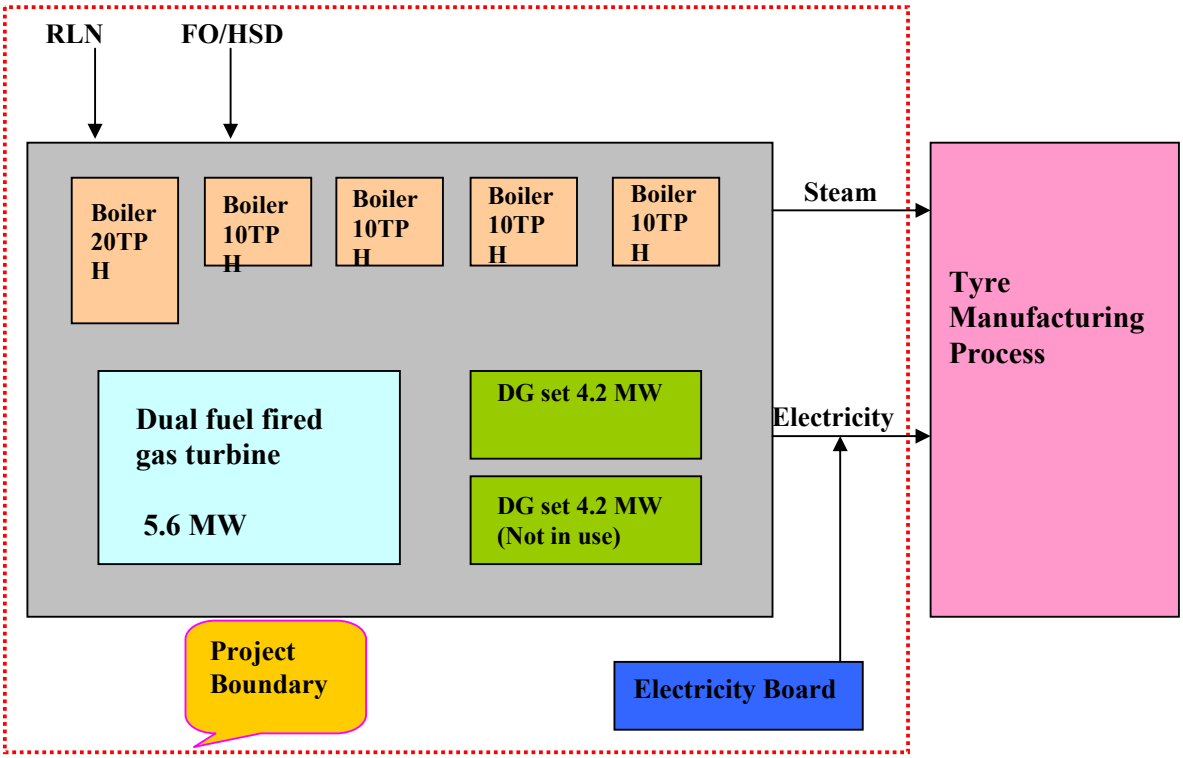
Other than costlier option there was huge investment of more than 10 million in the project activity. The plant was running in the normal operations with the sufficiently available power and steam demand. The investment in the project activity is a additional investment on the plant.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

>> The project boundary is power generation house and boiler house located within the plant (ATL) premises at Limda village, Vadodara. Following are the components of project boundary.

1. Boilers and Fuels used for steam generation.
2. Diesel Generator and fuel used for power generation
3. Turbo Generator and fuel used for power generation.
4. Electricity purchased from State Electricity Board (Power Grid).

Pictorial representation of the project boundary is given below:



B.5. Details of the baseline and its development:

>> **Date of completing the baseline:** 24/12/2005

Name of person/entity determining the baseline: Apollo Tyres Ltd. And their consultants

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>> 01/04/2003 (Construction start date)

C.1.2. Expected operational lifetime of the small-scale project activity:

>> 15 Years 0 month

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

>>

C.2.1. Renewable crediting period:

>> Not Applicable

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:

>> 01/01/2005

C.2.2.2. Length:

>> 10 years 0 month

SECTION D. Application of a monitoring methodology and plan:

>>

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

>> **Title:** Monitoring Methodology for the category II D – Energy efficiency and fuel switching measures for industrial facilities.

Reference: 'Paragraph 6 to 8' as provided in Type II.D. of Appendix B of the simplified modalities and procedures for small-scale CDM project activities - Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

>> As established in Section A.4.2 the project activity falls under Category II.D. Energy efficient power and steam generation leads to mitigation of GHG emissions that would have been produced by the inefficient operation. In order to monitor the mitigation of GHG due to the project activity, the fuel used and electricity/steam generated quantities need to be measured. The project activity is the installation of new equipment and retrofit of existing equipment. The monitoring methodology covers both the aspects i.e. new equipment and retrofit.

In the monitoring plan mainly following data is monitored:

1. Energy use/Energy generated of all the equipments.
2. Fuel used for generation of electricity and steam.
3. Electricity imported from electricity board.

Based on the monitored data and the IPCC emission factors the baseline emissions and project activity emissions are calculated.

