

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

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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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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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Reduction in specific energy consumption ratio by installation of energy efficient direct melt technology in PET film manufacturing unit at, Uttaranchal, India

Version: 03

Date: 08/12/2010

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

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Polyplex Corporation Limited (PCL) is one of India's leading manufacturers and exporters of Biaxially Oriented Polyester (BOPET) Film for packaging, electrical and other industrial applications. Polyplex was incorporated in 1984 and commenced commercial operations with its first Film line of 4000 TPA in May 1988. Globally Polyplex is present in India, Thailand and Turkey and its existing capacity is 110,000 MTPA making it the world's fourth largest producer of thin polyester film. Being a company with a global customer base, PCL realizes that energy conservation and environmental benign activities are key parameters for sustaining its business. With sustainability underpinning its business strategies, PCL continuously explores opportunities for energy conservation and Green House Gas (GHG) emission reduction.

Purpose of the project activity

The PCL project activity is an energy efficient process using the direct melt technique for producing BOPET films. The project activity involves the green-field installation of direct melt continuous process instead of the commonly used conventional chips manufacturing and extrusion batch process for production of BOPET films. This avoids the installation of Extruder, Crystallizer, Feeder and Dehumidifier which would be present in the conventional process thus leading to energy savings.

This kind of adoption of a new processing technology is an initiative taken up by PCL and is first of its kind in the country. In spite of the limitations and technical problems associated with the technology the Project proponent has decided to introduce it in his plant as an initiative for environment protection by saving energy.

Project's contribution in sustainable development

The project activity assists the host country in achieving sustainable development. The project activity is also oriented towards social and environmental benefits. The sustainable development indicators for the project activity are:

Social well being: Project activity would be generating direct and indirect employment for the unskilled / semi skilled and skilled persons, during different stages of the project- design, construction and implementation.

Environmental well being: Project activity would reduce the fossil fuel consumption and hence leads to resource sustainability. The project activity would reduce CO₂ (GHG) emissions, thus helping in abating global warming.

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Economic well-being: Project activity would result in conservation of fossil fuel and natural resources, thereby benefiting the economy.

Technological well being: Project activity would employ unique technology which is first of its kind and unconventional in Indian polyester industry. The project activity has good replication potential in Indian polyester industry.

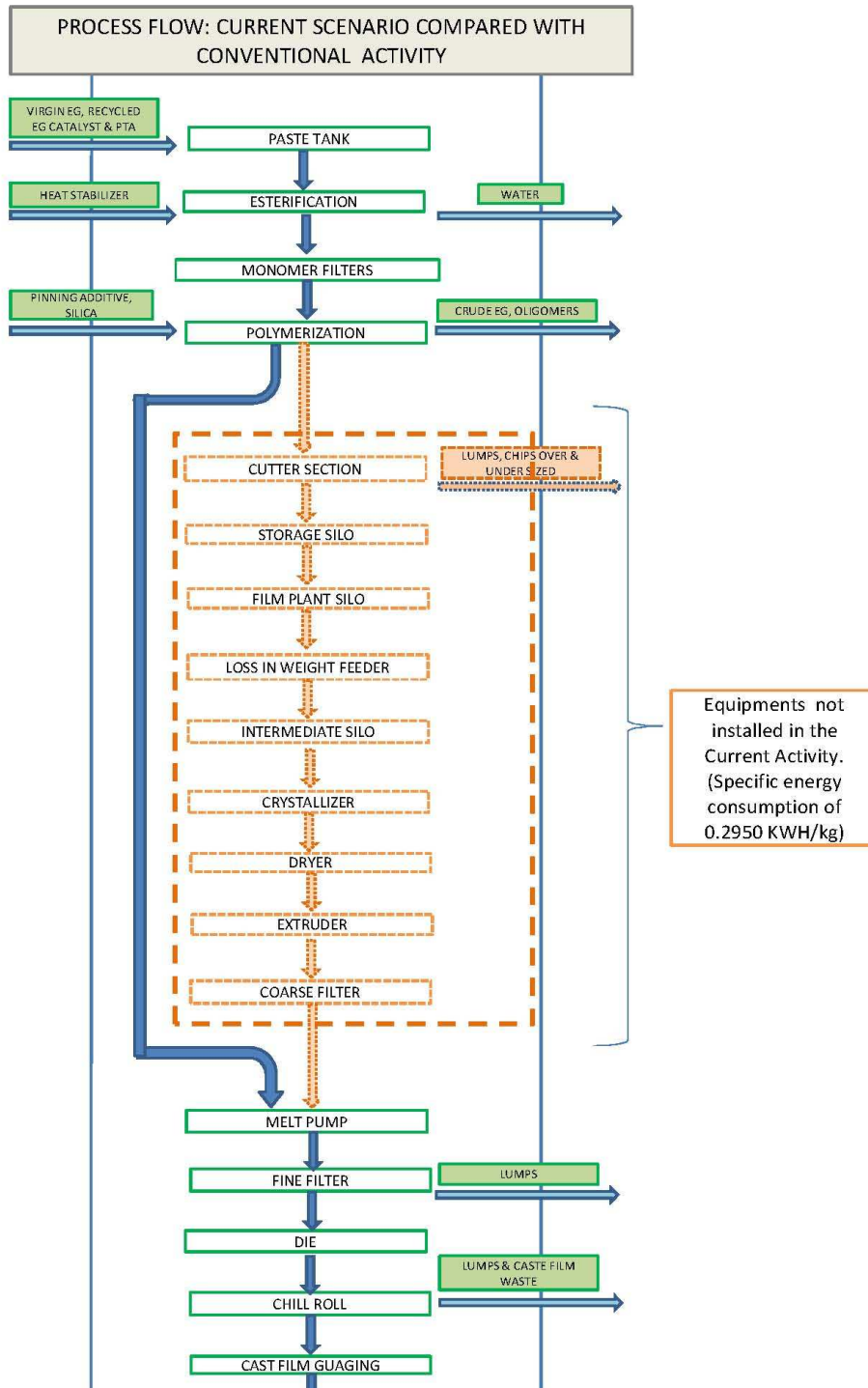
A.3. <u>Project participants:</u>
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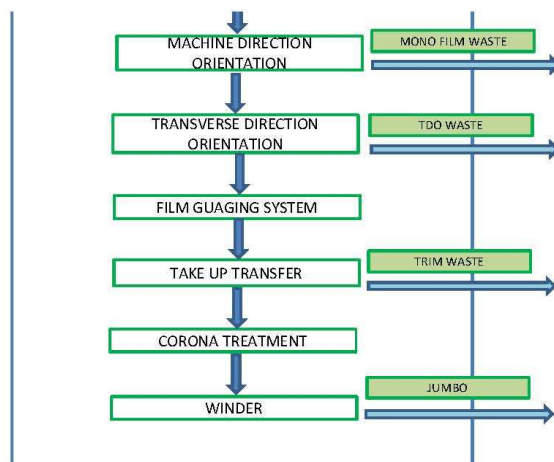
Name of Party involved (*) (host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Polyplex Corporation Limited (Private)	No

