

**MONITORING REPORT FORM (F-CDM-MR)**
Version 02.0**MONITORING REPORT**

Title of the project activity	Dolowal, Salar and Bhanubhura Mini Hydroelectric Projects
Reference number of the project activity	0328
Version number of the monitoring report	01
Completion date of the monitoring report	15/11/2012
Registration date of the project activity	30/04/2006
Monitoring period number and duration of this monitoring period	Monitoring period : Sixth (6 th) Duration of monitoring period: 01/08/2011 to 31/10/2012
Project participant(s)	Punjab Hydro Power Private Limited
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral scope : 01 Methodology : AMS I.D Version 07
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	26,383 tCO ₂
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	25,735 tCO ₂



SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Three Mini Hydroelectric Projects (MHP) aggregating to 4.2 MW at Dolowal, Salar and Bhanubhura on the Kotla Branch Canal, District Sangrur, Punjab, India were commissioned in April 2003. The plants are operating successfully since then.

The purpose of the project activity is to generate electricity by utilizing water flowing through the existing canal system as a renewable energy resource to meet the ever-increasing demand of energy in the region. The development of the project activity contemplates the production of clean hydroelectric power that will contribute to reduce CO₂ emissions, which would have occurred otherwise, in absence of these projects.

1.4 MW hydroelectric power plant at Dolowal, 1.5 MW hydroelectric power plant at Salar and 1.3 MW hydroelectric power plant at Bhanubhura of this project activity generate electricity and sell it to the State utility i.e. Punjab State Electricity Board.

These three plants are of low head, canal drop based mini hydroelectric projects. The projects are canal based renewable hydroelectric generating plants, which includes forebay, intake, power house, draft tube, turbine, and tailrace. The component plants do not involve any type of displacement, rehabilitation or relocation.

The projects are generating electricity successfully by converting the potential of kinetic energy of the canal water and the renewable electricity produced is fed into the Punjab State Electricity Board Grid thereby replacing the equivalent amount of electricity produced from thermal stations and thus reducing green house gas emission.

A.2. Location of project activity:

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MHP Dolowal : The project is located at Kotla Branch Canal

Latitude	: 30°32 ' 34 N,	Longitude	: 76° 03 ' 00 E
Town	: Malerkotla		
District	: Sangrur		
State	: Punjab		
Country	: India		

MHP Salar : The project is located at Kotla Branch Canal

Latitude	: 30° 30 ' 37 N,	Longitude	: 75° 59 ' 41 E
Town	: Malerkotla		
District	: Sangrur		
State	: Punjab		
Country	: India		



MHP Bhanubhura : The project is located at Kotla Branch Canal

Latitude : 30° 27 ' 37 N, Longitude : 75° 56 ' 21 E
Town : Malerkotla
District : Sangrur
State : Punjab
Country : India

A.3. Parties and project participant(s)

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Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Private entity: Punjab Hydro Power Private Limited	No

A.4. Reference of applied methodology

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Type I : Renewal Energy Projects
Category : I.D. Renewable Electricity Generation for a Grid
Version : 07

A.5. Crediting period of project activity

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Crediting period for this project activity is 26/04/2003 to 25/04/2013 (Fixed).

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

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The projects activities were commissioned on dates as mentioned below while it was registered with CDM EB on 30/04/2006.

SN	Name of the Project	Date of Commissioning
1	Dolowal	April 2003
2	Salar	April 2003
3	Bhanubhura	April 2003

The project proponent has installed all monitoring equipment to monitor the parameters which were described in the registered CDM PDD.

The project activity is in continuous operation since the date of commissioning. No special events or change of equipments have taken place during the current monitoring period.