There is no technology transfer in the project activity therefore the project activity doesn't lead to any leakage emissions. The difference between the baseline and project emissions is reported as emission reduction from the project activity.

D.3 Data to be monitored:

>>

Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
Monitoring parameters in gas turbine								
P.1	*Quantity of fuel used*	*Plant*	*ScuM or ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
P.2	*Calorific value of fuel*	*Plant*	*GJ/ScuM or GJ/ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
P.3	*Quantity of electricity generated*	*Plant*	*KWh*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
P.4	*Quantity of steam generated by waste heat boiler*	*Plant*	*Ton steam*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
Monitoring for electricity from electrical grid								
P.5	*Quantity of electricity purchased from electricity grid*	*Plant*	*KWh*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
P.6	*CO_2 operating margin*		*Kg CO_2 /kWh*	*Calculated*	*Yearly*	*100%*	*Electronic*	*Determine Simple operating margin, as defined in UNFCCC approved consolidated methodology ACM000. For detailed calculations refer*

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	emission factor for the grid							*Enclosure-8.Calculate updated value for each year.*
P.7	*CO_2 build margin emission factor for the grid*		*Kg CO_2 /kWh*	*Calculated*	*Yearly*	*100%*	*Electronic*	*Determine build margin, as defined in ACM0002. For detailed calculations refer Enclosure-8. Calculate updated value for each year.*
P.8	*CO_2 combined margin emission factor for the grid*		*Kg CO_2 /kWh*	*Calculated*	*Yearly*	*100%*	*Electronic*	*Determine the average of operating and build margin. For detailed calculations refer Enclosure-8.*
Monitoring of electricity generated from DG sets								
P.9	*Quantity of fuel used*	*Plant*	*Ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
P.10	*Calorific value of fuel*	*Plant*	*GJ/ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
P.11	*Quantity of electricity generated*	*Plant*	*KWh*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
P.12	*Quantity of steam generated by waste heat recovery*	*Plant*	*ton steam*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
Monitoring of steam generation from boiler								
P.13	*Quantity of*	*Plant*	*Ton*	*Measured*	*Monthly*	*100%*	*Paper &*	

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
	fuel used						*Electronic*	
P.14	*Calorific value of fuel*	*Plant*	*GJ/ton*	*Measured*	*Each consignment*	*100%*	*Paper & Electronic*	*Calorific value of fuel to be taken from supplier (if reputed supplier such as Indian Oil, Gas Authority of India Limited (GAIL) etc.), or to be tested from some reputed laboratory on consignment to consignment basis. Monthly average to be calculated.*
P.15	*Quantity of steam generated by waste heat recovery*	*Plant*	*ton steam*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	

Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
Monitoring for electricity from electrical grid								

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B.1	*Quantity of electricity purchased from electricity grid*	*Plant*	*KWh*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
B.2	*CO_2 operating margin emission factor for the grid*		*Kg CO_2 /kWh*	*Calculated*	*Yearly*	*100%*	*Electronic*	*Determine Simple operating margin, as defined in ACM0002 and interpreted in Annex 3 of this PDD. Calculate updated value for each year.*
B.3	*CO_2 build margin emission factor for the grid*		*Kg CO_2 /kWh*	*Calculated*	*Yearly*	*100%*	*Electronic*	*Determine build margin, as defined in ACM0002 and interpreted in Annex 3 of this PDD. Calculate updated value for each year.*
B.4	*CO_2 combined margin emission factor for the grid*		*Kg CO_2 /kWh*	*Calculated*	*Yearly*	*100%*	*Electronic*	*Determine the average of operating and build margin.*
Monitoring of electricity generated from DG sets								
B.5	*Quantity of fuel used*	*Plant*	*Ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
B.6	*Calorific value of fuel*	*Plant*	*GJ/ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B.7	*Quantity of electricity generated*	*Plant*	*KWh*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
B.8	*Quantity of steam generated by waste heat recovery*	*Plant*	*ton steam*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	
Monitoring of steam generation from boiler								
B.9	*Quantity of fuel used*	*Plant*	*Ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
B.10	*Calorific value of fuel*	*Plant*	*GJ/ton*	*Measured*	*Monthly*	*100%*	*Paper & Electronic*	
B.11	*Quantity of steam generated by waste heat recovery*	*Plant*	*ton steam*	*Measured*	*Continuous recording & monthly reporting*	*100%*	*Paper & Electronic*	