A.4. <u>Technical description of the small-scale project activity:</u>

The technology in the project activity would involve installation of a new Direct Melt film production line instead of the Conventional production process (involving chips production and extrusion) for production of BOPET Films. This avoids the installation of Extruder, Crystallizer, Feeder and Dehumidifier that would be present in the Conventional process. The melt polymer from melt polymer filter will be directly fed into the melt pump. This change of production from the Conventional process to a Direct Melt results in energy efficiency, reducing the specific energy requirement for production of BOPET films.



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

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The project activity is located at the BOPET film manufacturing facility of PCL at Uttarakhand erstwhile Uttaranchal.

A.4.1.1. Host Party(ies):

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India

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

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Uttarakhand erstwhile Uttaranchal

A.4.1.3. City/Town/Community etc:

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Udham Singh Nagar

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 project activity is located at:

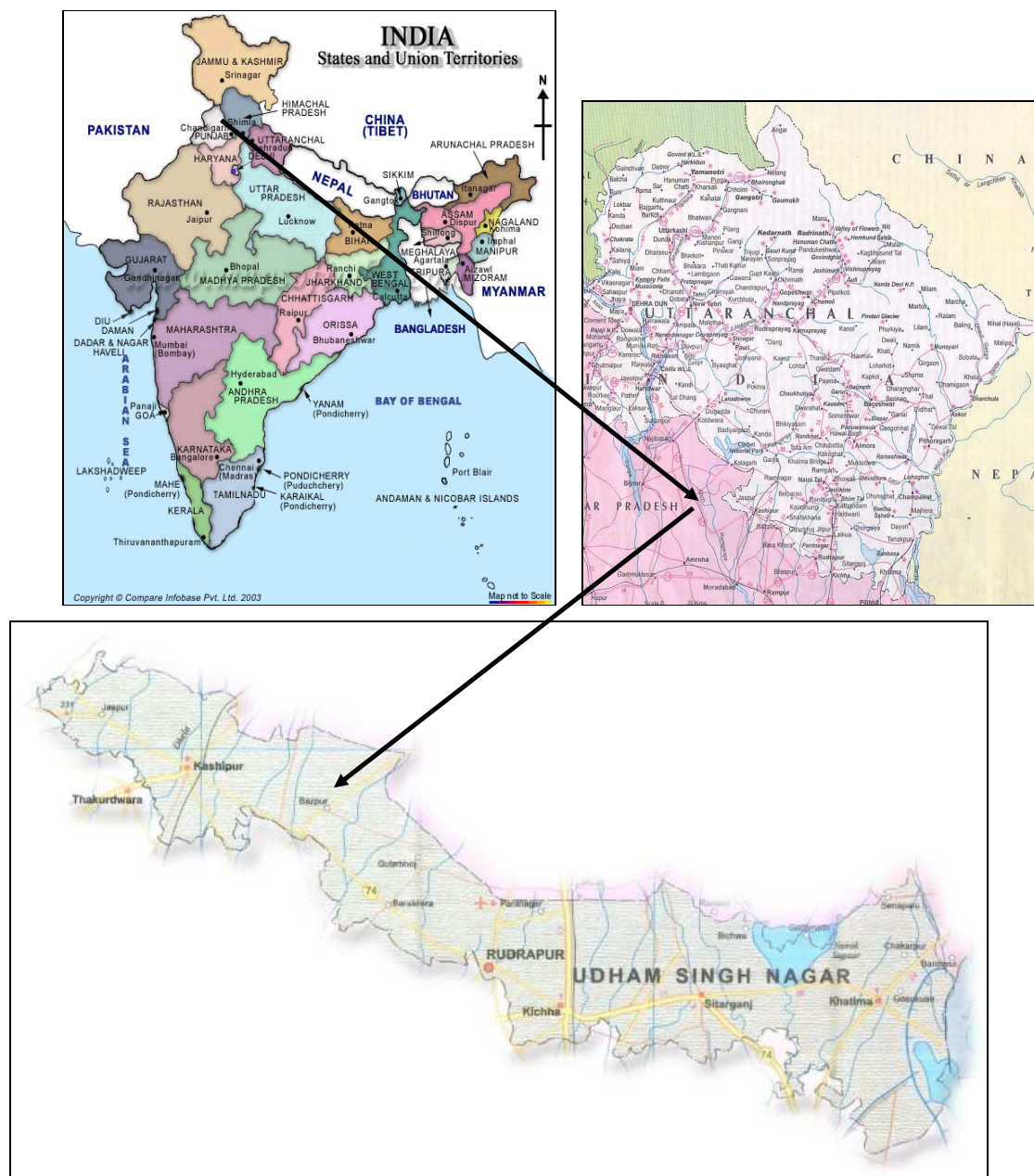
Village: Bazpur
 District: Udham Singh Nagar
 State: Uttarakhand erstwhile Uttaranchal

The location is well connected by rail and roadways. The exact geographical coordinates of the plant site are:

Latitude: 29.17° N
 Longitude: 79.16°E

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The pictorial representation of the geographical location of the project activity can be depicted from the following maps:



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

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The category for the project activity according to the “Appendix B - Indicative Simplified Baseline and monitoring Methodologies for Selected Small Scale CDM Project Activities” is as follows:

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Type-II: *Energy efficiency improvement projects***Category II.D:** *Energy efficiency and fuel switching measures for industrial facilities, (ver 11, EB 35)***Technology of the project activity**

The project activity involves the installation of the direct melt line for manufacturing BOPET film instead of the conventional chips production and extrusion process. The energy efficiency in the manufacturing unit is achieved by removing the Extruder, Crystallizer, Feeder and Dehumidifier with a direct melt manufacturing system. The absence of these equipments will lead to reduction in consumption of energy and thus reducing the specific energy consumption of manufactured product and thus becomes an energy efficient solution.