No events occurred during the current monitoring period which may have affected the applicability of the methodology.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

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Not Applicable

B.2.2. Corrections

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Not Applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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Not Applicable

B.2.4. Changes to project design of registered project activity

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Not Applicable

B.2.5. Changes to start date of crediting period

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Not Applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

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Not Applicable

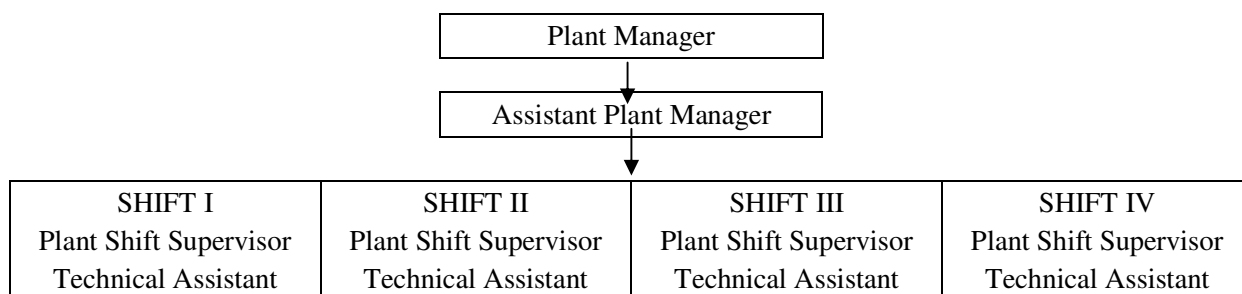


SECTION C. Description of monitoring system

For this project activity, the monitoring systems and procedures followed are as described below:

Energy:

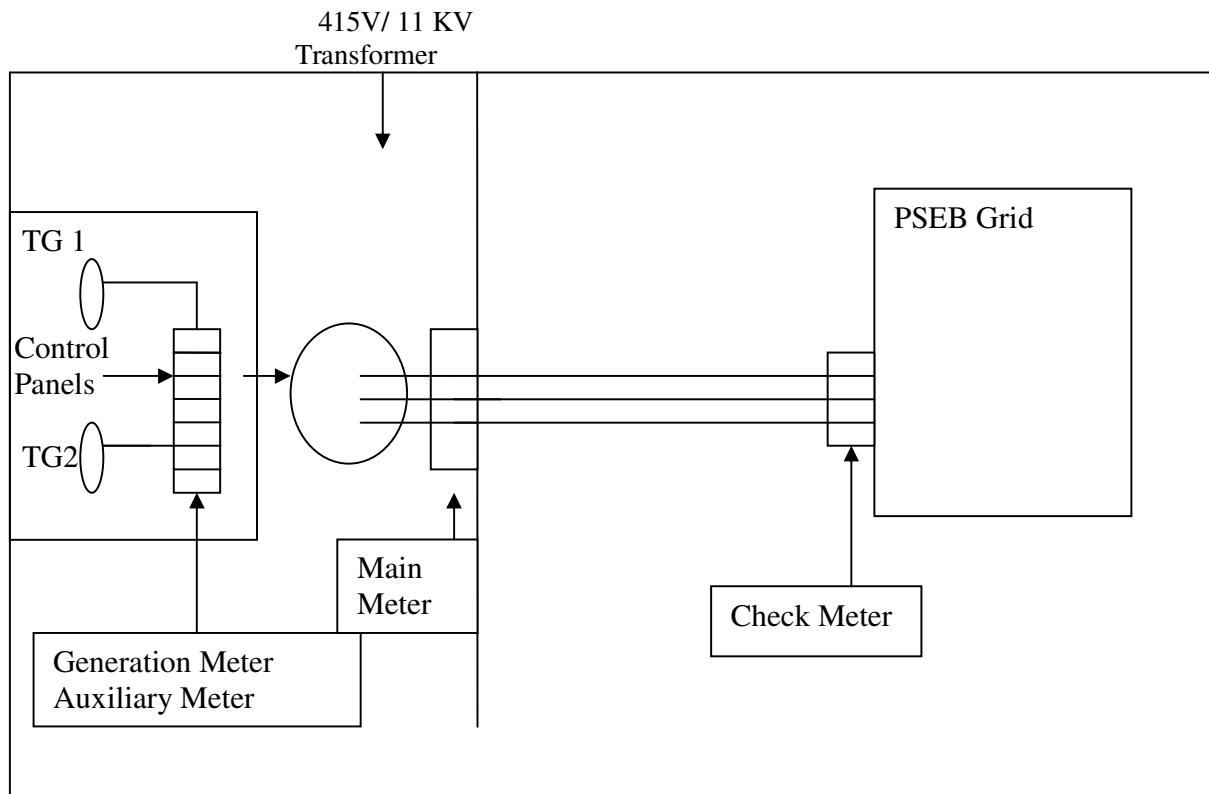
1. The Energy exported (kWh) and Energy imported (kWh) at the interconnection points have been measured by the bidirectional meters (i.e. Trivector Meters) installed at the interconnection points at all the 3 (three) project sites.
2. The Net Saleable Energy (Net electricity exported to grid) has been calculated as a difference between energy exported and energy imported. It is based on monthly joint meter readings.
3. Monthly joint meter readings were taken at interconnection points and certified by representatives of Punjab Hydro Power Private Limited (PHPPL) and the purchaser i.e. Punjab State Electricity Board (PSEB).
4. The joint meter readings were used to raise invoice for sale of net energy to PSEB.
5. The energy generated has been measured by the energy meters installed at the generation points on an hourly basis.
6. The auxiliary energy consumption has been measured by the auxiliary energy consumption meters installed at each of the plant sites on an hourly basis.
7. The data of the aforesaid parameters are recorded on hourly basis which are summed into a daily reading.
8. The hourly reading of electricity generation and auxiliary consumption were aggregated to daily & monthly electricity figure.
9. Monthly reports stating the energy exported, energy imported, energy generated and auxiliary energy consumption were prepared by shift-in-charge and verified by plant managers.
10. The finance department cross checked the data provided by plant managers.
11. The organizational structure responsible for monitoring the various parameters as per Monitoring Plan is as below:-



