



Monitoring report form for CDM project activity
(Version 07.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT

Title of the project activity	Salkhit Wind Farm	
UNFCCC reference number of the project activity	5977	
Version number of the PDD applicable to this monitoring report	03	
Version number of this monitoring report	02	
Completion date of this monitoring report	30/07/2019	
Monitoring period number	Twelfth monitoring report	
Duration of this monitoring period	01/01/2019-30/06/2019	
Monitoring report number for this monitoring period	N/A	
Project participants	Clean Energy LLC Swedish Energy Agency	
Host Party	Mongolia	
Applied methodologies and standardized baselines	ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 12.1.0	
Sectoral scopes	01 Energy Industries	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	81,484
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	96,034	

SECTION A. Description of project activity

A.1. General description of project activity

>>The objective of the Salkhit Wind Farm (hereinafter referred as Project) is to generate renewable electricity using wind power resources and supply it to Central Electricity System Grid to meet the growing electricity demand under the long-term Power Purchase Agreement (PPA). It is the first grid connected wind farm in Mongolia. The Project reduces greenhouse gas (GHG) emissions by avoiding CO₂ emissions from electricity generation from fossil fuel power plants that supplied to the Grid. Clean Energy (CE) is the Project developer and operator.

The specific goals of the Project are to:

- Generate clean electricity, reduce GHG emissions and contribute to reduction of air pollutants (SO₂, NO_x, PM) by saving coal and water consumption compared to business-as-usual scenario;
- Introduce wind power in Mongolia and help to stimulate the implementation of the other renewable energy source being the first grid-connected renewable energy source;
- Introduce private sector investment in renewable energy sector and pave the path for future projects being the first independent power producer with private sector investment in the country.
- Create local employment opportunity during Project development, construction and operation phases and create local expertise for future projects.

The 49.6MW Salkhit Wind Project is comprised of 31 wind turbine generators from General Electric (GE) each with an installed capacity of 1.6 MW. The expected total annual net electricity generation of the Salkhit Wind Farm is 168.5 GWh with an annual emission reduction of 178,778 tonnes of CO₂ equivalent (tCO₂e).

The commercial operation date is 25 June 2013 with all turbines commissioned as 19 Jul 2013 (though the start of the crediting period was updated as 24 June 2013). Construction lasted 2 years since 2011 (early civil works started in June 2011 while construction and erection work started in April 2012 as described in Table 1).

Table 1. Relevant Dates for the Project

Project start date as per the PDD	31/05/2011
Start of construction (early civil works)	06/2011
Registration date	30/03/2012
Construction and erection work	04/2012
Start of the crediting period	24/06/2013
Start of commercial operation	25/06/2013
All turbines commissioned	19/07/2013

The actual net electricity supply to the Grid from 01 Jan 2019 to 30 Jun 2019 was 76,799,316 kWh. The corresponding GHG emission reduction was 81,484 tCO₂ during this period. The operations summary and ER calculation are attached in 5977 MR12 Appendix 2.