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

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Years	Annual estimation of emission reductions in tones of CO ₂ e
2010	7,703
2011	7,703
2012	7,703
2013	7,703
2014	7,703
2015	7,703
2016	7,703
2017	7,703
2018	7,703
2019	7,703
Total estimated reductions (tCO₂ e)	77,030
Total number of crediting years	10 years
Annual average reductions over the crediting period (tCO₂ e)	7,703

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

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There is no public funding involved from Parties included in Annex I / ODA.

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

Appendix C of 'Simplified modalities and procedures for small-scale CDM project activities' corresponds to the procedures for determining the occurrence of debundling. According to Annex C 'Determining the Occurrence of Debundling' - '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 full project activity or any component of the full project activity shall follow the regular CDM modalities and procedures.

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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, PCL project activity is not a de-bundled component of a large project activity.

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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The baseline and monitoring methodology used for this project activity is:

Type II: Energy efficiency improvement projects.

Category D: Energy efficiency and fuel switching measures for industrial facilities, (AMS II.D. version 11, EB 35)

Reference: UNFCCC website

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

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As per the 'Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories' project activity falls under **Type II- Energy efficiency improvement projects and Category II.D. - Energy efficiency and fuel switching measures for industrial facilities, (version 11, EB 35).**

According to AMS II.D methodology,

- *The 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 GWh_e per year. A total saving of 60 GWh_e per year is equivalent to a maximal saving of 180 GWh_{th} per year in fuel input.*

The project activity fulfils all the requirements of the applied methodology in ensuing manner:

1. The project activity is installed in single industrial facility i.e. PCL, Uttarakhand plant
 2. The project activity involves energy efficiency measures by installing the Direct Melt process instead of the conventional chips production and extrusion process.
 3. The estimated energy savings from the project activity are 9.63 GWh_e per annum and will not exceed 60 GWh_e per annum.
- *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).*

It is possible to directly measure and record the energy use within the project boundary which has been defined as the BOPET Film line up to Melt Pump. The measurement equipment in the project consists of a positive displacement pump (Extrex-140 GP) that is used for pumping of virgin molten polymer. The pump has a DC Induction Proximity Switch that measures the number of revolutions

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which is used to calculate the mass of molten polymer input and consequently the energy use within the project boundary in the baseline scenario.

The project activity using the Direct Melt process avoids the installation of an extruder, crystallizer, feeder and dehumidifier in the project boundary which results in energy savings. The energy consumed in the rest of the film making process would be the same in both the Conventional and the Direct Melt processes. Therefore no metering of energy consumption in the project activity is required and the energy savings can be directly calculated as the product of the specific energy consumption values of the absent equipments and the total quantity of BOPET film extruded in the project activity.

- *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).*

The impact of the measures implemented by the project activity can be clearly distinguished from changes and the energy use due to other variables not influenced by the project activity. The project activity avoids the installation of Extruder, Crystallizer, Feeder and Dehumidifier from the conventional process and the energy consumption in these equipments can be clearly measured by project participant. The energy consumed in the rest of the film making process would be the same in both the conventional and the direct melt process. Specifically, there is no increase in energy consumption in the rest of the film making process while using direct melt process as compared to the conventional process. Thus when the entire film making process is taken into consideration, there is a saving in energy consumption in making Polyester film by the Direct Melt Process which is equal to the energy that would have been consumed by the equipments not installed in the Direct Melt process.

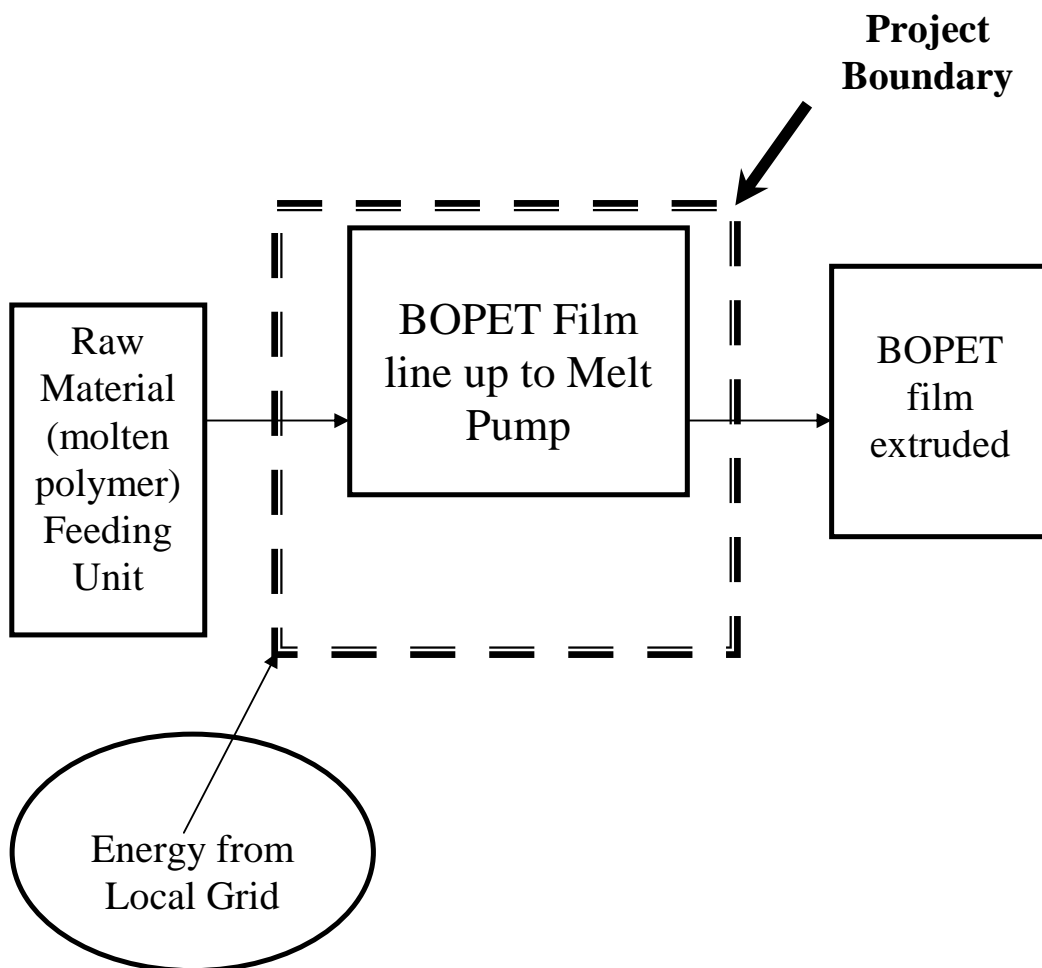
Thus the project activity fulfils all the applicability conditions of the methodology.

