Monitoring report form
(Version 03.1)

Monitoring report

Title of the project activity	Wind Power Project in Tinwari, Rajasthan
Reference number of the project activity	6160
Version number of the monitoring report	01
Completion date of the monitoring report	20/03/2013
Registration date of the project activity	25/07/2012
Monitoring period number and duration of this monitoring period	01 (01/08/2012 – 28/02/2013; including first and last days of monitoring period.)
Project participant(s)	Enercon (India) Limited
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope: 1, ACM0002, version 12.2.0
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	18,827
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	12,789

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The purpose of the project activity is to utilize renewable wind energy for generation of electricity. Project activity is the installation of green field energy production using wind as a source of power generation. In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the NEWNE, which are/ will be predominantly based on fossil fuels. Whereas the operation of Wind Energy Convertors (WEG's) is emission free and no emissions occur during the lifetime of the project activity.

The project consists of 25 machines of Enercon make E-53 type WEGs of 800KW capacity each totaling to the capacity of 20.0 MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV and further transmitted to Enercon Sub-station. From Enercon substation electricity is further evacuated to the Rajasthan regional electricity grid which is part of the NEWNE (Northern, Eastern, Western and North-Eastern) grid in India. The clean and green electricity supplied by the project will aide in sustainable growth in the region. Enercon (India) Limited (hereafter referred as "Enercon") is the project owner and project participant for the project activity.

The first machine under the project activity was commissioned on 30 September 2011 and last machine under the project activity was commissioned on 09 November 2011. The expected operational lifetime of the project is for 20 years.

The total emission reductions achieved under current monitoring period (01 Aug 2012 to 28 Feb 2013)[1] is 12,789 tCO_2e.

A.2. Location of project activity

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The Project is located in Jodhpur district in the Indian State of Rajasthan. The Project is spread across Salodi, Chensingh Nagar, Bari, Malunga, Bada Kotacha, Digadi Dhani, Balrva & Beru villages of Jodhpur district in the Rajasthan state of India. The nearest railway station from the project site is Jodhpur, approximately at a distance of 50 Kms. The nearest airport is Jodhpur from site. The wind turbines extend between Latitude N 26.42481 to Latitude N 26.51170 and Longitude E 72.77188 to Longitude E 72.87424.

Individual WEG location numbers and coordinates are detailed out in below table:-

S.No.	WEG Loc No.	Village	Latitude (N)	Longitude (E)
1	9	SALODI	26.42828	72.80512
2	48	Chain singh Nagar/Balrva	26.45382	72.87220
3	49	Chain singh Nagar/Balrva	26.45383	72.86990
4	50	Chain singh Nagar/Balrva	26.45661	72.87060
5	51	Chain singh Nagar/Balrva	26.45580	72.86707
6	53	Chain singh Nagar/Balrva	26.45745	72.86628
7	82	Bari	26.47798	72.83214
8	83	Bari	26.47596	72.82855
9	112	Malunga	26.45374	72.77689

[1] Crediting period of the project activity as per registered PDD starts from 28 Feb 2012 to 27 Feb 2022 (Fixed) and PP has chosen the first monitoring period starting from 28 Feb 2012 to 31 Dec 2012. However while calculating the emission reduction PP has forego the generation from 28 Feb 2012 to 29 Feb 2012, since the billing period of project activity starts from 1st day of March 2012. Carving out generation details for 02 days i.e., from 28 Feb 2012 to 29 Feb 2012 is difficult. Hence being conservative, the project proponent wishes to forego the generation for those 02 days for the purpose of simplicity in the calculation of emission reductions during this monitoring period.

10	113	Malunga	26.45609	72.77677
11	114	Malunga	26.45756	72.77531
12	115	Malunga	26.46012	72.77523
13	116	Malunga	26.45891	72.77188
14	129	Digadi Dhani (Malunga)	26.49696	72.79726
15	130	Bada Kotacha	26.50309	72.80070
16	131	Bada Kotacha	26.50395	72.79868
17	133	Bada Kotacha	26.50955	72.79788
18	134	Bada Kotacha	26.51170	72.79732
19	136	Digadi Dhani (Malunga)	26.50604	72.79201
20	137	Digadi Dhani (Malunga)	26.50539	72.79512
21	501	Chain singh Nagar/Balrva	26.45836	72.86488
22	504	Beru	26.42481	72.87424
23	515	Digadi Dhani (Malunga)	26.50039	72.79619
24	516	Digadi Dhani (Malunga)	26.50245	72.79325
25	517	Digadi Dhani (Malunga)	26.50828	72.79092

A.3. Parties and project participant(s)

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)	Enercon (India) Limited (Private entity)	No

A.4. Reference of applied methodology

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Title: Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"

Reference: Approved consolidated baseline methodology ACM0002 (Version 12.2.0, EB 58)

UNFCCC web reference of methodology:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 02.2.1[2]
- Tool for the demonstration and assessment of additionality – Version 05.2[3]

A.5. Crediting period of project activity

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Type of crediting period	:	Fixed
Start date of crediting period	:	01/08/2012
Length of crediting period	:	10 years