A.2. Location of project activity

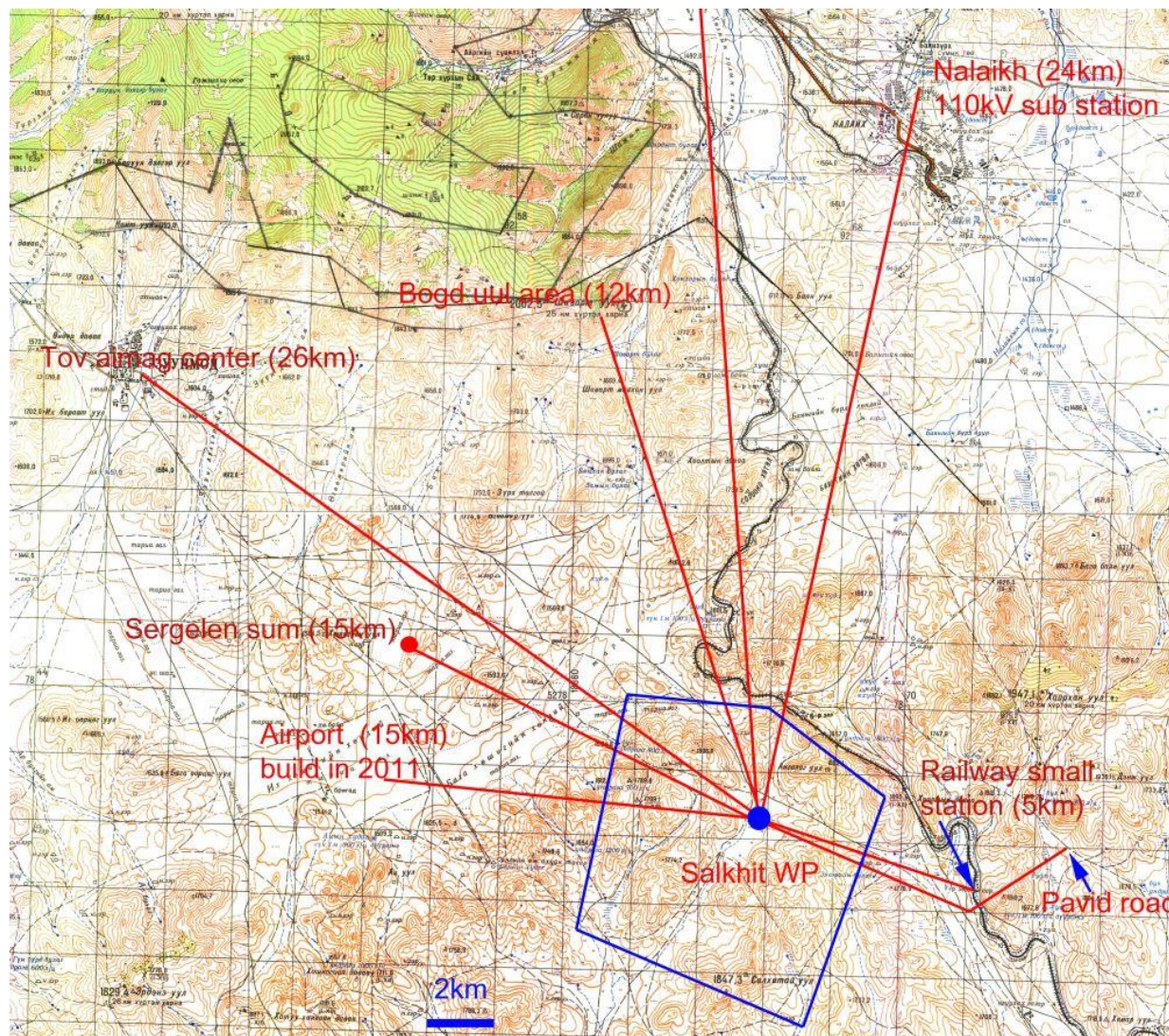
>>Host Party: Mongolia

The Project is located in Salkhit Mountain, Tsagduult and Shar Huviin Nuruu of Sergelen soum, Tuv aimag, approximately 70 km southeast of the capital city Ulaanbaatar.

The area is very remote: 11 km from a paved road, 5 km from a railway line, 13 km from the nearest 35 kV overhead line, and 22 km from the 110 kV Nalaikh substation. The nearest residential areas are 5 and 8 km away, where railway station employees and herders live (shown in Figure 1).

GPS coordinates of the Salkhit substation is E 107°11'19.7" longitude and N 47°34'37.1" latitude. The specific Project site layout with co-ordinates of 31 wind turbine generators (WTGs) is attached in Appendix 3.

Figure 1. Salkhit wind farm site location



A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Mongolia (host Party)	Clean Energy LLC (Private entity)	No
Sweden	Swedish Energy Agency (Public entity)	No
...	...	

A.4. References to applied methodologies and standardized baselines

>>Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 12.1.0.

This methodology refers to the latest approved versions of the following tools:

- AM Tool 07 “Tool to calculate the emission factor for an electricity system” version 02.2.1;
- AM Tool 01 “Tool for the demonstration and assessment of additionality” version 5.2;
- AM Tool 02 [“Combined tool to identify the baseline scenario and demonstrate additionality”](#) version 2.2 (this tool is not applicable to the project);
- AM Tool 03 “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” version 2 (this tool is not applicable to the project).

A.5. Crediting period type and duration

>>A 7-year renewable crediting period was chosen, starting from 24 June 2013 to 23 June 2020.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

>>The Project is comprised of:

- 31 wind turbine generators of GE 1.6-82.5xle type, each with a 1.62 MW capacity;
- A complete 2x50 MVA 110/35 kV substation with SVC;
- 28km long 110kV double circuit high voltage overhead transmission line;
- 24km long 35kV underground cable network.

31 Wind Turbine Generators (WTGs) were installed on Project site each with kiosk transformers. All turbines are connected to 110/35 kV onsite substation via 35 kV (underground) cable network. The onsite (Salkhit) substation is connected via 110 kV double circuit overhead high voltage transmission line to the Nalaikh substation, where it is transferred to the Grid. Detailed explanation with figures and diagrams are included in the section C (see figure 2.1 and 2.2).