B.3. Description of the project boundary:
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As per paragraph 2 of the AMS II.D (Version 11, EB 35), the project boundary encompasses the physical, geographical site of the industrial or mining and mineral production facility, processes or equipment that are affected by the project activity.

The project boundary for the project activity is shown below:



B.4. Description of baseline and its development:

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As per the methodology AMS II.D (version 11, EB 35) Para 5, the baseline for Energy efficiency and fuel switching measures for industrial facilities would be as follows:

“In the case of removal, 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 is a new facility constructed by PCL using the direct melt technology. In the absence of the initiatives taken by PCL, the new facility would have been installed with the Conventional chip manufacturing and extrusion batch process. Thus the baseline of the project activity is the Conventional manufacturing process for BOPET film.

Further, it may be noted that the lifetime of the equipments used in the Conventional chip manufacturing and extrusion batch process is a minimum of 20 years. Hence, in the situation that the Conventional baseline equipment was installed in the facility, there would have been no possibility of it being

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replaced, modified or retrofitted with the new direct melt technology before the end of the proposed crediting period of 10 years.

Emission Factor of the NEWNE Grid for Electricity Reduction activities

As per AMS II.D 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.”

Accordingly, present generation mix for grid with sector wise installed capacities, emission co-efficient and generation efficiencies are used to arrive at the net emission coefficient of the chosen grid. The provisions require the emission factor (measured in tCO₂e/MWh) to be calculated in a transparent and conservative manner as:

- (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the ‘Tool to calculate the emission factor for an electricity system’.

OR

- (b) The weighted average emissions (in kg CO₂e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The emission coefficient for the electricity displaced has been calculated / considered in accordance with CO₂ Baseline Database for the Indian Power Sector Version 4.0 from Central Electricity Authority (CEA), Ministry of Power, India¹. The baseline emission factor is calculated and fixed ex-ante based on a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) for the NEWNE Grid.

$$EF_{\text{NEWNE}} = 0.8 \text{ tCO}_2/\text{MWh}$$

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:

As per the decision 17/CP.7 paragraph 43, a CDM project activity is additional if anthropogenic emissions of greenhouse-gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

The project activity includes energy efficiency measures with net CO₂ emission reductions through reduced electricity consumption for the manufacturing process being carried out at the plant to manufacture BOPET film. PCL identified plausible project options, which include all possible courses of actions that could be adopted. These plausible options were further analyzed to establish project additionality and determine an appropriate baseline scenario.

The two general plausible alternatives available for the projects with PCL were:

Alternative I: Continuation of current situation;

No energy efficient direct melt process implemented in the greenfield manufacturing units of PCL. In the above alternative PCL would continue with the existing equipments / technologies for their manufacturing process. This alternative is in compliance with all applicable legal and regulatory requirements. This alternative is a prevailing practice in this sector and has been operative at PCL’s other

¹ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

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manufacturing units from a long time. There is no technological or other barriers associated with its implementation and is a plausible baseline alternative.

Alternative 2- Implementation of the project activity as energy efficiency measures at the PCL units without the CDM benefits.

This alternative is in compliance with all applicable legal and regulatory requirements and there is no legal binding on PCL to take up this alternative as a project activity. However, the implementation of this alternative is associated with certain barriers as described below:

Barriers due to prevailing practice

The project activity proposes to utilize direct melt technology for the production of Biaxially Oriented Polyester (BOPET) film. At the time of webhosting of the PDD, there was no single investor/company in the similar business who had previously commercially operated or planned to implement this technology in the host country (India). The project proponent will infact be the second in the world after Cifu Group (China) to implement this technology². The conventional process involves producing and re-melting polyester chips which is avoided in the direct melt technology thereby reducing energy consumption.

Further, “Polyester Film Industries Association” (PFIA) which is an active association of polyester film manufacturers in the host country has certified that the technology being implemented by the project proponent has not been implemented by any other company/member engaged in similar business³. The certificate also gives a list of the members of the association which are leading polyester film manufacturers.

Thus the project proponent is undertaking a huge risk in implementing a technology which has no previous track record of its performance or operational history in the entire country. The project activity is thus the first of its kind in terms of technology, geography and sector type in the host country.

Hence in accordance with the guidance provided by CDM EB in its 35th Meeting (Annex 34 - Non-binding best practice examples to demonstrate additionality for SSC project activities), the project activity faces the prevailing practice barrier.