[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf
[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project activity consists of 25 machines (800 kW) of Enercon make E-53. The first machine under the project activity was commissioned on 30 September 2011 and last machine under the project activity was commissioned on 09 November 2011. The commissioning dates for all the machines include in the project activity are given in the table below:-

S.No.	WEG Loc No.	Village	Date of Commissioning
1	9	SALODI	30 Sep 2011
2	48	Chain singh Nagar/Balrva	09 Nov 2011
3	49	Chain singh Nagar/Balrva	09 Nov 2011
4	50	Chain singh Nagar/Balrva	09 Nov 2011
5	51	Chain singh Nagar/Balrva	09 Nov 2011
6	53	Chain singh Nagar/Balrva	09 Nov 2011
7	82	Bari	30 Sep 2011
8	83	Bari	30 Sep 2011
9	112	Malunga	09 Nov 2011
10	113	Malunga	09 Nov 2011
11	114	Malunga	09 Nov 2011
12	115	Malunga	09 Nov 2011
13	116	Malunga	09 Nov 2011
14	129	Digadi Dhani (Malunga)	30 Sep 2011
15	130	Bada Kotacha	30 Sep 2011
16	131	Bada Kotacha	30 Sep 2011
17	133	Bada Kotacha	30 Sep 2011
18	134	Bada Kotacha	30 Sep 2011
19	136	Digadi Dhani (Malunga)	30 Sep 2011
20	137	Digadi Dhani (Malunga)	30 Sep 2011
21	501	Chain singh Nagar/Balrva	09 Nov 2011
22	504	Beru	09 Nov 2011
23	515	Digadi Dhani (Malunga)	30 Sep 2011
24	516	Digadi Dhani (Malunga)	30 Sep 2011
25	517	Digadi Dhani (Malunga)	30 Sep 2011

Enercon operation and maintenance activities are ISO 9001:2008 certified. Referring to the data available it can be inferred that there have not been any major special events for any of the machines that are included in the project activity. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance for 16 to 18 hours annually and for visual inspection for 6 to 7 hours quarterly. Further the consolidated performance report of project WEGs during the monitoring period including the down time, machine availability, grid availability, etc. has been added in Appendix 1. During the monitoring period there were no events or situations occurred, which may impact the applicability of the methodology.

The project activity consists of 25 WEGs of Enercon make E-53 and each machine capacity is of 800 kW (E-53) totaling to the capacity of 20.0 MW. The WEGs generates 3-phase power at 400V, which is stepped up to 33 kV and connected to 33kV metering points. From 33 kV metering point's electricity transmitted to Enercon Sub-station. At sub-station electricity is step-up to 132 kV. From Enercon substation electricity is further evacuated to the state electricity grid at 132kV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are:-

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.

- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawal (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEG with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking System.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts generation of power at wind speed of 3 m/s

Enercon (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured. Diagram of main component of Enercon make E-53 is shown in below picture:-

Figure: Enercon make E-53 Diagram.

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

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Enercon (India) Limited is O&M contractor for the project activity and will be responsible for the maintaining all the monitoring data on behalf of Enercon in respect of the project activity. Enercon (India) Limited has implemented the management structure for managing the monitored data.

This approved monitoring methodology requires monitoring of the following:

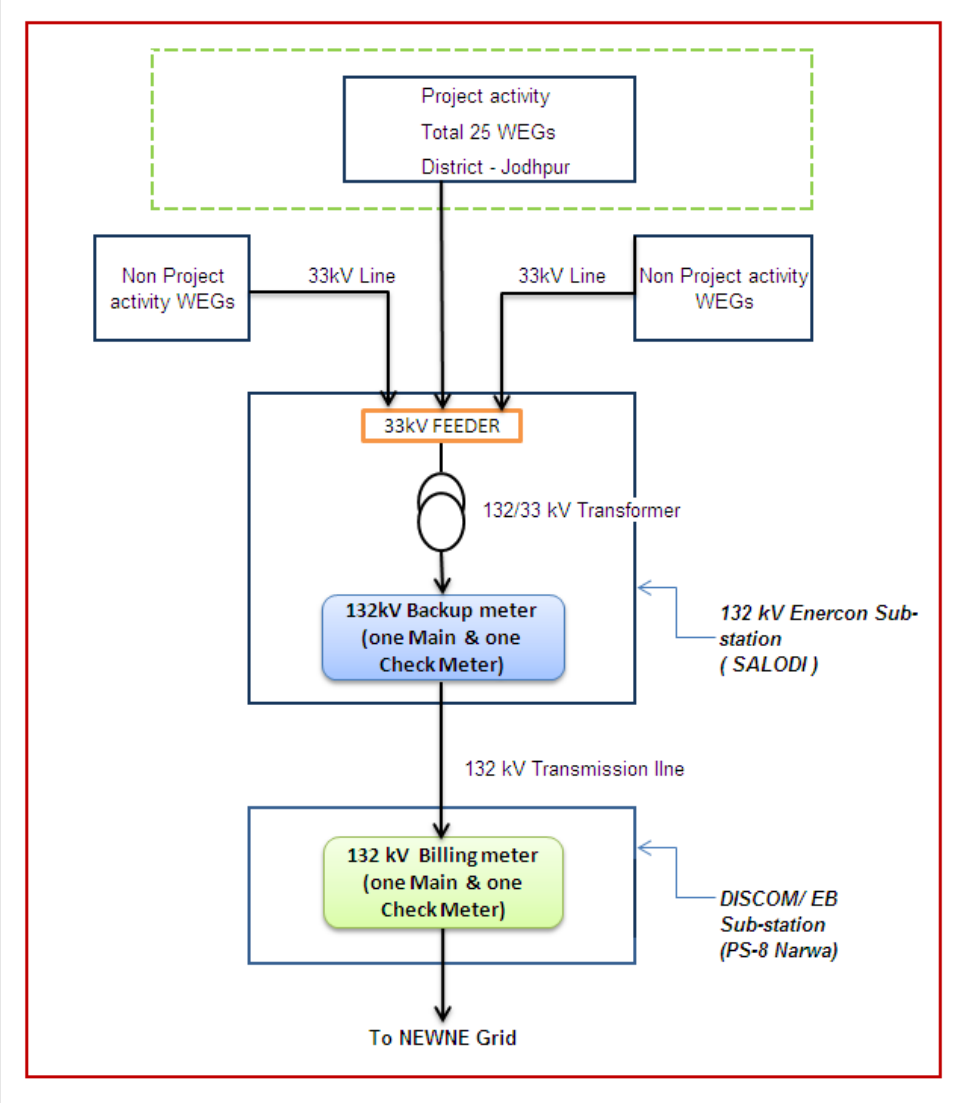
- Net electricity supplied from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where *ex post* determination of grid emission factor has been chosen