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
P.1	*Low*	*ISO 9001 or similar type of quality system is required.*
P.2	*Low*	*ISO 9001 or similar type of quality system is required.*
P.3	*Low*	*ISO 9001 or similar type of quality system is required.*
P.4	*Low*	*ISO 9001 or similar type of quality system is required.*
P.5	*Low*	*ISO 9001 or similar type of quality system is required.*
P.6	*Low*	*Data received from government.*
P.7	*Low*	*Data received from government.*
P.8	*Low*	*Data received from government.*
P.9	*Low*	*ISO 9001 or similar type of quality system is required.*
P.10	*Low*	*ISO 9001 or similar type of quality system is required.*
P.11	*Low*	*ISO 9001 or similar type of quality system is required.*
P.12	*Low*	*ISO 9001 or similar type of quality system is required.*
P.13	*Low*	*ISO 9001 or similar type of quality system is required.*
P.14	*Low*	*ISO 9001 or similar type of quality system is required.*
P.15	*Low*	*ISO 9001 or similar type of quality system is required.*
B.1	*Low*	*ISO 9001 or similar type of quality system is required.*
B.2	*Low*	*Data received from government.*
B.3	*Low*	*Data received from government.*
B.4	*Low*	*Data received from government.*
B.5	*Low*	*ISO 9001 or similar type of quality system is required.*
B.6	*Low*	*ISO 9001 or similar type of quality system is required.*
B.7	*Low*	*ISO 9001 or similar type of quality system is required.*
B.8	*Low*	*ISO 9001 or similar type of quality system is required.*
B.9	*Low*	*ISO 9001 or similar type of quality system is required.*
B.10	*Low*	*ISO 9001 or similar type of quality system is required.*
B.11	*Low*	*ISO 9001 or similar type of quality system is required.*

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>> Emission monitoring and calculation procedure will follow the following organisational structure. All data and calculation formula required to proceed is given in the section D in PDD.

Organisational structure for monitoring plan

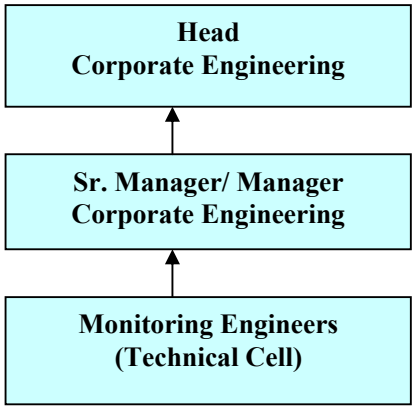


Table --: Monitoring and calculation activities and responsibility

Monitoring and calculation activities	Procedure and responsibility
Data source and collection	Data is taken from the purchase, materials and accounting system. Most of the data is available in quality management system.
Frequency	Monitoring frequency should be as per section D of PDD.
Review	All received data is reviewed by the engineers in the technical cell.
Data compilation	All the data is compiled and stored in technical cell.
Emission calculation	Emission reduction calculations will be done annual based on the data collected. Engineers of technical cell will do the calculations
Review	Sr. Manager/Manager, Corporate Engineering will review the calculation.
Emission data review	Final calculations is reviewed and approved by Head Corporate engineering.
Record keeping	All calculation and data record will be kept with the technical cell.

D.6. Name of person/entity determining the monitoring methodology:

>> Apollo Tyres Limited & their associated consultants

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>> No formulae for GHG emission reduction is specified for Category I.D of Appendix B of the Simplified Modalities and Procedures for Small-scale CDM Project Activities.

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>> **Project emission calculation:**

Step 1: Specific Emission factor for each generation device

1. For Turbine generator

$$PSEF_{TG} = [(F_i \times CV_i \{EF_i + (MEF_i \times GWP(CH_4)) + (NEF_i \times GWP(N_2O))\}] / Elect_{Proj-TG}$$

Where

$PSEF_{TG}$ = Project specific emission factor for turbine generator (Equ. Kg CO_2/kWh)

Fi = Consumption of fuel *i* used in the project scenario (ton or SCuM)

CVi = Calorific value of fuel *i* used in the project scenario (GJ/Scum or GJ/ton)

EFi = Carbon dioxide emission factor per unit energy of fuel *i* (e.g. $kgCO_{2e}$/GJ) (combustion)

MEFi = Methane emission factor per unit energy of fuel *i* (e.g. tCH_4/GJ) (combustion)

GWP (CH_4) = Global warming potential (GWP) global warming potential of CH_4 set as 21 tCO_{2e}/tCH_4 for the 1st commitment period

NEF = Nitrous oxide emission factor per unit energy of fuel *i* (e.g. tN_2O/GJ) (combustion)

GWP (N_2O) = Global warming potential of N_2O set as 310 tCO_{2e}/tN_2O for the 1st commitment period

$Elect_{proj-TG}$ = Electricity generated by turbine generator in project scenario

2. For diesel generator

$$PSEF_{DG} = [(F_i \times CV_i \{EF_i + (MEF_i \times GWP(CH_4)) + (NEF_i \times GWP(N_2O))\}] / Elect_{Proj-DG}$$

Where

$PSEF_{DG}$ = Project specific emission factor for diesel generator (Equ. Kg CO_2/kWh)

Fi = Consumption of fuel *i* used in the project scenario (ton or SCuM)

CVi = Calorific value of fuel *i* used in the project scenario (GJ/Scum or GJ/ton)

EFi = Carbon dioxide emission factor per unit energy of fuel *i* (e.g. $kgCO_{2e}$/GJ) (combustion)

MEFi = Methane emission factor per unit energy of fuel *i* (e.g. tCH_4/GJ) (combustion)

GWP (CH_4) = Global warming potential (GWP) global warming potential of CH_4 set as 21 tCO_{2e}/tCH_4 for the 1st commitment period