Technological Barrier

The direct melt technology for Biaxially Oriented Polyester (BOPET) film production being implemented in the project activity is neither a stable nor a preferred option. The conventional process involving chips production and extrusion is simpler to install and easier to operate. As a result, it is widely prevalent in the film production industry and is the norm adopted by the projects which have been set up or are being set up in the BOPET film industry.

The new Direct Melt process has a few key equipments removed (crystallizer, dryer, extruder as enumerated in Section B.6.3) that would otherwise be present in the conventional manufacturing process. Since these equipments are removed, the film line is directly coupled to the polymerization line and intermediate buffer storage of chips has been eliminated. Any stoppage in polymerization unit would directly result in stoppage in film line. This leads to a lower stability in the production, making the process vulnerable to any fluctuations in the output of the polymerization unit. This fact has been

² Article in an international publication published by PCI Films Consulting Limited, Seatons Business Centre, England states in its Report No. 60 Page 15 that “A direct melt line for polymer chips in India which can be turned into final film..... will make Polyplex only one of two companies worldwide with this technology, the other being Cifu of China.” (<http://www.uhdeinventafischer.com/pages/global/index.cfm?str=0&snr=207>)

³ Certificate from Polyester Film Industries Association has been submitted to the DOE.

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recognized by the equipment supplier, Lindauer Dornier GmbH⁴ as well as Bruckner Maschinenbau GmbH & Co. KG⁵.

The only other similar technology was implemented in Shaoxing P.R. China. This multi-line BOPET Direct Film Casting (DFC) line is the world's first and largest plant of its kind and is recognized as a revolutionary technology step⁶. The project was also a tremendous challenge for both the project proponent as well as supplier of the film line due to the instability of the technology.

This instability of the plant results in frequent stoppages of the production process and reduction in quality of the product which results in monetary and market losses. A successful implementation of this plant will promote the use of this energy efficient technology in the BOPET manufacturing industry and lead to sustainable development.

As elucidated above, these energy efficiency measures had technological and prevailing practice barriers associated with their implementation. In spite of the knowledge of these barriers that would be faced by PCL during project conception, implementation and operation, it was decided to go ahead with the CDM project activity only with the faith in the potential CDM revenue stream to alleviate these barriers and to contribute to the cause of mitigation of global warming.

In accordance with the "Guidance on the demonstration and assessment of prior consideration of the CDM", Version 03 (EB49, Annex 22), for project activities with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, the serious consideration of CDM in the decision to proceed with the implementation of the project activity is demonstrated below:

- a) The Project Proponent was well aware of CDM at the time of project decision making process and seriously considered CDM in the decision to implement the project activity. This can be further confirmed from the minutes of meeting of the Board of Directors held on 13th July 2007 wherein the Board decided to implement the project activity with due consideration of CDM.
- b) The following timeline of implementation of the project activity along with the timeline of events and actions taken to achieve CDM registration clearly indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation:

Activity	Date
Decision by Board of Directors to implement project activity	13-Jul-07
Contract with Lindaur Dornier for supply of film line (Start Date)	21-Sep-07
Appointment of CDM consultant	13-Oct-07
Approval to purchase land for project activity	01-Aug-08
Land purchase for project activity	08-Aug-08
Request for quotation from DOE	4-Feb-09
Local Stakeholder consultation for project activity	17-Apr-09
Start of Webhosting of the PDD for Global Stakeholder Process	16-Jul-09

⁴ Letter from equipment supplier, Lindauer Dornier GmbH

⁵ Letter from Bruckner Maschinenbau GmbH & Co. KG

⁶ "World's First Multi-Line BOPET Direct Film Casting (DFC) Polymer Plant swings into Production" by M. Hittorff, Site Manager at Zhejiang Euro-Asia Film Materials Co. Ltd, Uhde Inventa-Fischer

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Activity	Date
End of Webhosting of the PDD for Global Stakeholder Process	14-Aug-09
Date of plant commissioning	17-Mar-10

Thus, it can be seen that in accordance with paragraph 8 of “Guidelines on the demonstration and assessment of prior consideration of the CDM”, Version 03 (EB49, Annex 22), a gap of 2 years has never been exceeded between documented evidence.

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.

Procedure followed for calculating Baseline emissions

The extrusion quantity of PET films (Q_{PET}) will be calculated as below:

Parameter		Value	Units	Source
Density of Polyester	D_p	1.15	g/cm^3	As per data from technical specifications for Extrex-140 GP melt pump
Specific volume flow through pump	SVF	1493	cm^3/rev	

Mass throughput after N revolutions of the pump (Q_{PET}) = $D_p \times SVF \times N / 10^6$ tonnes

- i. The baseline emissions of Extruder is calculated using equation

$$BE_{Ex} = SEC_{Ex,PET} \times Q_{PET} \times EF_{NEWNE}$$

- ii. The baseline emissions of Crystallizer is calculated using equation

$$BE_{Cr} = SEC_{Cr,PET} \times Q_{PET} \times EF_{NEWNE}$$

- iii. The baseline emissions of Feeder is calculated using equation

$$BE_{Fe} = SEC_{Fe,PET} \times Q_{PET} \times EF_{NEWNE}$$

- iv. The baseline emissions of Dehumidifier is calculated using equation

$$BE_{De} = SEC_{De,PET} \times Q_{PET} \times EF_{NEWNE}$$

Parameter		Value	Units	Source
Specific Energy Consumption of Extruder	$SEC_{Ex,PET}$	0.185	kWh/kg	As per data from Bruckner Maschinenbau GmbH & Co. KG
Specific Energy Consumption of Crystallizer	$SEC_{Cr,PET}$	0.1	kWh/kg	
Specific Energy Consumption of Feeder	$SEC_{Fe,PET}$	0.01	kWh/kg	
Specific Energy Consumption of Dehumidifier	$SEC_{De,PET}$	0.0	kWh/kg	

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The baseline specific energy consumption of equipment based on data from Lindauer Dornier GmbH is found to be a total of 0.2971 kWh/kg. Hence, the data from Bruckner Maschinenbau GmbH & Co. KG (0.295 kWh/kg) is found to be more conservative and has been used for calculation of baseline emissions.