Emission factor of NEWNE electricity grid of the project activity is fixed ex ante hence no further monitoring of this parameter is required. As per ACM0002 leakage need not be considered hence leakage has not been considered for the project activity. Hence, the sole parameter for monitoring is the net electricity supplied by the project activity to the grid.

The Project activity is operated by (O&M contractor for the project activity) and managed by the Enercon. The operational and maintenance activity will be taken care by the service department of Enercon, which is an ISO 9001 certified company. Enercon follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

Calculation of Net Electricity Supplied to the grid by project activity:

Layout of Metering arrangement for project activity is as follows:-



From the above layout it is clear that project activity WEGs (25Nos) along with WEGs of other customers, who are not the part of project activity are connected to Enercon Sub-stations which are further connected to EB sub-station through EHV line. The 25WEGs of project activity installed in Jodhpur district is connected through 132kV Enercon (India) Limited (herein after referred as EIL) pooling sub-station (132kV SALODI sub-station), through 33kV feeder lines. At EIL pooling sub-station SALODI electricity is stepped up to 132kV, wherein the backup meter (one main & one check meter) connected. From EIL pooling sub-station electricity is transmitted to state utility (DISCOM) sub-station (PS-8 Narwa Sub-station) through 132kV transmission line/ EHV line wherein billing meter (one main & one check meter) is connected. At EB sub-station metering is done at 132kV billing meter. From EB sub-station electricity is further transmitted to NEWNE grid.

The net electricity supplied to the grid will be calculated on monthly basis at the EB/DISCOM substations (PS-8 Narwa) wherein the billing meter is connected. The monthly joint meter readings are taken by the representatives of DISCOM and Enercon (PP's representative) who also signs the JMR. Simultaneously, the monthly joint meter reading of backup meters available at EIL pooling sub-station (SALODI) is also taken by representatives of RVPN/DISCOM and Enercon. The copy of JMR at backup meters is available with Enercon.

Since the project activity WEGs are connected through common metering system along with non project activity WEGs of other customers at the main meter, apportioning of electricity export & import as recorded in JMR is being done to calculate the electricity export & import by individual WEGs/ customers. Apportioning is being done based on the net electricity generation (Gross Export – Gross Import) recorded at LCS meter

installed in individual WEGs

Based on the monthly JMR reading, which is signed by representative of DISCOM and PP's representative (Enercon); Enercon prepares the monthly breakup generation sheets which indicate export, import & the net electricity supplied by individual customers to the grid. An apportioning procedure is used by PP's representative to arrive at net electricity supplied to the grid by individual investors.

The monthly generation sheet is submitted to both, DISCOM as well as individual investors. PP raises the invoice based on the monthly breakup sheet corresponding to the net electricity generation value indicated in the monthly breakup sheet. DISOM based on the JMR reading along with monthly breakup sheet prepared by Enercon and the invoice raised by investors, conduct the audit to cross check the net electricity values and in case all the values are found to be correct, DISCOM release the payment against the invoice raised by individual investors.

The values of the net electricity supplied to grid by project activity can be cross checked with invoices raised by the PP on DISCOM and/or RTGS transaction or cheque copy.