The hourly data is monitored and recorded in the log books by the shift staff comprising of Plant Shift Supervisor and Technical Assistant. The daily data is checked and countersigned by the Assistant Plant

Manager. The daily and monthly data is checked and verified by the Plant Manager. The data is audited annually by the auditor of the Company having financial background.

The Diagram showing all relevant monitoring points has been displayed as below:



**SECTION D. Data and parameters****D.1. Data and parameters fixed ex ante or at renewal of crediting period**

Data / Parameter	Grid Emission Factor
Unit	kg of CO ₂ / kWh
Description	The Grid Emission Factor has been calculated as the weighted average of the Operating Margin Emission Factor (EF _{OM}) and the Build Margin Emission Factor (EF _{BM}).
Source of data	Northern Region Grid's permission from Central Electricity Authority
Value(s) applied	0.942
Purpose of data	Baseline emission calculations
Additional comment	This parameter is fixed ex-ante for the full crediting period

**D.2. Data and parameters monitored**

Data / Parameter	Energy exported			
Unit	kWh			
Description	Energy exported to grid			
Measured /Calculated /Default	Measured			
Source of data	Main / Trivector Meter			
Value(s) of monitored parameter				
	Dolowal	Salar	Bhanubhura	Total
	8,958,330	9,101,840	9,297,400	27,357,570
Monitoring equipment				
	Particulars	Dolowal	Salar	Bhanubhura
	Type	L&T Electronic bidirectional trivector meter	L&T Electronic bidirectional trivector meter	L&T Electronic bidirectional trivector meter
	Accuracy class	(±)0.50%	(±)0.50%	(±)0.50%
	Serial number	03123065	03123066	03174966
	Calibration frequency	6 month	6 month	6 month
	Calibrations during monitoring period	18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012	18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012	18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012



Measuring/Reading/ Recording frequency	Monthly
Calculation method(if applicable)	Not Applicable
QA/QC procedures	<p>The power exported by PHPPL is monitored and recorded on the basis of reading of the Main Meter & Check Meter. Joint Meters reading are based on the Main Meter reading for the export and import of the electricity to and from the Grid.</p> <p>The principles of Frequency, Data recording and Reliability as mentioned in the PDD are strictly adhered to. The Main Meters and Check Meters are test checked for accuracy every six months by the team of PSEB.</p> <p>The Meters installed at generation end are also test checked for accuracy every six months.</p>
Purpose of data	To calculate emission reductions
Additional Comment	Not Applicable