Total Baseline emissions

$$BE_y = BE_{Ex} + BE_{Cr} + BE_{Fe} + BE_{De}$$

$$= (SEC_{De,PET} + SEC_{Fe,PET} + SEC_{Cr,PET} + SEC_{Ex,PET}) \times Q_{PET} \times EF_{NEWNE}$$

Project Emissions:

The project boundary has also been defined as the BOPET Film line up to Melt Pump. No metering of energy consumption or calculation of project emissions within this project boundary is required since the energy savings are only due to the absence of an extruder, crystallizer, feeder and dehumidifier in the project activity with the rest of the process remaining the same.

Thus the project emissions would be equal to zero.

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

Data / Parameter:	EF _{NEWNE}
Data unit:	tCO ₂ /MWh
Description:	Baseline emission factor for the Grid
Source of data used:	Obtained from baseline Carbon Dioxide Emission Database Version 4.0
Value applied:	0.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	The database is published by CEA which is a statutory organization under Ministry of Power which collects and records the data concerning the generation, transmission, trading, distribution and utilization of electricity
Any comment:	The value is being fixed ex-ante for the entire crediting period.

Data / Parameter:	SEC _{Ex,PET}
Data unit:	kWh/kg
Description:	Specific Energy Consumption by Extruder
Source of data used:	Data from Equipment Supplier
Value applied:	0.185
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data has been obtained from Equipment Supplier, Bruckner Maschinenbau GmbH & Co. KG. The certificate issued by the technology provider provides the value of the specific energy consumption at the highest extrusion throughput. At lower throughputs, specific energy consumption per tonne of throughput will be higher, hence, this value is a conservative estimate.
Any comment:	The value is being fixed ex-ante for the entire crediting period.

Data / Parameter:	SEC _{Cr,PET}
Data unit:	kWh/kg
Description:	Specific Energy Consumption by Crystallizer

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Source of data used:	Data from Equipment Supplier
Value applied:	0.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data has been obtained from Equipment Supplier, Bruckner Maschinenbau GmbH & Co. KG. The certificate issued by the technology provider provides the value of the specific energy consumption at the highest extrusion throughput. At lower throughputs, specific energy consumption per tonne of throughput will be higher, hence, this value is a conservative estimate.
Any comment:	The value is being fixed ex-ante for the entire crediting period.

Data / Parameter:	SEC_{Fe,PET}
Data unit:	kWh/kg
Description:	Specific Energy Consumption by Feeder
Source of data used:	Data from Equipment Supplier
Value applied:	0.01
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data has been obtained from Equipment Supplier, Bruckner Maschinenbau GmbH & Co. KG. The certificate issued by the technology provider provides the value of the specific energy consumption at the highest extrusion throughput. At lower throughputs, specific energy consumption per tonne of throughput will be higher, hence, this value is a conservative estimate.
Any comment:	The value is being fixed ex-ante for the entire crediting period.

Data / Parameter:	SEC_{De,PET}
Data unit:	kWh/kg
Description:	Specific Energy Consumption by Dehumidifier
Source of data used:	Data from Equipment Supplier
Value applied:	0.00
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data has been obtained from Equipment Supplier, Bruckner Maschinenbau GmbH & Co. KG. The certificate issued by the technology provider provides the value of the specific energy consumption at the highest extrusion throughput. At lower throughputs, specific energy consumption per tonne of throughput will be higher, hence, this value is a conservative estimate.
Any comment:	The value is being fixed ex-ante for the entire crediting period.

Data / Parameter:	D_p
Data unit:	g/cm ³
Description:	Density of Polyester
Source of data used:	Technical specifications of Extrex-140 GP melt pump
Value applied:	1.15
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data has been obtained from the technical specifications for Extrex-140 GP melt pump used in the project activity which is a positive displacement pump used for pumping virgin bright melt polymer.

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Any comment:	The value is being fixed ex-ante for the entire crediting period.
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Data / Parameter:	SVF
Data unit:	cm ³ /rev
Description:	Specific volume flow through pump
Source of data used:	Technical specifications of Extrex-140 GP melt pump
Value applied:	1,493
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data has been obtained from the technical specifications for Extrex-140 GP melt pump used in the project activity. It is a positive displacement pump with a constant volume feed that is used for pumping virgin bright melt polymer.
Any comment:	The value is being fixed ex-ante for the entire crediting period.

B.6.3 Ex-ante calculation of emission reductions:

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Baseline Emissions

Quantity of BOPET film extruded will be calculated as below:

Parameter		Value	Units	Source
Density of Polyester	D _p	1.15	g/cm ³	As per data from technical specifications for Extrex-140 GP melt pump
Specific volume flow through pump	SVF	1,493	cm ³ /rev	

Mass throughput after N revolutions of the pump (Q_{PET}) = $1.15 * 1493 * N / 10^6$ tonnes

The ex-ante estimate of BOPET film extruded per annum is 32,640 tonnes which is calculated as below:

Parameter	Value	Unit
Capacity of BOPET extrusion system per hour	4	MT/hr
Number of hours of operation per day	24	Hours
Number of days of operation per annum	340	Days
BOPET film extruded per annum (Q_{PET}) = $4 * 24 * 340$	32,640	tonnes

Total Baseline emissions

$$BE_y = BE_{Ex} + BE_{Cr} + BE_{Fe} + BE_{De}$$

$$= (SEC_{De,PET} + SEC_{Fe,PET} + SEC_{Cr,PET} + SEC_{Ex,PET}) \times Q_{PET} \times EF_{NEWNE}$$

Specific Energy consumption			
Crystallizer	SEC _{Cr,PET}	0.1	kWh/kg or MWh/tonne
Drying including dehumidification	SEC _{De,PET}	0	kWh/kg or MWh/tonne
Extrusion up to melt pump	SEC _{Ex,PET}	0.185	kWh/kg or MWh/tonne

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Raw material feeding	$SEC_{Fe,PET}$	0.01	kWh/kg or MWh/tonne
Total Energy Consumption		9,628.80	MWh
EF (NEWNE Grid)	EF_{NEWNE}	0.8	tCO ₂ /MWh