Procedure for apportioning:-

Procedure used by PP's representative to prepare monthly breakup sheets for project activity:-

The monthly JMR reading contains the electricity export, import & net electricity supplied by all the WEGs of project activity as well as non project activity connected to the metering system at DISCOM substation. Hence in order to arrive at the electricity export, import & net electricity supplied by WEGs of the project activity based on the net electricity generation (Gross Export – Gross Import) recorded at LCS meter, following procedure is used by O&M contractor (Enercon):-.

net electricity generation (Gross Export – Gross Import) by WEGs of project activity,

$$\sum \mathbf{EG}_{\mathbf{Controller,\ i}} = \sum_{j=1}^{n} \mathbf{EG}_{\mathbf{Controller,\ i}}$$

Where, **n** is the number of WEGs (n = 1 to 25) in project activity.

net electricity generation (Gross Export – Gross Import) by all WEGs (Project activity & non project activity) connected to Discom substation,

$$\sum \mathbf{EG}_{\mathbf{Controller,\ i}} = \sum_{i=1}^{j+k} \mathbf{EG}_{\mathbf{Controller,\ i}}$$

Where, j+k is the number of WEGs (project activity & non project activity) connected to sub-station.

As LCS meter measures the net electricity generation (Gross Export – Gross Import) by individual WEG, which is the difference of export and import and doesn't provide individual reading of Export & Import; the apportioning of electricity export & import at recorded at billing meter as indicated in JMR sheet is done based on net electricity generation (Gross Export – Gross Import) of WEGs. This is a standard procedure that is followed in the state of Rajasthan and is accepted by the state DISCOM for payment of tariff invoices.

Electricity exported by all WEGs of project activity is apportioned on the basis of summation of net electricity generation (Gross Export – Gross Import)[4] (by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site and the electricity export recorded at the main meter mentioned in the JMR. The formula used for computing electricity export to the grid by the project activity is as follows:-

Electricity Export to the grid by the Project activity,

[4] LCS meter installed in individual WEGs control panel measures the net/ gross electricity generation (Export- Import) by WEG and therefore $\sum EG_{Controller,\ j}$ is used by developer to calculate electricity export & import by individual developer (project activity & non project activity WEGs)..

$$EG_{Export,y} = \frac{EG_{JMR,Export} * \sum EG_{Controller,\,i}}{\sum EG_{Controller,i}^{5}} \quad \text{.....(1)}$$

As LCS meter measures the net electricity generation (Gross Export – Gross Import) by WEGs and doesn't provide individual reading of Export & Import. Therefore apportioning of export as well as import for all WEG of the project activity is also apportioned on the basis of summation of net electricity generation (Gross Export – Gross Import) by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site and the electricity import recorded at the main meter mentioned in the JMR. The formula used for computing electricity import from the grid by the project activity is as follows

Electricity Import from the grid by the Project activity,

$$EG_{Import,y} = \frac{EG_{JMR,Import} * \sum EG_{Controller,\,i}}{\sum EG_{Controller,i}} \quad \text{.....(2)}$$

Wherein,

$\sum EG_{Controller,\,i}$	=	Summation of net electricity generation (Gross Export – Gross Import) by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site
$\sum EG_{Controller,i}$	=	Summation of net electricity generation (Gross Export – Gross Import) by all WEG (i number of WEGs) of project activity or non project activity, as measured at the controller (LCS meter) at project site
$EG_{JMR,Export}$	=	Electricity export by project and non project recorded at respective billing meters located at DISCOM sub-station. This can be checked from JMR certificates.
$EG_{JMR,Import}$	=	Electricity import by project and non project recorded at respective billing meters located at DISCOM sub-station. This can be checked from JMR certificates.
$\mathbf{EG_{Export,y}}$	=	Electricity export by project activity calculated as per formula 1 above
$\mathbf{EG_{import,y}}$	=	Electricity import by project activity calculated as per formula 2 above.

Therefore net electricity supplied to grid by 25 WEGs of the project activity is calculated as the difference of equation (1) & (2),

$$\mathbf{EG_{Facitlity,y} = EG_{Export,y} - EG_{Import,y}}$$

Even though the above mentioned of apportioning is done by the PP's representative and submitted to respective DISCOM, the same undergoes the series of audit by the hierarchy of auditors (Asst. Auditors, divisional auditors & account auditors) and then finally authorised by the Superintending engineer (SE) of the circle office of respective DISCOMs.

The above method of apportioning is not conducted by the PP but is described in details only to provide the clear description of entire procedure by relevant authority

Procedure to deal with data uncertainty:

During the annual calibration, if the meter is found to be outside the permissible limits of the error and if that

[5] The report detailing the value of $\sum EG_{Controller}$ can be provided to the verifying DOE on request.

