

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

CONTENTS

- A. General description of the small scale project activity
- B. Application of a baseline and monitoring methodology
- C. Duration of the project activity / crediting period
- D. Environmental impacts
- E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the proposed small scale project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring Information

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.

CDM – Executive Board

SECTION A. General description of small-scale project activity**A.1 Title of the small-scale project activity:**

Reliance PET recycling Project
Version Number 01
21st September 2010

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

>>

The proposed CDM project activity involves the recovery and recycling of PET (Polyethylene Terephthalate) bottles into marketable products like sheets, flakes, chips etc undertaken by Reliance Industries Limited and involves the establishment of a new recycling facility with input capacity of 20000MT/annum to be implemented in two phases of 10000MT/annum. The project activity is located in Nagothane district, in the state of Maharashtra, India. The project activity will reduce greenhouse gases by Kt CO₂e per year from the recycling of PET, reducing energy consumption which would otherwise be required for the production of PET through virgin inputs.

The sustainable development potential of the project activity is highlighted through the following broad categories:

- Contribution of socio- economic well-being.
- Contribution to environmental well-being.

Contribution to socio-economic well-being:

The project makes a significant contribution to development as it provides an important source of direct and indirect employment to the surrounding area. The plant is expected to create employment in the area by employing of skilled and semiskilled workers for the recycling processes.

Contribution to environmental well-being:

The recycling of PET bottles will reduce GHG emissions as compared to the production of PET from virgin inputs. The recycling of PET bottles will also decrease the impact of plastics in environment by keeping landfills free of non-degradable plastic waste.

A.3. Project participants:

>>

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)	Private Entity: Reliance Industries Limited	No
United Kingdom of Great Britain and Northern Ireland	Private Entity: Agrinergy Pte Ltd	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of

CDM – Executive Board

requesting registration, the approval by the Party(ies) involved is required.

A.4. Technical description of the small-scale project activity:
A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>>

India

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

>>

State: Maharashtra

A.4.1.3. City/Town/Community etc:

>>

District: Nagothane

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

>>

The location and coordinate of the plant is as below

Plant: Reliance industries limited

State: Maharashtra

Site: Nagothane

Latitude: N 18° 33'22"

Longitude: E 76° 6'4"

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

>>

In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the proposed project activity falls under the following type and category:

Type III: Other project activities

Category AJ: Recovery and recycling of materials from solid waste (under a revision of the existing methodology)

Technology Description

The technology employed in the project involves the establishment of a 20000MT/annum integrated recycling and manufacturing plant to be implemented in two phases of capacity 10000MT/annum .The plant includes the installation of equipments for the three main technological stages of producing recycled PET chips which are listed as follows:

1. Wash line (Recycling facility) consisting of

CDM – Executive Board

- Bale breaker
- Label stripper
- Trommel
- Sorting Conveyor
- Granulators (wet and Dry)
- Sink floating tank
- Reactors (Pre wash, Caustic wash, Soap wash)
- Dryer
- Air classifier
- Metal separator

2. Extrusion process consisting of

- Pre dryer
- Extruder
- Palletizer

3. Solid state Polymerisation process consisting

- Crystallizer
- SSP (solid state polymerisation) reactor.

The technology has been sourced from Germany and implemented by Reliance Industries Limited and the equipments are purchased within India hence there is transfer of technology involved.

The project qualifies as a small scale activity as it will result in emission reductions less than 60 Kt CO₂ equivalent annually.

A.4.3 Estimated amount of emission reductions over the chosen <u>crediting period</u>:

>>

A.4.4. Public funding of the <u>small-scale project activity</u>:
--

>>

The project has not received any public funding.

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

Appendix C, paragraph 2 of the Simplified Modalities and Procedures for Small-Scale CDM project activities states:

“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; and*
- *Registered within the previous 2 years; and*

CDM – Executive Board

- *Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.”*

The project participants do not have a proposed small-scale activity whose project boundary is within 1 km of the project activity boundary at the closest point. Therefore, it can be concluded that the small scale project activity is not a debundled component of a large scale 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:**

>>

The project activity uses a proposed new revision of AMSIII AJ as the baseline methodology.