Data / Parameter	Energy imported			
Unit	kWh			
Description	Energy imported from grid			
Measured /Calculated /Default	Measured			
Source of data	Main / Trivector Meter			
Value(s) of monitored parameter				
	Dolowal	Salar	Bhanubhura	Total
	13,770	12,190	11,580	37,540



Monitoring equipment	<table><tr><th>Particulars</th><th>Dolowal</th><th>Salar</th><th>Bhanubhura</th></tr><tr><td>Type</td><td>L&T Electronic bidirectional trivector meter</td><td>L&T Electronic bidirectional trivector meter</td><td>L&T Electronic bidirectional trivector meter</td></tr><tr><td>Accuracy class</td><td>(±)0.50%</td><td>(±)0.50%</td><td>(±)0.50%</td></tr><tr><td>Serial number</td><td>03123065</td><td>03123066</td><td>03174966</td></tr><tr><td>Calibration frequency</td><td>6 month</td><td>6 month</td><td>6 month</td></tr><tr><td>Calibrations during monitoring period</td><td>18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012</td><td>18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012</td><td>18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012</td></tr></table>				Particulars	Dolowal	Salar	Bhanubhura	Type	L&T Electronic bidirectional trivector meter	L&T Electronic bidirectional trivector meter	L&T Electronic bidirectional trivector meter	Accuracy class	(±)0.50%	(±)0.50%	(±)0.50%	Serial number	03123065	03123066	03174966	Calibration frequency	6 month	6 month	6 month	Calibrations during monitoring period	18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012	18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012	18/02/2011 to 17/08/2011 12/08/2011 to 11/02/2012 26/01/2012 to 25/07/2012 29/06/2012 to 28/12/2012
	Particulars	Dolowal	Salar	Bhanubhura																								
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,																												
Measuring/Reading/ Recording frequency	Monthly																											
Calculation method(if applicable)	Not Applicable																											
QA/QC procedures	The main and check meters installed are bidirectional tri-vector meters capable of recording energy exported and energy imported. The same are test checked for accuracy every six months. The data of main meter is checked / compared with the data of the check meter.																											
Purpose of data	To calculate emission reductions.																											
Additional comment	Not applicable																											



Data / Parameter	Net saleable energy											
Unit	kWh											
Description	Net salable energy to grid											
Measured /Calculated /Default	Calculated											
Source of data	Main Meter / PSEB Monthly Bills											
Value(s) of monitored parameter	<table><tr><td>Dolowal</td><td>Salar</td><td>Bhanubhura</td><td>Total</td></tr><tr><td>8,944,560</td><td>9,089,650</td><td>9,285,820</td><td>27,320,030</td></tr></table>				Dolowal	Salar	Bhanubhura	Total	8,944,560	9,089,650	9,285,820	27,320,030
Dolowal	Salar	Bhanubhura	Total									
8,944,560	9,089,650	9,285,820	27,320,030									
Monitoring equipment	As this is calculated, this section is not applicable for this monitoring parameter.											
Measuring/Reading/ Recording frequency	Monthly											
Calculation method(if applicable)	Net Saleable energy = Energy Exported – Energy Imported											
QA/QC procedures	Net Saleable energy is the net exported energy which is the difference of energy exported and energy imported. Joint Meters reading are taken from the Main and Check Meter every month to arrive at Net Saleable Energy. Net saleable generation is calculated from main meter. The Main and Check Meters are tested for accuracy every six months.											
Purpose of data	To calculate emission reductions											
Additional comment	Not applicable											



Data / Parameter	Energy generated			
Unit	kWh			
Description	Gross energy generated			
Measured /Calculated /Default	Measured			
Source of data	Generation Meters			
Value(s) of monitored parameter				
	Dolowal	Salar	Bhanubhura	Total
	9,223,184	9,357,660	9,652,062	28,232,906
Monitoring equipment				
	Particulars	Dolowal	Salar	Bhanubhura
	Type	Enercon Digital Energy Meter	Enercon Digital Energy Meter	Minsun Digital Energy Meter
	Accuracy class	(±) 0.5%	(±) 0.5%	(±) 0.5%
	Serial No. (Unit-I)	E33/148-0702	E33/150-0702	6690502
	Serial No. (Unit-II)	E33/149-0702	E33/151-0702	6690501
	Calibration Frequency	6 month	6 month	6 month
	Calibration during monitoring period	25/06/2011 to 24/12/2011 23/12/2011 to 22/06/2012 19/06/2012 to 18/12/2012	25/06/2011 to 24/12/2011 23/12/2011 to 22/06/2012 19/06/2012 to 18/12/2012	25/06/2011 to 24/12/2011 23/12/2011 to 22/06/2012 19/06/2012 to 18/12/2012