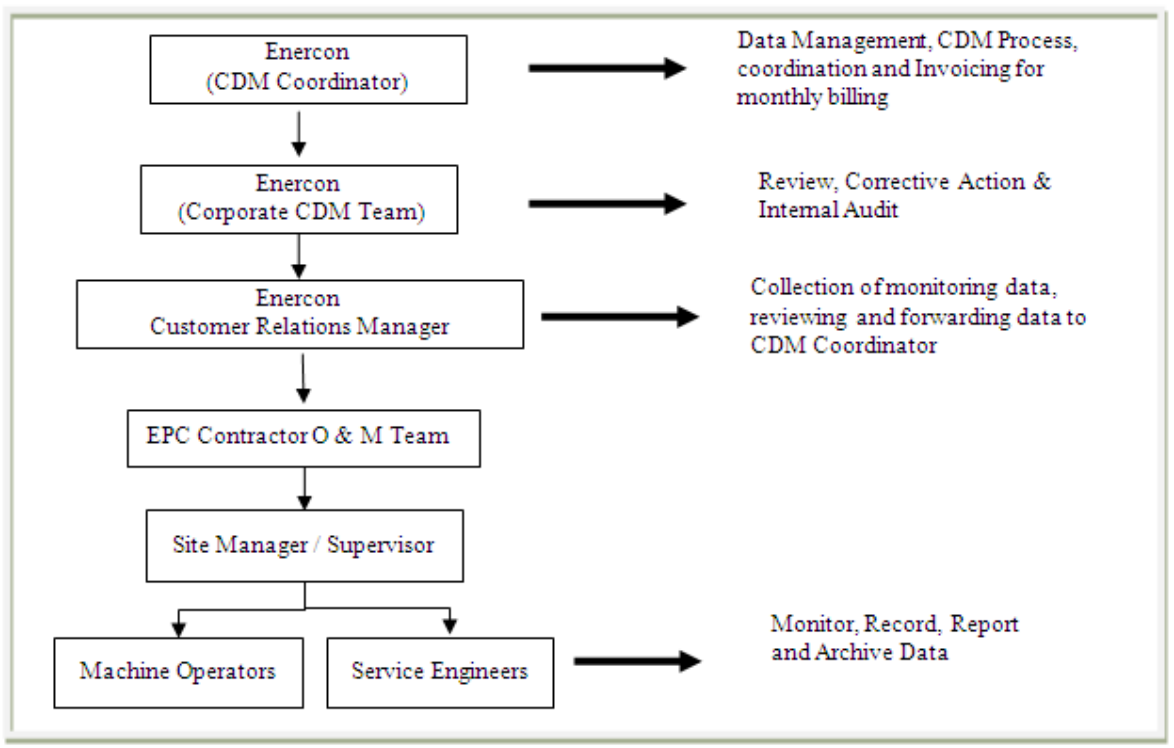
meter readings have been used in JMR, the (–ve) error value would be applied to electricity export and (+ve) error value will be applied to import of electricity from grid to all the JMR values since the date of last calibration. The meter would be replaced immediately with new calibrated meter.

Training and maintenance requirements:

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that Enercon's service staffs is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The Enercon Training Academy provides need-based training to meet the training requirements of Enercon projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

Monitoring roles and responsibilities

The operational and management structure implemented for data monitoring is as follows:



Meter Test Checking Details:

The metering equipment were inspected & tested by State Utility. Meter details & calibration details for the all the main and check meters are as follows:-

Location of meter	PS-8 Sub-station (Electricity Board)		Salodi Sub-station (Enercon)
Type of meter	Main Meter	Check Meter	Backup meter
Meter Sr. No.	RJB 00354	RJB 00356	RJB 00358
Meter Make	Secure	Secure	Secure
Accuracy class	0.20%	0.20%	0.20%

Type		All the meters are two-way Tri-vector meters capable of recording import and export of electricity.		
Calibration Details	2011	24-Mar-11	24-Mar-11	24-Mar-11
	2012	16-Mar-12	16-Mar-12	15 Mar 12

The main and check meters are tested for accuracy on annual basis by state utility and in case of error; meters are calibrated by state utility. Further during the annual meter testing, all the meters were under the permissible limit of error and accordingly none of the meter was replaced during the current monitoring period.

SECTION D. Data and parameters

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

Data / Parameter:	$EF_{CM,y}$
Unit:	tCO_2e/MWh
Description:	Combined Margin Emission Factor of NEWNE Electricity Grid
Source of data:	Combined Margin Emission Factor ($EFgrid_{CM,y}$) is calculated as the weighted average of Operating Margin Emission Factor ($EFgrid_{OM,y}$) and Build Margin Emission Factor ($EFgrid_{BM,y}$). The "CO_2 Baseline Database for Indian Power Sector", version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied):	"CO_2 Baseline Database for Indian Power Sector", version 6.0 published by the Central Electricity Authority, Ministry of Power, Government of India. Combined Margin Emission Factor ($EFgrid_{CM,y}$) 0.94881 Refer Annex – 3 for comprehensive calculation of Combined Margin Emission Factor.
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	This value is calculated on ex-ante basis and will remain fixed for the entire crediting period.

Data / Parameter:	$EF_{OM,y}$
Unit:	tCO_2e/MWh
Description:	Operating Margin Emission Factor of NEWNE Electricity Grid
Source of data:	"CO_2 Baseline Database for Indian Power Sector", version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied):	0.99431

Purpose of data:	Calculation of Baseline Emissions
Additional comment:	This value is calculated on ex-ante basis and will remain fixed for the entire crediting period.