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

>>

<p><i>This methodology comprises activities for recovery and recycling of high density polyethylene (HDPE) and low density polyethylene(LDPE) materials¹ in municipal solid wastes² to process them into intermediate or finished products e.g., plastic resin to displace production of virgin HDPE and LDPE materials in dedicated facilities thereby resulting energy savings and emission reduction”</i></p> <p><i>1 Other materials such as glass, paper found in solid wastes that are manufactured in industrial processes can be potentially recycled, project proponents are encouraged to submit a revision of this methodology to include additional materials proposing conservative default values for specific energy consumption for the production from virgin raw materials.</i></p>	<p>As per the proposed revision the project activity comprises of recycling of Polyethylene Terephthalate (PET) from solid wastes to process them into crystallized food grade PET pellets to displace production of the virgin PET in dedicated facilities thereby resulting in energy savings and emission reductions</p>
<p><i>Emission reductions can only be claimed for the difference in energy use for the production of HDPE/LDPE product/s from virgin inputs versus production from recycled material;</i></p>	<p>Emission reductions are based only on the energy saving associated with the recycling of PET</p>
<p><i>The emission reductions under this methodology will accrue to the recycling facility. In order to avoid double counting of emission reductions, a contractual agreement between the recycling facility and processing/manufacturing facility shall indicate that the latter shall not claim emission reductions. Similarly through contractual</i></p>	<p>As per the proposed revision if the recycling and manufacturing facility are integrated the manufacturing facility can claim for the emission reductions.</p>

CDM – Executive Board

<i>agreement and other means, credible proof is provided to show that the materials supplied from the recycling facility are used for Processing/Manufacturing and not for other purposes such as a source of fuel;</i>	
<i>Using three years historic data (market data, official statistics etc.) prior to the start date of the project activity, it is possible to demonstrate that the PET finished products in the host country of the CDM project were manufactured using either in country PET resin manufacturing facility or PET resin imported from another non-annex I country. Optionally analysis may be limited to PET products where recycled materials have proven to be technically viable option;</i>	Historic data of PET production in India will be provided to the DOE during validation
<i>The solid wastes containing recyclable materials are procured locally from sources located within 200 km of the recycling facilities. Plastics already segregated from the rest of the waste and transported over 200 km distance are not eligible under this methodology;</i>	A revision has been proposed to this effect to include the emissions related to transport in the project emissions
<i>Processing/Manufacturing facility is located within 200 km from the Recycling facility.</i>	Recycling and manufacturing facility are integrated at a single location
<i>Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO₂ equivalent annually.</i>	The annual project emissions is calculated as x ktCO ₂ equivalent as demonstrated in the ex-ante estimation in section A.4.3 of this PDD

B.3. Description of the project boundary:

>>

The project boundary covered:

- The processing/manufacturing units where the recyclables are transformed into intermediate or final products.
- The transport of material from sources beyond 200KM within the host country boundary

B.4. Description of baseline and its development:

>>

The baseline corresponds to the production of virgin PET in dedicated facilities. The baseline emissions include emissions associated with energy consumption for the production of PET from virgin materials. The baseline emissions are calculated as per paragraph 6 of AMSIII.AJ

Baseline emissions for the production of pellet type i from virgin inputs are calculated using equation (1).

CDM – Executive Board

$$BE_y = \sum_i [Q_{i,y} * L_i * (SEC_{Bl,i} * EF_{el,y} + SFC_{Bl,i} * EF_{FF,CO2})] \quad (1)$$

Where:

BE_y	Baseline emissions in year y (tCO ₂ /y)
I	Indices for material type i ($i = 1, 2$)
$Q_{i,y}$	Quantity of plastic type i recycled in year y (t/y)
L_i	Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material (use 0.75)
$SEC_{Bl,i}$	Specific electricity consumption for the production of virgin material type - i (MWh/t), <i>take value specified in paragraph 5 (ii or iii, as mentioned in the proposed revision)</i>
$EF_{el,y}$	Emission factor for grid electricity generation, as per the most recent version of “Tool to calculate emission factor for an electricity system” (tCO ₂ /MWh). If the virgin material is sourced from more than one non-Annex 1 countries, the weighted average of the grid emission factors shall be used, using market data from the last three years prior to the project start date
$SFC_{Bl,i}$	Specific fuel consumption for the production of virgin material type - i (GJ/t), <i>take value as specified in paragraph 5 (i or iii, as mentioned in the proposed revision)</i>
$EF_{FF,CO2}$	CO ₂ emission factor for fossil fuel (tCO ₂ /GJ)

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:

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

The proposed revision to AMS III AJ is to suggest the inclusion of PET and other recyclable plastics in the list of specified materials.

The project displaces the use of PET from virgin inputs by recycling of PET bottles for the manufacture of food grade PET chips.

The emission reductions achieved by the project activity can be summarised as follows

$$ER_y = BE_y - (PE_y + PET_{i,y}) - L_y$$

Where

ER_y Emission Reductions for year y, tCO₂

CDM – Executive Board

BE_y	Baseline Emissions for year y, tCO ₂
PE_y	Project Emissions for year y, tCO ₂
$PET_{i,y}$	Project emission related to the transport of material i for year y, tCO ₂
L_y	Leakage for year y, tCO ₂

Baseline Emissions:

$$BE_y = \sum_i [Q_{i,y} * L_i * (SEC_{Bl,i} * EF_{el,y} + SFC_{Bl,i} * EF_{FF,CO_2})] \quad (1)$$

Where:

BE_y	Baseline emissions in year y (tCO ₂ /y)
I	Indices for material type i ($i = 1, 2$)
$Q_{i,y}$	Quantity of plastic type i recycled in year y (t/y)
L_i	Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material (use 0.75)
$SEC_{Bl,i}$	Specific electricity consumption for the production of virgin material type i (MWh/t), <i>take value specified in paragraph 5 (ii or iii, as mentioned in the proposed revision)</i>
$EF_{el,y}$	Emission factor for grid electricity generation, as per the most recent version of “Tool to calculate emission factor for an electricity system” (tCO ₂ /MWh). If the virgin material is sourced from more than one non-Annex 1 countries, the weighted average of the grid emission factors shall be used, using market data from the last three years prior to the project start date
$SFC_{Bl,i}$	Specific fuel consumption for the production of virgin material type i (GJ/t), <i>take value as specified in paragraph 5 (i or iii, as mentioned in the proposed revision)</i>
EF_{FF,CO_2}	CO ₂ emission factor for fossil fuel (tCO ₂ /GJ)

Project Emissions:

$$PE_y = \sum_i [(EC_{i,y} * EF_{el} + FC_{i,y} * NCV_{FF} * EF_{FF,CO_2}) + (Q_{i,y} * SEC_{proc} * EF_{el,y})] \quad (1)$$

Where:

PE_y	Project emissions in year y (tCO ₂ /y)
I	Indices for plastic type i ($i = 1, 2$)
$EC_{i,y}$	Electricity consumption of the recycling facility apportioned to the plastic type i (MWh/t) in year y, <i>see below</i>
$FC_{i,y}$	Fuel consumption of the recycling facility apportioned to the plastic type i (unit mass or volume/t) in year y, <i>see below</i>
NCV_{FF}	Net calorific value of the fossil fuel consumed in the recycling facility in year -y

CDM – Executive Board

(GJ/unit mass or volume)

EF_{FF,CO_2} CO₂ emission factor of the fossil fuel consumed at the recycling facility (tCO₂/GJ), use local or national values, or IPCC default values

SEC_{proc} Specific electricity consumption for the processing/manufacturing, use 0.5 MWh/t (1.8 GJ/t)

Project emissions related to transport of recyclable material are calculated on the basis of distance and number of trips (or the average truck load)

$$PET_{i,y} = N_y \cdot AVD_y \cdot EF_{km,CO_2,y} \quad (3)$$

Or

$$PET_{i,y} = \frac{\sum_k BF_{T,y}}{TL_y} \cdot AVD_y \cdot EF_{km,CO_2,y} \quad (4)$$