NEF = Nitrous oxide emission factor per unit energy of fuel *i* (e.g. tN_2O/GJ) (combustion)
GWP (N_2O) = Global warming potential of N_2O set as 310 tCO_{2e}/tN_2O for the 1st commitment period
$Elect_{proj-DG}$ = Electricity generated by diesel generator in project scenario

3. For Boiler

$$PSEF_{Boiler} = [(F_i \times CV_i \{EF_i + (MEF_i \times GWP(CH_4)) + (NEF_i \times GWP(N_2O))\}] / Steam_{proj-Boiler}$$

Where
$PSEF_{Boiler}$ = Project specific emission factor for steam generating boiler (Equ. Kg CO_2/ton of steam)
Fi = Consumption of fuel *i* used in the project scenario (ton or SCuM)
CVi = Calorific value of fuel *i* used in the project scenario (GJ/Scum or GJ/ton)
EFi = Carbon dioxide emission factor per unit energy of fuel *i* (e.g. $kgCO_{2e}/GJ$) (combustion)
MEFi = Methane emission factor per unit energy of fuel *i* (e.g. tCH_4/GJ) (combustion)
GWP(CH_4) = Global warming potential (GWP) global warming potential of CH4 set as 21 tCO_{2e}/tCH_4 for the 1st commitment period
NEF = Nitrous oxide emission factor per unit energy of fuel *i* (e.g. tN_2O/GJ) (combustion)
GWP (N_2O) = Global warming potential of N_2O set as 310 tCO_{2e}/tN_2O for the 1st commitment period
$Steam_{proj-Boiler}$ = Steam generated by boiler (tonnes) in project scenario

Step 2: Annual project emission

$$E_{Project} = [PSEF_{TG} \times Elect_{Project-TG} + PSEF_{DG} \times Elect_{Project-DG} + PSEF_{Boiler} \times Steam_{Project-Boiler} + Elect_{proj-Grid} \times EF_{Grid}] / 1000$$

Where
$E_{project}$ = Emissions from the project activity (ton CO_2)
$Elec_{proj-Grid}$ = Electricity purchased from grid (kWh)
EF_{Grid} = Grid Emission factor (kg CO_2/kWh)

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>> There is no technology transfer in project activity. No leakage is envisaged in project activity.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>> It will remain same as project emissions.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>> **Baseline emission calculation:**

Step 1: Specific Emission factor for each generation device

1. For diesel generator

$$BSEF_{DG} = [(F_i \times CV_i \{EF_i + (MEF_i \times GWP(CH_4)) + (NEF_i \times GWP(N_2O))\}] / Elect_{Base-DG}$$

Where

$BSEF_{DG}$ = Baseline specific emission factor for diesel generator (Equ. Kg CO_2/kWh)

Fi = Consumption of fuel *i* used in the project scenario (ton or SCuM)

CVi = Calorific value of fuel *i* used in the project scenario (GJ/Scum or GJ/ton)

EFi = Carbon dioxide emission factor per unit energy of fuel *i* (e.g. $kgCO_{2e}$/GJ) (combustion)

MEFi = Methane emission factor per unit energy of fuel *i* (e.g. tCH_4/GJ) (combustion)

$GWP(CH_4)$ = Global warming potential (GWP) global warming potential of CH_4 set as 21 tCO_{2e}/tCH_4 for the 1st commitment period

NEF = Nitrous oxide emission factor per unit energy of fuel *i* (e.g. tN_2O/GJ) (combustion)

GWP (N_2O) = Global warming potential of N_2O set as 310 tCO_{2e}/tN_2O for the 1st commitment period

$Elect_{Base-DG}$ = Electricity generated by diesel generator in baseline scenario

2. For Boiler

$$BSEF_{Boiler} = [(F_i \times CV_i \{EF_i + (MEF_i \times GWP(CH_4)) + (NEF_i \times GWP(N_2O))\}] / Steam_{Base-Boiler}$$

Where

$BSEF_{Boiler}$ = Baseline specific emission factor for steam generating boiler (Equ. Kg CO_2/ton of steam)

Fi = Consumption of fuel *i* used in the project scenario (ton or SCuM)

CVi = Calorific value of fuel *i* used in the project scenario (GJ/Scum or GJ/ton)

EFi = Carbon dioxide emission factor per unit energy of fuel *i* (e.g. kgCO2e/GJ) (combustion)

MEFi = Methane emission factor per unit energy of fuel *i* (e.g. tCH_4/GJ) (combustion)

$GWP(CH_4)$ = Global warming potential (GWP) global warming potential of CH_4 set as 21 tCO_{2e}/tCH_4 for the 1st commitment period

NEF = Nitrous oxide emission factor per unit energy of fuel *i* (e.g. tN_2O/GJ) (combustion)

GWP (N_2O) = Global warming potential of N_2O set as 310 tCO_{2e}/tN_2O for the 1st commitment period

$Steam_{Base-Boiler}$ = Steam generated by boiler (tonnes) in baseline scenario

Step 2: Annual baseline emission

$$E_{Baseline} = [BSEF_{DG} \times (Elect_{Proj-DG} + Elect_{Proj-TG}) + BSEF_{Boiler} \times Steam_{Proj-Boiler} + Elect_{proj-Grid} \times EF_{Grid} + (Steam_{Proj-TG} + Steam_{Proj-DG} - Steam_{Base-DG}) \times BSEF_{Boiler}] / 1000$$