Data / Parameter:	$EF_{BM,y}$
Unit:	tCO_2e/MWh
Description:	Build Margin Emission Factor of NEWNE Electricity Grid
Source of data:	"CO_2 Baseline Database for Indian Power Sector", version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value(s) applied):	0.81231
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	This value is calculated on ex-ante basis and will remain fixed for the entire crediting period.

Please refer Annex 1 for combined margin calculation

D.2. Data and parameters monitored

Data / Parameter:	$EG_{facility,y}$
Unit:	MWh (Mega-watt hour)
Description:	Net electricity generation supplied to the grid by the Project activity.
Measured/ Calculated / Default:	Calculated
Source of data:	Generation break-up sheets prepared by the developer (Enercon), which is based on monthly JMR reading recorded at main meter installed at DISCOM sub-station and the LCS controller meter (panel meter) reading.
Value(s) of monitored parameter:	= 13,479.785 MWh
Monitoring equipment:	Since it is calculated value, hence not applicable.
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Refer section 'C' (Description of monitoring system) for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	The procedures for calculation of net electricity supplied to grid has been followed as per the provisions of the power purchase agreement and details of calculation method has been explained in monitoring plan under section C of monitoring report.
QA/QC procedures:	Value of $EG_{facility,y}$ can be cross checked with the tariff invoices raised on the DISCOM and/or RTGS transaction or cheque copy. All the billing Main & Backup meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon)

Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	**$EG_{Export,y}$**
Unit:	MWh (Mega-watt hour)
Description:	Electricity export to the grid by the Project activity.
Measured/ Calculated / Default:	Measured
Source of data:	Generation break-up sheets prepared by the developer (Enercon), which is based on monthly joint meter reading recorded at main meter installed at DISCOM sub-station and the LCS controller meter (panel meter) reading.
Value(s) of monitored parameter:	=13,510.309 MWh
Monitoring equipment:	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, meter test checking frequency, date of last meter test checking and validity under the heading 'Meter Test Checking Details'
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly. Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	Value of $EG_{Export,y}$ can be cross checked with the tariff invoices raised on the DISCOM and/or RTGS transaction or cheque copy. All the billing & Back meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon)
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	**$EG_{Import,y}$**
Unit:	MWh (Mega-watt hour)
Description:	Electricity Import from grid by the Project activity.
Measured/ Calculated / Default:	Measured
Source of data:	Generation break-up sheets prepared by the developer (Enercon), which is based on monthly meter reading recorded at main meter installed at DISCOM sub-station and the LCS controller meter (panel meter) reading.

Value(s) of monitored parameter:	=30.524 MWh
Monitoring equipment:	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, meter test checking frequency, date of last meter test checking and validity under the heading 'Meter Test Checking Details'
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	Value of $EG_{Import,y}$ can be cross checked with the tariff invoices raised on the DISCOM and/or RTGS transaction or cheque copy. All the billing & Back meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon).
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived both in electronic and hard paper format for crediting period + 2 years

Data / Parameter:	**$EG_{JMR, Export}$**
Unit:	MWh (Mega-watt hour)
Description:	Electricity export by project activity & non project activity recorded by main meter installed at DISCOM sub-station.
Measured/ Calculated / Default:	Measured
Source of data:	Monthly JMR sheets recorded by representative of both DISCOM & Enercon
Value(s) of monitored parameter:	=61,292.563 MWh
Monitoring equipment:	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, meter test checking frequency, date of last meter test checking and validity under the heading 'Meter Test Checking Details'
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	All the billing & Backup meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon)

Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived both in electronic and hard paper format for crediting period + 2 years

Data / Parameter:	**$EG_{JMR, Import}$**
Unit:	MWh (Mega-watt hour)
Description:	Electricity import by project activity & non project activity recorded by main meter installed at DISCOM sub-station
Measured/ Calculated / Default:	Measured
Source of data:	Monthly JMR sheets recorded by representative of both DISCOM & Enercon.
Value(s) of monitored parameter:	=155.275 MWh
Monitoring equipment:	Please refer section 'C' (Description of monitoring system) for the details of meter type, accuracy class, serial number, meter test checking frequency, date of last meter test checking and validity under the heading 'Meter Test Checking Details'
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	All the billing & Backup meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon).
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived both in electronic and hard paper format for crediting period + 2 years

Data / Parameter:	**$EG_{Controller, i}$**
Unit:	MWh (Mega-watt hour)

Description:	Net electricity generation (Gross Export – Gross Import) by a WEG of project activity or non project activity, as measured at the controller (LCS meter) at project site. Each WEG has exclusive LCS meter that records net electricity generation (Gross Export – Gross Import) from the WEG (project or non project). Where, i is any WEG between 1 to j+ k. j is number of WEG of project activity connected to main meter at DISCOM substation and backup meter at Enercon substation. k is number of WEG of non project activity connected to main meter at DISCOM substation and backup meter at Enercon substation.
Measured/ Calculated / Default:	Measured
Source of data:	Monthly controller generation report (LCS) sourced from SCADA system installed at project site.
Value(s) of monitored parameter:	Please refer CER calculation sheet for the values of parameter.
Monitoring equipment:	Please refer section 'C' for details of controller meter (LCS).
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	-
QA/QC procedures:	All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately.
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived in electronic form for crediting period + 2 years.