Where:

$PET_{i,y}$	CO ₂ emissions during the year y due to transport of the segregated plastic type i to the project plant (tCO ₂ /yr)
N_y	Number of truck trips during the year y
AVD_y	Average round trip distance (from and to) between the recyclable plastic supply sites and the site of the project plant during the year y (km)
$EF_{km,CO_2,y}$	Average CO ₂ emission factor for the trucks measured during the year y (tCO ₂ /km)
$BF_{T,y}$	Quantity of plastic that has been transported to the project site during the year y (tons of dry matter)
TL_y	Average truck load of the trucks used (tons) during the year y
i	Types of plastic used in the project plant and that have been transported to the project plant in year y

Leakage:

No leakage is considered from the proposed project activity

Thus,

$$L_y = 0$$

Thus the total emission reductions from the proposed project activity is the difference between the baseline and project emissions

$$ER_y = BE_y - (PE_y + PET_{i,y})$$

CDM – Executive Board

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

Data / Parameter:	L_i
Data unit:	-
Description:	Ratio to account for material loss and composition change during recycling
Source of data used:	AMS IIIAJ
Value applied:	0.75
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	$SFC_{bl,i}$
Data unit:	MJ/kg
Description:	Specific Fuel consumption for production of virgin material type i
Source of data used:	AMS IIIAJ
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Conservative value covering steam cracking of heavy hydrocarbons into ethylene
Any comment:	-

Data / Parameter:	$SEC_{bl,i}$
Data unit:	MJ/kg
Description:	Specific Electricity consumption for production of virgin material type i
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Conservative value covering the polymerisation cycle ethylene glycol and Purified teraphthalic acid
Any comment:	-

Data / Parameter:	$EF_{CO_2,grid,v,NEWNE}$
Data unit:	tCO ₂ /MWh
Description:	Baseline (NEWNE grid) Emission Factor
Source of data used:	CO ₂ baseline database for the Indian power Sector, Central Electricity Authority, India (Version 5)

CDM – Executive Board

Value applied:	0.84
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per the “Tool to calculate emission factor for an electricity system” with the data for operating margin and build margin from the CO ₂ baseline database for the Indian power sector provided by the Central Electricity Authority, India
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

From the section B.6.1, the emission reductions are given as:

$$ER_y = BE_y - (PE_y + PET_{i,y})$$

And

$$BE_y = \sum_i [Q_{i,y} * L_i * (SEC_{Bl,i} * EF_{el,y} + SFC_{Bl,i} * EF_{FF,CO2})]$$

Based on the conservative values mentioned in B.6.2

BE_y =

The project emission is given as

$$PE_y = \sum_i [(EC_{i,y} * EF_{el} + FC_{i,y} * NCV_{FF} * EF_{FF,CO2}) + (Q_{i,y} * SEC_{proc} * EF_{el,y})]$$

PE_y =

And

$$PET_{i,y} = N_y \cdot AVD_y \cdot EF_{km,CO2,y}$$

PET_{i,y} =

Thus the emission reductions are estimated as:

$$ER_y = BE_y - (PE_y + PET_{i,y})$$

ER_y =

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

>>

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

B.7.1 Data and parameters monitored:

CDM – Executive Board

(Copy this table for each data and parameter)

Data / Parameter:	
Data unit:	
Description:	
Source of data to be used:	
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

B.7.2 Description of the monitoring plan:

>>

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

>>

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:**

>>

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

>>

C.2 Choice of the crediting period and related information:**C.2.1. Renewable crediting period****C.2.1.1. Starting date of the first crediting period:**

>>

C.2.1.2. Length of the first crediting period:

>>

CDM – Executive Board

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

C.2.2.2. Length:

>>

SECTION D. Environmental impacts

>>

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

>>

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:

>>

SECTION E. Stakeholders' comments

>>

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

>>

E.2. Summary of the comments received:

>>

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

>>

CDM – Executive Board

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

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

CDM – Executive Board

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Annex 4

MONITORING INFORMATION