Measuring/Reading/ Recording frequency	Hourly
Calculation method (if applicable)	Not Applicable
QA/QC procedures	The readings of the energy generated are taken from the meters installed at generation point. These are test checked for accuracy every six months.
Purpose of data	Monitored as mentioned in PDD.
Additional comment	Not applicable

Data / Parameter	Auxiliary energy consumption			
Unit	kWh			
Description	Auxiliary energy consumed for running the plant			
Measured /Calculated /Default	Measured			
Source of data	Auxiliary Meters			
Value(s) of monitored parameter				
	Dolowal	Salar	Bhanubhura	Total
	125,157	118,994	120,419	364,570
,				
Monitoring equipment				
	Particulars	Dolowal	Salar	Bhanubhura
	Type	Enercon	Conzerv	Enercon
	Accuracy class	(+) 1.0%	(+)1.0%	(+) 1.0%
	Serial no.	E64/1187-0902	172264/5705735-0909	E64/1186-0902
	Calibration frequency	6 month	6 month	6 month
	Calibrations during monitoring period	25/06/2011 to 24/12/2011 23/12/2011 to 22/06/2012 19/06/2012 to 18/12/2012	25/06/2011 to 24/12/2011 23/12/2011 to 22/06/2012 19/06/2012 to 18/12/2012	25/06/2011 to 24/12/2011 23/12/2011 to 22/06/2012 19/06/2012 to 18/12/2012



	,
Measuring/Reading/ Recording frequency	Hourly
Calculation method (if applicable)	Not Applicable
QA/QC procedures	Auxiliary energy consumption readings are recorded at the auxiliary meters installed in the panel. These are test checked for accuracy every six months.
Purpose of data	Monitored as mentioned in PDD.
Additional comment	Not applicable

D.3. Implementation of sampling plan

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Not applicable

**SECTION E. Calculation of emission reductions or GHG removals by sinks****E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

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SN	Description	Formula	Unit	Value
A	Energy Exported		kWh	27,357,570
B	Energy Imported		kWh	37,540
C	Net Saleable Energy	$C = A - B$	kWh	27,320,030
D	Carbon Emission Factor as per the baseline adopted		kg CO ₂ /kWh	0.942
E	Baseline Emissions	$E = (C * D) / 1,000$	ton CO ₂	25,735

E.2. Calculation of project emissions or actual net GHG removals by sinks

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No project emissions are associated with the project activity during this monitoring period. This is also in line with the PDD and methodology.

E.3. Calculation of leakage

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As the energy generating equipment is not transferred from another activity or the existing equipment is also not transferred to another activity, leakage is not considered. The same is in line with the methodology and the registered PDD.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

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Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO ₂ e)
Total	25,735	NIL	NA	25,735

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

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Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO ₂ e)	26,383	25,735

E.6. Remarks on difference from estimated value in registered PDD

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The actual emission reductions during this monitoring period are less than estimated value in the registered PDD for the equivalent time period.

**Annexure - I**

The month wise data on energy generated is given hereunder. The monthly data is based on the hourly reading taken at the meters installed at the generation end

Energy Generated (kWh)

Billing Month	Year	Dolowal	Salar	Bhanubhura	Total
Aug	2011	546,122	564,154	551,758	1,662,034
Sep	2011	254,320	270,986	290,321	815,627
Oct	2011	599,700	625,016	657,325	1,882,041
Nov	2011	537,130	561,797	590,836	1,689,763
Dec	2011	413,730	430,475	492,177	1,336,382
Jan	2012	715,900	728,221	790,215	2,234,336
Feb	2012	784,138	804,165	810,982	2,399,285
Mar	2012	872,320	871,460	883,271	2,627,051
Apr	2012	220,471	215,992	232,051	668,514
May	2012	802,865	788,600	794,139	2,385,604
Jun	2012	852,582	856,515	866,241	2,575,338
Jul	2012	917,025	918,350	894,098	2,729,473
Aug	2012	747,151	749,416	752,783	2,249,350
Sep	2012	593,580	599,212	666,470	1,859,262
Oct	2012	366,150	373,301	379,395	1,118,846
Total		9,223,184	9,357,660	9,652,062	28,232,906