Where

$E_{project}$ = Emissions from the project activity (ton CO_2)

$Elec_{proj-Grid}$ = Electricity purchased from grid in project scenario (kWh)

EF_{Grid} = Grid Emission factor (kg CO_2/kWh)
Steam $_{Proj-TG}$ = Steam generated by the turbine generator waste heat in project scenario (tonnes)
Steam $_{Proj-DG}$ = Steam generated by the diesel generator waste heat in project scenario (tonnes)
Steam $_{Base-DG}$ = Steam generated by the diesel generator waste heat in baseline scenario (tonnes)

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

CO_2 emission reduction due to project activity = (Baseline emission) - (Project emissions)

E.2 Table providing values obtained when applying formulae above:

>>

Year	Estimation of project activity emission reductions (tonnes of CO_2 e)	Estimation of baseline emission reductions (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
2005	79949	102576	22627
2006	79949	102576	22627
2007	79949	102576	22627
2008	79949	102576	22627
2009	79949	102576	22627
2010	79949	102576	22627
2011	79949	102576	22627
2012	79949	102576	22627
2013	79949	102576	22627
2014	79949	102576	22627
Total estimated reductions (tonnes CO_2 equ.)	**799490**	**1025760**	**226270**
Total no of Crediting Years	10 years	10 years	10 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**79949**	**102576**	**22627**

SECTION F.: Environmental impacts:

F.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 27/01/94 has listed a set of industrial activities in Schedule I[5] 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. However, the project under consideration does not require any EIA to be conducted as the activity is not included in Schedule I.

Article 12 of the Kyoto Protocol requires that a CDM project activity contribute to the sustainable development of the host country. Assessing the project activity's positive and negative impacts on the local environment and on society is thus a key element for each CDM project.

ATL's CDM project activity ensures maximum global and local benefits in relation to certain environmental and social issues and is a small step towards sustainable development.

The primary objective of the project is to reduce the emission in tyre manufacturing process. By this way project activity reduces environmental impacts related to emissions from steam and power consumption. The project activity does not have any significant negative environmental impact at the site. The GHG emission reductions from project activity benefit the global environment. The short summary of environmental impacts is given in table.

Environmental Impact Assessment table

SL. NO.	ENVIRONMENTAL IMPACTS & BENEFITS	REMARKS
A	CATEGORY: ENVIRONMENTAL – AIR QUALITY	
1.	The project activity is using natural gas as fuel for steam and power generation. Natural gas is cleanest fossil fuel, so the activity has reduced the emissions based on the DG set earlier.	The project activity reduces emission of CO_2 -a global entity.
B	CATEGORY: ENVIRONMENTAL –WATER	
1	The project activity does not contribute to water pollution.	
D	CATEGORY: ENVIRONMENTAL – NOISE GENERATION	
1	The project activity does not contribute to noise pollution.	-

SECTION G. Stakeholders' comments:

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

>> ATL had organised stakeholder consultation meetings with local stakeholders, employees in the area with the objective to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity. Invitation for stakeholder consultation meetings were sent out requesting the members to participate and communicate any suggestions/objections regarding the project activity.

The other stakeholders identified for the project activity were as under:

1. Local population
2. Employees
3. State pollution control board
4. Consultants
5. GAIL
6. Equipment suppliers

Stakeholders list includes the government and non-government parties, which are involved in the project activity at various stages. At the appropriate stage of the project development, consulted/would consult stakeholders / relevant bodies to get the comments. The comments received are available on request.

G.2. Summary of the comments received:

>> Local population comprises of the local people in and around the project area. The project does not require displacement of any local population. The distance between the electrical substation for power evacuation and the plant is very less, hence installation of transmission lines would not create any inconvenience to the local population.

Thus, the project will not cause any adverse social impacts on local population. ATL has already completed the necessary consultation and documented the approval by local population for the project.

GSPCB has prescribed standards of environmental compliance and monitors the adherence to the standards. GSPCB have issued Consent to Establish (CTE) and consent to operate (CTO).
Projects consultants were involved in the project activity to take care of the various pre contract and post contract issues / activities like preparation of basic and detailed engineering documents, preparation of tender documents, and selection of vendors / suppliers. They would be further involved in supervision of project operation, implementation, successful commissioning and trial run.

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

[5] http://www.envfor.nic.in/legis/eia

>> In view of various direct and indirect benefits (economical, environmental), no concerns were raised during the consultation with stakeholders. The relevant comments and important clauses mentioned in the project documents like Detailed Project Report (DPR), environmental clearances, local clearance, etc. were considered in the preparation of CDM project design document.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Apollo Tyres Limited
Street/P.O.Box:	Limda
Building:	
City:	Vadodara
State/Region:	Gujarat
Postfix/ZIP:	
Country:	India
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FAX:	91-2668-262588
E-Mail:	krpillai@apollotyres.com
URL:	
Represented by:	
Title:	Head - Corporate Engineering
Salutation:	Mr.
Last Name:	Pillai
Middle Name:	Radhakrishna
First Name:	K
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding received for the project.