- The baseline emissions of Extruder is calculated using equation

$$BE_{Ex} = SEC_{Ex,PET} \times Q_{PET} \times EF_{NEWNE}$$

$$BE_{Ex} = 0.185 \times 32,640 \times 0.8$$

- The baseline emissions of Crystallizer is calculated using equation

$$BE_{Cr} = SEC_{Cr,PET} \times Q_{PET} \times EF_{NEWNE}$$

$$BE_{Ex} = 0.1 \times 32,640 \times 0.8$$

- The baseline emissions of Feeder is calculated using equation

$$BE_{Fe} = SEC_{Fe,PET} \times Q_{PET} \times EF_{NEWNE}$$

$$BE_{Ex} = 0.01 \times 32,640 \times 0.8$$

- The baseline emissions of Dehumidifier is calculated using equation

$$BE_{De} = SEC_{De,PET} \times Q_{PET} \times EF_{NEWNE}$$

$$BE_{Ex} = 0.00 \times 32,640 \times 0.8$$

Total Baseline emissions

$$BE_y = BE_{Ex} + BE_{Cr} + BE_{Fe} + BE_{De} = 7,703 \text{ tCO}_2\text{e}$$

Project Emissions

The project boundary has also been defined as the BOPET Film line up to Melt Pump. No metering of energy consumption or calculation of project emissions within this project boundary is required since the energy savings are only due to the absence of an extruder, crystallizer, feeder and dehumidifier in the project activity with the rest of the process remaining the same.

$$PE_y = 0$$

Leakage Emissions

$$L_y = 0$$

Emission Reductions

$$ER_y = BE_y - PE_y - L_y$$

$$ER_y = 7,703 \text{ tCO}_2\text{e}$$

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

>>

Year	Project activity emissions (tCO ₂ e)	Baseline emissions (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions (tCO ₂ e)
2010	0	7,703	0	7,703

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2011	0	7,703	0	7,703
2012	0	7,703	0	7,703
2013	0	7,703	0	7,703
2014	0	7,703	0	7,703
2015	0	7,703	0	7,703
2016	0	7,703	0	7,703
2017	0	7,703	0	7,703
2018	0	7,703	0	7,703
2019	0	7,703	0	7,703
Total (t CO₂e)	0	77,030	0	77,030

B.7 Application of a monitoring methodology and description of the monitoring plan:**B.7.1 Data and parameters monitored:**

Data / Parameter:	N
Data unit:	-
Description:	Revolutions of the melt pump
Source of data to be used:	Log books
Value of data:	The same shall be monitored ex-post
Description of measurement methods and procedures to be applied:	<u>Monitoring:</u> Measured using DC Induction Proximity Switch <u>Data Type:</u> Monitored <u>Frequency:</u> Shift wise <u>Archiving Policy:</u> Paper & Electronic <u>Responsibility:</u> Shift In charge would be responsible for monitoring and recording the necessary values.
QA/QC procedures to be applied:	Annual calibration of DC Induction Proximity Switch of the pump will be carried out.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	Q _{PET}
Data unit:	Tonnes
Description:	Extrusion quantity for BOPET films per annum
Source of data to be used:	Calculated based on Log book records for number of revolutions (N) of melt pump. Quantity of BOPET film extruded will be calculated as below: Density of Polyester (D _p) = 1.15 g/cm ³ Specific volume flow through pump (SVF) = 1493 cm ³ /rev Mass throughput after N revolutions of the pump = 1.15 * 1493 * N / 10 ⁶ tonnes
Value of data:	32,640
Description of measurement methods and procedures to be applied:	<u>Monitoring:</u> The value would be calculated on the basis of the number of revolutions recorded in DC Induction Proximity Switch <u>Data Type:</u> Calculated <u>Frequency:</u> Shift wise

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	<u>Archiving Policy: Paper & Electronic</u>
QA/QC procedures to be applied:	The DC Induction Proximity Switch used for measuring the revolutions of the melt pump would be calibrated on an annual basis.
Any comment:	Ex-ante quantity of BOPET film extruded per annum has been estimated based on 4 MT/hr extrusion capacity of system with 340 days of operation per year and 24 hours per day. Data archived: Crediting period + 2 yrs

B.7.2 Description of the monitoring plan:

>>>

The project activity falls under the Type-II Energy Efficiency Improvement Project, Subcategory: II.D. : Energy efficiency and fuel switching measures for industrial facilities. The monitoring methodology and plan as per the paragraphs 6 and 7 of the methodology are:

In the case of replacement, modification and retrofit measures the monitoring shall consist of:

- (a) Documenting the specifications of the equipment replaced;
- (b) Metering the energy use of the industrial or mining and mineral production facility, processes or the equipment affected by the project activity;
- (c) Calculating the energy savings using the metered energy obtained from subparagraph (b)

In the case of a new facility, monitoring shall consist of:

- (a) Metering the energy use of the equipment installed;
- (b) Calculating the energy savings due to the equipment installed.

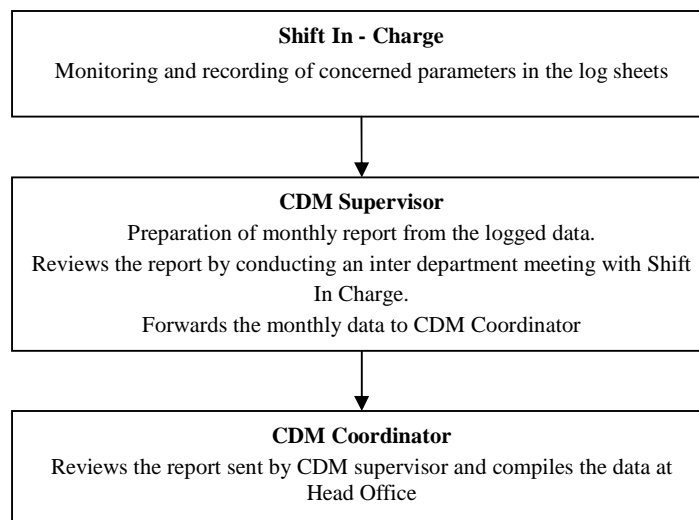
Since the project activity is a new facility involving energy efficiency measure, the emission reductions of the project activity depends on the amount of electricity saved. The electric consumption of the equipments to be removed is taken from two reputed suppliers of the technology. The energy savings are in terms of specific electricity savings per unit of film produced.