Data / Parameter:	$\sum EG_{Controller,i}$
Un□t:	MWh (Meg□-watt hour)

D□scription	Summation of net electricity generation (Gross Export-Gross Import) by all WEG (i number of WEGs) of project activity (j number of WEGs) and non-project activity (k number of WEGs), as measured at the controller (LCS meter) at project site, Each WEG has exclusive LCS meter that records net electricity generation (Gross Export-Gross Import) from the WEG (project or non-project). Where, i is any WEG between 1 to j+ k and connected to main meter (JMR/billing meter) at DISCOM substation and backup meter at Enercon substation. j is number of WEGs of project activity connected to main meter (JMR/billing meter) at DISCOM substation and backup meter at Enercon substation. k is number of WEG of non-project activity connected to main meter (JMR/billing meter) at DISCOM substation and backup meter at Enercon substation.
Measured/ Calculated / Default:	Calculated
Source of data:	Monthly controller generation report (LCS) sourced from SCADA system installed at project site.
Value(s) of monitored parameter:	Please refer CER calculation sheet.
Monitoring equipment:	Please refer section 'C' for details of controller meter (LCS).
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	Please refer section 'C' for calculation procedure.
QA/QC procedures:	All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately.
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived in electronic form for crediting period + 2 years.

Data / Parameter:	$\sum \mathbf{EG}_{\mathbf{Controller,\ j}}$
U□□t:	MWh (M□□□-watt hour)

Description:	Summation of net electricity generation (Gross Export – Gross Import) by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site. Each WEC has exclusive LCS meter that records net electricity generation (Gross Export – Gross Import) from the WEG (project or non project). j is number of WEG of project activity connected to main meter at DISCOM substation and backup meter at Enercon substation.
Measured/ Calculated / Default:	Calculated
Source of data:	Monthly controller generation report (LCS) sourced from SCADA system installed at project site.
Value(s) of monitored parameter:	Please refer CER calculation sheet.
Monitoring equipment:	Please refer section 'C' for details of controller meter (LCS).
Measuring/ Reading/ Recording frequency:	Frequency of recording data: Monthly Further all the meters have the capability of continuous measurement of data. Refer section 'C' for an illustration of the provisions for measurement methods.
Calculation method (if applicable):	Please refer section 'C' for calculation procedure.
QA/QC procedures:	All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately.
Purpose of data:	Calculation of Baseline Emissions
Additional comment:	The data will be archived in electronic form for crediting period + 2 years.

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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"The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO2e/kWh) as described in registered PDD.

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Baseline emission factor (Combined Margin) ($EF_{grid, CM, y}$) = 0.94881 tCO_2e/MWh.

Since the project activity is the installation of a new grid connected renewable power plant the $EG_{PJ,y}$ is calculated as :

$EG_{PJ.v} = EG_{facilitv.v}$

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Baseline Emission Reductions calculation for project activity:-

Duration	Electricity export to the grid by the Project activity [MWh]	Electricity import from grid by the Project activity [MWh]	Net electricity generation supplied to the grid by the Project activity [MWh]	Baseline Emission Factor (tCO_2e/MWh)	Baseline Emissions (tCO_2e)
	$[EG_{Export,y}]$	$[EG_{Import,y}]$	$[EG_{facility,y}]$	$[EF_y]$	$[BE_v] = [EG_{facitlity,v}] * [EF_y]$
01 Aug 12 to 31 Dec 12	8730.148	26.011	8704.137	0.94881	8,258
01 Jan 13 to 28 Feb 13	4780.161	4.513	4775.648	0.94881	4,531

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

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Since the project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

E.3. Calculation of leakage

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No leakage is considered from the project activity as per approved methodology ACM0002.

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

Item	Baseline emissions or baseline net GHG removals by sinks ($t CO_2e$)	Project emissions or actual net GHG removals by sinks ($t CO_2e$)	Leakage ($t CO_2e$)	Emission reductions or net anthropogenic GHG removals by sinks ($t CO_2e$)
Total	12,789	0	0	12,789

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

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks ($t CO_2e$)	**18,827** (212 days equivalent of annually (365 days) **32,415** emission reductions estimated in the registered PDD)	**12,789**

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

>>

There is marginal change of 32.10% (downside) in the expected and annual emission reductions since the monitoring period include the low wind season leading to low plant load factor during the monitoring period.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks ($t CO_2e$)	**8,258**	4,531

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Document information

Version	*Date*	*Description*
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: issuance
Keywords: monitoring report, performance monitoring

BASELINE INFORMATION

The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE Grid as published in the "CO_2 Baseline Database for Indian Power Sector"[6], Version 6.0, 1st March, 2011, published by Central Electricity Authority (CEA), Government of India have been used for the estimation of the Baseline Emission. The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE are as follows:

Simple Operating Margin

	NEWNE Grid (tCO_2e/GWh)	**Net Generation Total (MWh)**
Simple Operating Margin – 2007-08	0.99990	496.119
Simple Operating Margin – 2008-09	1.00655	510.693
Simple Operating Margin – 2009-10	0.97774	544.915
Weighted Average Operating Margin *		0.99431

** Calculated as per Option A, i.e. generation weighted average CO2 emissions per unit electricity generation has been used*

Build Margin

	NEWNE Grid (tCO_2e/GWh)
Build Margin- 2009-10	0.81231

Combined Margin Calculations

	Weights	**NEWNE Grid (tCO_2e/GWh)**
Operating Margin	0.75	0.99431
Build Margin	0.25	0.81231
Combined Margin		**0.94881**

Detailed information on calculation of Operating Margin Emission Factor and Build Margin Emission Factor is available at www.cea.nic.in.

[6] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Appendix 1: WEG Performance Report

State	RAJASTHAN		Monthly Performance Report					Date:01/08/2012-28/02/2013		
Wec No.	Generation		Down Time					Machine Availability (%)	Capacity Factor (%)	Grid Availability (%)
	KWh	Hrs	Machine		Grid		Total			
			Fault	Shutdown	Fault	Shutdown				
Site: TIWARI,RAJASTHAN									Total WEC : 25	
EILTI-01 (130)	455490	3476:00:00	1000:00:00	34:48:00	12:54	31:41:00	1612:00:00	79.66	11.19	99.12
EILTI-02 (131)	540397	3446:00:00	1125:08:00	33:23:00	12:54	31:41:00	1642:00:00	77.23	13.28	99.12
EILTI-03 (515)	511690	4204:00:00	28:00:00	42:23:00	13:26	34:49:00	884:00:00	98.62	12.57	99.05
EILTI-04 (129)	570377	4251:00:00	13:58	35:47:00	13:26	34:49:00	837:00:00	99.02	14.01	99.05
EILTI-05 (516)	523818	4215:00:00	34:13:00	35:19:00	13:26	34:49:00	873:00:00	98.63	12.87	99.05
EILTI-06 (137)	507582	4228:00:00	0	29:44:00	13:26	34:49:00	860:00:00	99.42	12.47	99.05
EILTI-07 (133)	545237	4274:00:00	3:21	29:24:00	13:26	34:49:00	814:00:00	99.36	13.4	99.05
EILTI-08 (134)	491261	4237:00:00	5:31	35:47:00	13:26	34:49:00	851:00:00	99.19	12.07	99.05
EILTI-09 (136)	513926	4241:00:00	1:48	31:41:00	13:26	34:49:00	847:00:00	99.34	12.63	99.05
EILTI-10 (517)	539752	4271:00:00	7:07	33:34:00	13:26	34:49:00	817:00:00	99.2	13.26	99.05
EILTI-11 (82)	517935	4224:00:00	19:46	28:01:00	13:26	16:03	864:00:00	99.06	12.72	99.42
EILTI-12 (83)	443381	4208:00:00	20:22	26:49:00	13:26	19:10	880:00:00	99.07	10.89	99.36
EILTI-13 (9)	523030	4227:00:00	63:01:00	28:56:00	13:26	16:03	869:00:00	98.19	12.85	99.42
EILTI-14 (112)	624120	4297:00:00	6:12	27:49:00	13:26	16:03	810:00:00	99.33	15.33	99.42
EILTI-15 (113)	574424	4209:00:00	62:34:00	26:10:00	13:26	16:03	896:00:00	98.26	14.11	99.42
EILTI-16 (114)	621524	4294:00:00	18:16	28:43:00	13:26	16:03	811:00:00	99.08	15.27	99.42
EILTI-17 (115)	539469	4268:00:00	43:18:00	28:29:00	13:26	16:03	837:00:00	98.59	13.25	99.42
EILTI-18 (116)	609768	4277:00:00	37:02:00	27:13:00	13:26	16:03	814:00:00	98.74	14.98	99.42
EILTI-19 (504)	586370	4275:00:00	20:51	20:17	13:26	30:41:00	832:00:00	99.19	14.41	99.13
EILTI-20 (48)	503685	4185:00:00	61:22:00	16:32	13:26	46:46:00	922:00:00	98.47	12.37	98.82
EILTI-21 (49)	611508	4260:00:00	15:22	16:07	13:26	46:46:00	847:00:00	99.38	15.02	98.82
EILTI-22 (50)	650622	4312:00:00	25:44:00	17:58	13:26	46:10:00	796:00:00	99.14	15.98	98.83
EILTI-23 (51)	675330	4280:00:00	57:00:00	17:05	13:26	46:46:00	827:00:00	98.54	16.59	98.82

EILTI-24 (53)	674175	4266:00:00	47:40:00	18:25	13:26	46:46:00	841:00:00	98.7	16.56	98.82
EILTI-25 (501)	597970	4229:00:00	24:20:00	15:51	13:26	46:46:00	877:00:00	99.21	14.69	98.82
Total	**13952841**	**104654:00**	**2741:56:00**	**686:15:00**	**334:46:00**	**784:06:00**	**22760:00**	**97.3**	**13.71**	**99.12**