Annex 3

Baseline Information

Baseline data of August 2004

POWER, STEAM AND FUEL RECORD FOR THE MONTH OF AUG-04									
DATE	TOTAL DG POWER (kWh)	TOTAL DG FUEL (Lts)	GEB (kWh	TOTAL POWER (kWh)	Steam from Boiler MT	Steam from WHRB 1 (MT)	Steam from WHRB 2 (MT)	Total Steam generation (MT)	Total fuel consumption for steam
1-Aug-2004	152300	38310	56700	209000	641.33	33.254	33.254	707.8382	44.692
2-Aug-2004	153310	38690	55950	209260	660.66	31.28	31.28	723.2197	46.039
3-Aug-2004	153535	38800	63480	217015	640.283	34.659	34.659	709.6007	44.619
4-Aug-2004	150215	38000	61470	211685	646.997	31.412	31.412	709.821	45.0869
5-Aug-2004	156250	39520	53400	209650	593.487	31.23	31.23	655.9473	41.358
6-Aug-2004	156175	39280	57510	213685	644.961	32.127	32.127	709.2148	44.945
7-Aug-2004	93900	24080	125910	219810	662.898	15.3425	15.3425	693.5833	46.195
8-Aug-2004	154400	38790	61140	215540	658.837	27.689	27.689	714.2152	45.912
9-Aug-2004	108818	27970	101790	210608	656.685	19.002	19.002	694.6887	45.762
10-Aug-2004	156968	39570	62970	219938	656.756	29.002	29.002	714.7605	45.767
11-Aug-2004	151504	38170	59610	211114	651.892	33.092	33.092	718.0758	45.428
12-Aug-2004	157353	39680	60330	217683	664.405	23.271	23.271	710.947	46.3
13-Aug-2004	157010	39480	60300	217310	664.606	27.73	27.73	720.0659	46.314
14-Aug-2004	155101	39090	56040	211141	662.496	27.203	27.203	716.9025	46.167
15-Aug-2004	23840	6910	32070	55910	267.929	4.6785	4.6785	277.2859	18.671
16-Aug-2004	151906	38360	59160	211066	620.236	26.601	26.601	673.4377	43.222
17-Aug-2004	155421	39120	60240	215661	639.407	29.225	29.225	697.8573	44.558
18-Aug-2004	152787	38570	63360	216147	599.73	28.479	28.479	656.6876	41.793
19-Aug-2004	149720	37810	59070	208790	682.314	27.802	27.802	737.9178	47.548
20-Aug-2004	153455	38720	63090	216545	630.166	28.16	28.16	686.4859	43.914
21-Aug-2004	152850	38490	62220	215070	639.077	27.495	27.495	694.0673	44.535
22-Aug-2004	146970	37220	63210	210180	624.11	27.116	27.116	678.3422	43.492
23-Aug-2004	154330	38970	59940	214270	640.455	29.509	29.509	699.4729	44.631
24-Aug-2004	152860	38450	65880	218740	745.181	31.852	31.852	808.8852	51.929
25-Aug-2004	153525	38750	69420	222945	511.836	31.108	31.108	574.0518	35.668
26-Aug-2004	151150	38190	66360	217510	664.764	29.286	29.286	723.3358	46.325
27-Aug-2004	154425	38790	66570	220995	611.798	29.267	29.267	670.3319	42.634
28-Aug-2004	11571	3250	23550	35121	0	0	0	0	0
29-Aug-2004	0	0	12390	12390	0	0	0	0	0
30-Aug-2004	16515	4330	39960	56475	0	0	0	0	0
31-Aug-2004	102484	25710	93420	195904	561.51	27.732	27.732	616.974	44.051
Average	147730	37281	66242.2	213973	639.884	28.5158	28.51576	696.9158	44.773515