The parameter mentioned in the section B.7.1 would be monitored and logged in log sheet by the respective shift in charge. Based on the logged data a report would be prepared by CDM Supervisor on a monthly basis. The CDM Supervisor will forward the report to the CDM Coordinator at Head Office where the data is compiled.

The data would be reviewed by conducting an inter department review meeting once in 6 months.

The control panel log sheet is audited regularly according to the specified procedure.

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

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Date of completion of the application of the baseline: 01/02/2009

Name of entity determining baseline: M/s Polyplex Corporation Limited

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SECTION C. Duration of the project activity / crediting period**C.1 Duration of the project activity:****C.1.1. Starting date of the project activity:**

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21/09/2007

In accordance with the 'CDM glossary of terms' the start date of a project activity is defined as "*the earliest date at which either the implementation or construction or real action of a project activity begins*". The above definition of start date was further clarified by the CDM EB in its 41st meeting, according to which, the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity.

The start date has thus been chosen to be the date on which the project proponent had first committed to major financial expenditures related to the project activity. This is represented by the date of contract with Lindaur Dornier for supply of film line for project activity.

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

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The expected operational lifetime of the PET film manufacturing facility is 20 years.

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

A fixed crediting period of 10 years has been selected

C.2.1. Renewable crediting period**C.2.1.1. Starting date of the first crediting period:**

>>

Not Applicable

C.2.1.2. Length of the first crediting period:

>>

Not Applicable

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

>>

01/09/2010 or the date of registration, which ever occurs later.

C.2.2.2. Length:

>>

10 year 0 month

SECTION D. Environmental impacts

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

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The Ministry of Environment and Forests (MoEF), Government of India has released a Notification vide S.O. 1533 (E)⁷ dated 14 September 2006 that lists the project activities requiring an Environmental clearance. The continuous polymerisation plant of PCL has obtained an environmental clearance from the State Level Environment Impact Assessment Authority, Uttarakhand under schedule 5 (f) of this notification and all the necessary clearances are in place for operating the plant.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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There are no significant environmental impacts of the project activity. The project involves reduction in specific energy consumption of BOPET produced which subsequently reduces fuel consumption in service boiler leading to GHG emission reduction.

The project activity results in simultaneous benefits of conservation of fuel, achieving energy efficiency of the plant and has many associated environmental benefits. The environmental impacts and benefits are that the project would not have any adverse impact on the air quality. Thus, the project activity would reduce CO₂ emissions associated with the equivalent amount of energy production.

It is therefore evident that the project activity has positive impacts on the local and global environment.

⁷ Reference : <http://envfor.nic.in/legis/eia/so1533.pdf>

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SECTION E. Stakeholders' comments

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

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Stakeholders have been identified on the basis of their involvement at various stages of project activity. The list of relevant stakeholders includes all the organizations, which were related to project activity in direct and indirect manner. The stakeholders identified for the project are as under:

- Employees of PCL
- Local villagers
- Technology supplier/contractor

A Stakeholder consultation for the CDM project activity was carried out on 17th April 2009 where PCL explained and deliberated with the employees on various features and benefits of the project activity.

E.2. Summary of the comments received:

>>

PCL explained and deliberated with the employees on various features and benefits of the project activity. The employees expressed their appreciation for the project activity as it would reduce energy demand and the harmful effects due to associated GHG emissions. A Stakeholder consultation for the CDM project activity was carried out on 17th April 2009.

The Ministry of Environment & Forest (MoEF), Government of India (GoI) has provided the host country approval for the project activity. PCL has also received the 'Consent to establish' for the plant from State Pollution Control Board.

Stakeholder meeting for the project was conducted at the project site on 17th April 2009. Above identified stakeholders were invited and briefed about the project and their comments were duly recorded.

S. No.	Stakeholder Queries	Answer
1	By when will the project be operational?	The project is expected to be operational by September 2009
2	Will this project provide new job opportunities for local villagers and if yes then how many?	The project will result in generation on direct and indirect employment for the unskilled / semi skilled and skilled persons, during different stages of the project- design, construction and implementation. This will result in a substantial social development of the area
3	How will the project help in development of the local area?	The project will not only provide job opportunities to the local people but also result in attracting other industries to the district which will result in further economic development of the area. Project activity would result in conservation of fossil fuel and natural

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		resources; thereby it will also benefit the economy of the country.
4	How you will ensure that this project shall not affect the level of environmental pollution and shall be under rule and regulations of Govt. of India?	<p>We have assessed the environmental aspects and impacts of the project activity and found that there are no significant environmental impacts due to the project activity. We will ensure regular plant inspection and assure the compliance with all the environmental pollution regulations of Govt. of India</p> <p>Moreover the project activity would reduce the fossil fuel consumption and lead to resource sustainability. The project activity would reduce CO₂ (GHG) emissions, helping in abating global warming.</p>
5	Whether your new process plant produces any noise or other such nuisance in the area?	No, the plant operations will not result in nuisance of any kind in the area and will operate in compliance with all the environmental pollution regulations of Govt. of India

The Stakeholders acknowledged the work being done by the Project proponent and the local stakeholder representative Mr. Rana appreciated the project and assured help of any kind from the local people as and when required for the promotion of the activities for success of the project and urged the local people for active participation.

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

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No adverse comments were received at the stakeholder's meet for the project. Further, as required by the CDM cycle, the PDD has been published at the DOE's web site for public comments.

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Annex 1**CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Parties included in Annex I to the Convention is involved for the project activity.

Annex 3

BASELINE INFORMATION

Baseline emissions calculation has been explained in detail in Section B.4 of the PDD.

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Annex 4

MONITORING INFORMATION

As Per Section B.7.2 of the PDD