**Annexure - II**

The month-wise data on auxiliary energy consumption is given hereunder. The monthly data is based on hourly reading taken at the auxiliary meters installed at the panel:

Auxiliary Energy Consumption (kWh)

Billing Month	Year	Dolowal	Salar	Bhanubhura	Total
Aug	2011	7,717	7,034	7,875	22,626
Sep	2011	4,700	5,193	5,933	15,826
Oct	2011	8,435	8,071	7,989	24,495
Nov	2011	8,238	7,302	6,712	22,252
Dec	2011	7,607	7,495	7,063	22,165
Jan	2012	8,456	8,311	7,814	24,581
Feb	2012	7,322	7,076	6,969	21,367
Mar	2012	8,321	7,523	7,256	23,100
Apr	2012	4,728	4,637	3,810	13,175
May	2012	9,686	9,475	10,125	29,286
Jun	2012	11,015	11,555	11,594	34,164
Jul	2012	11,589	10,761	11,227	33,577
Aug	2012	11,084	10,430	11,257	32,771
Sep	2012	9,915	8,871	9,764	28,550
Oct	2012	6,344	5,260	5,031	16,635
Total		125,157	118,994	120,419	364,570

The energy generated data and auxiliary energy consumption data is not used for calculation of emission reductions as the calculation of emission reductions is based on Net Saleable energy i.e. the difference of energy exported and energy imported.

**Annexure - III**

Month-wise data on Net Saleable Energy for the monitoring period is given as under:

As per the Project Design Document, Emission reductions are to be calculated based on the energy exported minus energy imported during shut-down and start-ups by the power plant.

Net Saleable Energy (kWh)

Billing Month	Year	Energy Exported				Energy Imported				Net Saleable Energy
		Dolowal	Salar	Bhanubhura	Total	Dolowal	Salar	Bhanubhura	Total	
Aug	2011	530,480	549,330	530,630	1,610,440	1,540	1,500	1,840	4,880	1,605,560
Sep	2011	246,280	262,610	279,780	788,670	2,560	2,540	2,980	8,080	780,590
Oct	2011	581,970	608,360	635,780	1,826,110	90	90	60	240	1,825,870
Nov	2011	520,400	548,170	572,860	1,641,430	70	40	30	140	1,641,290
Dec	2011	399,420	418,830	474,640	1,292,890	60	60	30	150	1,292,740
Jan	2012	697,490	710,090	763,500	2,171,080	160	130	70	360	2,170,720
Feb	2012	765,660	786,970	782,970	2,335,600	100	130	70	300	2,335,300
Mar	2012	851,360	851,440	853,250	2,556,050	120	150	100	370	2,555,680
Apr	2012	214,780	210,420	223,930	649,130	4,320	3,450	2,840	10,610	638,520
May	2012	779,740	765,070	762,850	2,307,660	100	230	170	500	2,307,160
Jun	2012	828,080	829,940	831,350	2,489,370	160	380	220	760	2,488,610
Jul	2012	889,820	889,730	858,330	2,637,880	230	310	230	770	2,637,110
Aug	2012	722,490	726,130	722,300	2,170,920	170	170	230	570	2,170,350
Sep	2012	574,060	581,030	639,990	1,795,080	190	150	160	500	1,794,580
Oct	2012	356,300	363,720	365,240	1,085,260	3,900	2,860	2,550	9,310	1,075,950
Total		8,958,330	9,101,840	9,297,400	27,357,570	13,770	12,190	11,580	37,540	27,320,030



History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the monitoring report form” (EB66, Annex 20)
01	EB 54, Annex 34 28 May 2010	Initial adoption
Decision Class: Regulatory Document Type: Form Business Function: Issuance		