Baseline data of September 2004

POWER, STEAM AND FUEL RECORD FOR THE MONTH OF Sep-04									
DATE	TOTAL DG POWER (kWh)	TOTAL DG FUEL (Lts)	GEB (kWh	TOTAL POWER (kWh)	Steam from Boiler MT	Steam from WHRB 1 (MT)	Steam from WHRB 2 (MT)	Total Steam generation (MT)	Total fuel consumption for steam
1-Sep-2004	150897	37880	63300	214197	556.245	27.26	27.26	610.763	42.168
2-Sep-2004	138152	34950	79770	217922	573.446	28.83	28.83	631.11	44.343
3-Sep-2004	152629	38380	68340	220969	549.491	28.13	28.13	605.757	40.875
4-Sep-2004	154485	38400	68040	222525	561.917	29.04	29.04	619.988	43.4525
5-Sep-2004	153301	38960	68340	221641	586.688	28.15	28.15	642.984	43.4525
6-Sep-2004	154540	38970	69750	224290	568.045	29.05	29.05	626.153	44.262
7-Sep-2004	146639	37150	65190	211829	713.8	28.03	28.03	769.866	43.398
9-Sep-2004	147212	37120	61260	208472	648	25.52	25.52	699.03	42.911
9-Sep-2004	150500	38010	66600	217100	704.7	24.75	24.75	754.206	43.986
10-Sep-2004	154585	38940	70050	224635	706	28.84	28.84	763.686	45.917
11-Sep-2004	133480	33910	89610	223090	659	23.56	23.56	706.12	43.405
12-Sep-2004	154325	38740	69060	223385	648	27.14	27.14	702.274	43.405
13-Sep-2004	153225	38720	70680	223905	662	28.03	28.03	718.054	46.034
14-Sep-2004	152110	38360	70230	222340	667.5	26.50	26.50	720.494	46.04
15-Sep-2004	148050	37270	68130	216180	680.4	24.42	24.42	729.248	46.847
16-Sep-2004	151750	38610	70080	221830	620	26.81	26.81	673.62	46.325
17-Sep-2004	154325	38450	72330	226655	585	35.33	35.33	655.656	44.454
19-Sep-2004	155725	39170	70230	225955	785	34.10	34.10	853.2	45.411
19-Sep-2004	156275	39330	65910	222185	759	31.68	31.68	822.356	45.411
20-Sep-2004	157822	39930	66000	223822	707	30.35	30.35	767.7	54.208
21-Sep-2004	154913	39100	68730	223643	668	30.02	30.02	728.044	35.695
22-Sep-2004	159962	40160	65700	225662	671	29.63	29.63	730.266	45.571
23-Sep-2004	157773	39800	63150	220923	679	29.30	29.30	737.594	44.526
24-Sep-2004	160385	40390	68280	228665	702	29.66	29.66	761.318	44.708
25-Sep-2004	161283	40540	69240	230523	709	29.80	29.80	768.603	53.377
26-Sep-2004	161751	40660	69660	231411	711	27.21	27.21	765.422	38.205
27-Sep-2004	155885	39380	66720	222605	701	33.21	33.21	767.424	43.699
29-Sep-2004	160031	40340	71340	231371	713	33.61	33.61	780.222	46.423
29-Sep-2004	156555	39420	72420	228975	687	32.82	32.82	752.646	44.333
30-Sep-2004	158985	40020	72930	231915	661	31.83	31.83	724.666	45.281
Average	153585	38702	69369	222954	661.4411	29.0873	29.0873	719.6157	44.6041

Baseline data of October 2004

POWER, STEAM AND FUEL RECORD FOR THE MONTH OF OCT-04									
DATE	TOTAL DG POWER (kWh)	TOTAL DG FUEL (Lts)	EB (kWh	TOTAL POWER (kWh)	Steam from Boiler MT	Steam from WHRB 1 (MT)	Steam from WHRB 2 (MT)	Total Steam generation (MT)	Total fuel consumption for steam (KL)
1-Oct-2004	160515	40250	69960	230475	631	31.41	31.41	693.82	46.616
2-Oct-2004	160000	40150	70050	230050	646	31.24	31.24	708.48	46.889
3-Oct-2004	161845	40580	67560	229405	642	31.42	31.42	704.83	46.889
4-Oct-2004	161375	40460	70200	231575	629	30.11	30.11	689.23	46.865
5-Oct-2004	125595	31940	106260	231855	647	21.53	21.53	690.06	47.778
6-Oct-2004	159025	39680	66750	225775	651	33.78	33.78	718.57	47.931
7-Oct-2004	162725	40560	69090	231815	632	33.64	33.64	699.27	47.277
10-Oct-2004	160875	40210	70140	231015	639	30.49	30.49	699.98	45.757
10-Oct-2004	162125	40520	72120	234245	675	33.26	33.26	741.51	48.314
10-Oct-2004	163840	40760	68760	232600	660.2	31.82	31.82	723.84	47.752
11-Oct-2004	166129	41370	69630	235759	643.4	29.33	29.33	702.05	46.129
12-Oct-2004	165964	41120	71550	237514	631	31.48	31.48	693.97	48.296
13-Oct-2004	160357	39940	69480	229837	648.3	29.57	29.57	707.43	49.254
14-Oct-2004	165296	41190	69090	234386	621.5	30.54	30.54	682.57	46.482
15-Oct-2004	160600	40050	73650	234250	628.6	30.59	30.59	689.78	47.204
16-Oct-2004	159752	39750	64950	224702	626.1	28.03	28.03	682.16	47.355
17-Oct-2004	157228	39150	64590	221818	642	30.81	30.81	703.62	45.996
18-Oct-2004	152427	38060	73680	226107	635.6	29.28	29.28	694.16	48.914
19-Oct-2004	149372	36820	65340	214712	607	27.74	27.74	662.49	43.914
20-Oct-2004	150670	37680	77910	228580	585	28.60	28.60	642.2	45.3
21-Oct-2004	140660	35400	64260	204920	584	34.18	34.18	652.35	42
22-Oct-2004	140965	35480	68010	208975	534.3	33.13	33.13	600.56	38.936
23-Oct-2004	149220	37480	65070	214290	549.6	31.78	31.78	613.16	42.077
24-Oct-2004	149845	37670	66390	216235	551.5	30.95	30.95	613.39	42.555
25-Oct-2004	150745	37840	73080	223825	568	29.09	29.09	626.19	43.2
26-Oct-2004	148925	37430	83310	232235	580	27.80	27.80	635.6	42.6
27-Oct-2004	148275	37260	84300	232575	585.1	29.63	29.63	644.36	42.406
28-Oct-2004	149175	37450	89160	238335	602.8	29.33	29.33	661.45	43.223
29-Oct-2004	148350	37260	83070	231420	601.9	30.77	30.77	663.43	42.5
30-Oct-2004	105600	26650	127380	232980	593.8	28.40	28.40	650.6	44.331
31-Oct-2004	152850	38270	78840	231690	597.5	28.2	28.2	653.9	42.5
Avergae	153236.3	38336	74633.2	227869.5	615.14	30.25469	30.255	675.64	45.395

Annex 4
Calculations

Certified Emission Reduction from waste heat recovery project at Apollo Tyres, Vadodara, Gujarat, India												
Elecctricity & steam Generation scenario	**Units**	**Baseline**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Gas turbine												
Calorific value (LCV) of fuel used	GJ/SCuM		0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Electricity generated by the fuel used	kWh		30129655	30129655	30129655	30129655	30129655	30129655	30129655	30129655	30129655	30129655
Fuel consumption in Gas turbine	SCuM		10855100	10855100	10855100	10855100	10855100	10855100	10855100	10855100	10855100	10855100
Quantity of steam generated from the waste heat	Tons		73000	73000	73000	73000	73000	73000	73000	73000	73000	73000
Net emission factor	Equ kg CO_2/GJ		56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
Specific emissions	Kg CO_2/kWh		0.715	0.715	0.715	0.715	0.715	0.715	0.715	0.715	0.715	0.715
Power from GEB												
Total power imported from GEB	kWh	25579565	25781775	25781775	25781775	25781775	25781775	25781775	25781775	25781775	25781775	25781775
Emission factor	Kg CO_2/kWh	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760
Power generation from DG												
Total power generated	Kwh	53188165	26631860	26631860	26631860	26631860	26631860	26631860	26631860	26631860	26631860	26631860
Quantity of steam generated from the waste heat	Tons	20440	9490	9490	9490	9490	9490	9490	9490	9490	9490	9490
Total fuel consumption	Ton	12443.9	6253.3	6253.3	6253.3	6253.3	6253.3	6253.3	6253.3	6253.3	6253.3	6253.3
Calorific value (LCV) of fuel used	GJ/ton	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13
Net emission factor	Equ kg CO_2/GJ	77.6	77.6	77.6	77.6	77.6	77.6	77.6	77.6	77.6	77.6	77.6
Specific emissions	Kg CO_2/kWh	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Steam generation from boiler												
Total steam generation required (Based on the Baseline)	Tons	224110	141620	141620	141620	141620	141620	141620	141620	141620	141620	141620
Quantity of FO required	tonnes	14709.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Calorific value of FO	GJ/ton	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13	40.13
Emission factor	Equ kgCO_2/GJ	77.60	77.60	77.60	77.60	77.60	77.60	77.60	77.60	77.60	77.60	77.60
Quantity of steam generated	tonnes		153665	153665	153665	153665	153665	153665	153665	153665	153665	153665
Quantity of RLNG required	SCuM		10581715	10581715	10581715	10581715	10581715	10581715	10581715	10581715	10581715	10581715
Calorific value of RLNG	GJ/SCuM		0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Emission factor	Equ kgCO_2/GJ		56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
Specific emissions	Kg CO_2/ton of steam	204.39	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61	136.61
Baseline emissions	Ton CO_2/annum		102576	102576	102576	102576	102576	102576	102576	102576	102576	102576
Project activity emissions	Ton CO_2/annum		79949	79949	79949	79949	79949	79949	79949	79949	79949	79949
Annual Emission reduction	Ton CO_2/annum		**22627**	**22627**	**22627**	**22627**	**22627**	**22627**	**22627**	**22627**	**22627**	**22627**

Appendix A: Abbreviations

ATL	Apollo Tyres Limited
BM	Build Margin
CEA	Central Electricity Authority
CTE	Consent to Establish
CTO	Consent to Operate
CO_2	Carbon dioxide
DG	Diesel generating set
EIA	Environment Impact Assessment
FO	Furnace Oil
GHG	Greenhouse gas
IPCC	Inter Governmental Panel On Climate Change
Kg	Kilogram
Km	Kilometer
kW	Kilo watt
kWh	Kilo watt hour
MW	Mega watt
MNES	Ministry of Non Conventional Energy Sources
OM	Operating Margin
PDD	Project design document
RLNG	Re-gassified Liquified Natural Gas
UNFCCC	United Nations Framework Convention on Climate Change

Appendix B: List of References

- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Website of United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int
- UNFCCC document: Clean Development Mechanism, Simplified Project Design Document For Small Scale Project Activities (SSC-PDD), Version 02
- UNFCCC document: Simplified modalities and procedures for small–scale clean development mechanism project activities
- UNFCCC document: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, Version 07, 28th November 2005
- UNFCCC document: Determining the occurrence of de-bundling
- Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual
- http://mnes.nic.in
- http://cea.nic.in/

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