The commercial operation date is 25 June 2013. 4th MP started from 1st January to 30th June 2015. 5th MP started from 1st July to 31st December 2015. 6th MP started 01st January to 30th June 2016. 7th MP started 1st July to 31st December 2016, 8th MP started 01st January to 30th June 2017, 9th MP started 1st July to 31st December 2017, 10th MP started 1st January to 30th June 2018, 11st MP started 1st July to 31st December 2019.

Monitoring Report will be done twice a year instead of once a year.

Construction lasted about 2 years from 2011 (early civil works started in June 2011 while construction and erection work started in Apr 2012 and continued till Aug 2013). Table 3 shows key dates related with Project commissioning.

Table 3. Project Commissioning Dates

Operations license issued	19 June 2013
Project opening ceremony	20 June 2013
The commercial operation date and the date of sealing/resetting meters	25 June 2013
State commissioning act issued	8 Jul 2013
Grid connection of all WTGs reached	19 Jul 2013

The Project is implemented as described in the registered PDD, but the operation date was slightly delayed compared to the expected timeframe in the registered PDD. Project implementation since operation is in accordance with company plans and controls except for delay in hand-over and lower electricity supply to the grid. The reason for delay in hand-over is related with contracting issues with sub-contractors that are being solved. Reasons for higher electricity supply were mainly caused partly by power curtailment from the Grid Company and the lower wind speed than the forecast.

B.2. Post-registration changes**B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents**

>>No temporary deviations have been applied during this monitoring period.

B.2.2. Corrections

>>There were few corrections to the registered PDD that do not affect project design prior to this monitoring period. The PDD has been approved on 7 May 2015 (PRC-5977-001).

B.2.3. Changes to the start date of the crediting period

>>No changes to the start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.

B.2.4. Inclusion of monitoring plan

>>No inclusion of a monitoring plan to the registered PDD.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>>There was a change from registered monitoring plan prior to this monitoring period. The PDD has been approved on 7th May 2015. (Ref: PRC-5977-001).

B.2.6. Changes to project design

>>There was no change to the project design of the registered project activity prior to this monitoring period.

B.2.7. Changes specific to afforestation or reforestation project activity

>> No changes specific to afforestation or reforestation project activity.

SECTION C. Description of monitoring system**>>Meters Readings and Monitoring Points**

Both electric meters at Nalaikh and Salkhit substation (shown in Figure 2.1) were read and measured continuously with monthly cross-check. The net on-grid electricity generation was based on the main meter installed at the Nalaikh substation. The monthly compile is recorded through joint reports, signed and approved by both parties. This joint report serves as the basis for invoice and payment. Both main and control meter at Nalaikh substation has been regularly checked and read by both parties; and is owned by Clean Energy. While the main meter of Nalaikh substation will remain the property of Clean Energy, the control meter is property of the Grid company (National Electricity Transmission Grid) as per the PPA. Electricity export and import between the Grid and the Project are continuously measured on both Salkhit and Nalaikh substations. Meters at Salkhit substation measures electricity export and import through the 110 kV Overhead Transmission Line (OTL).

Figure. 2.1 Schematic of metering arrangement (for demonstration purpose only)

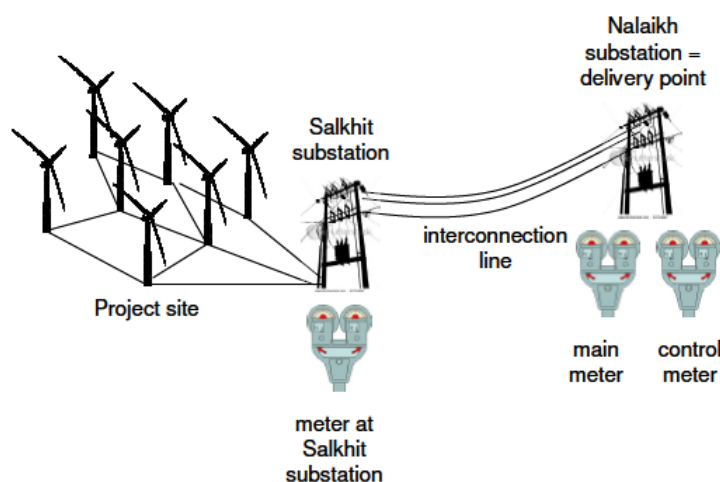
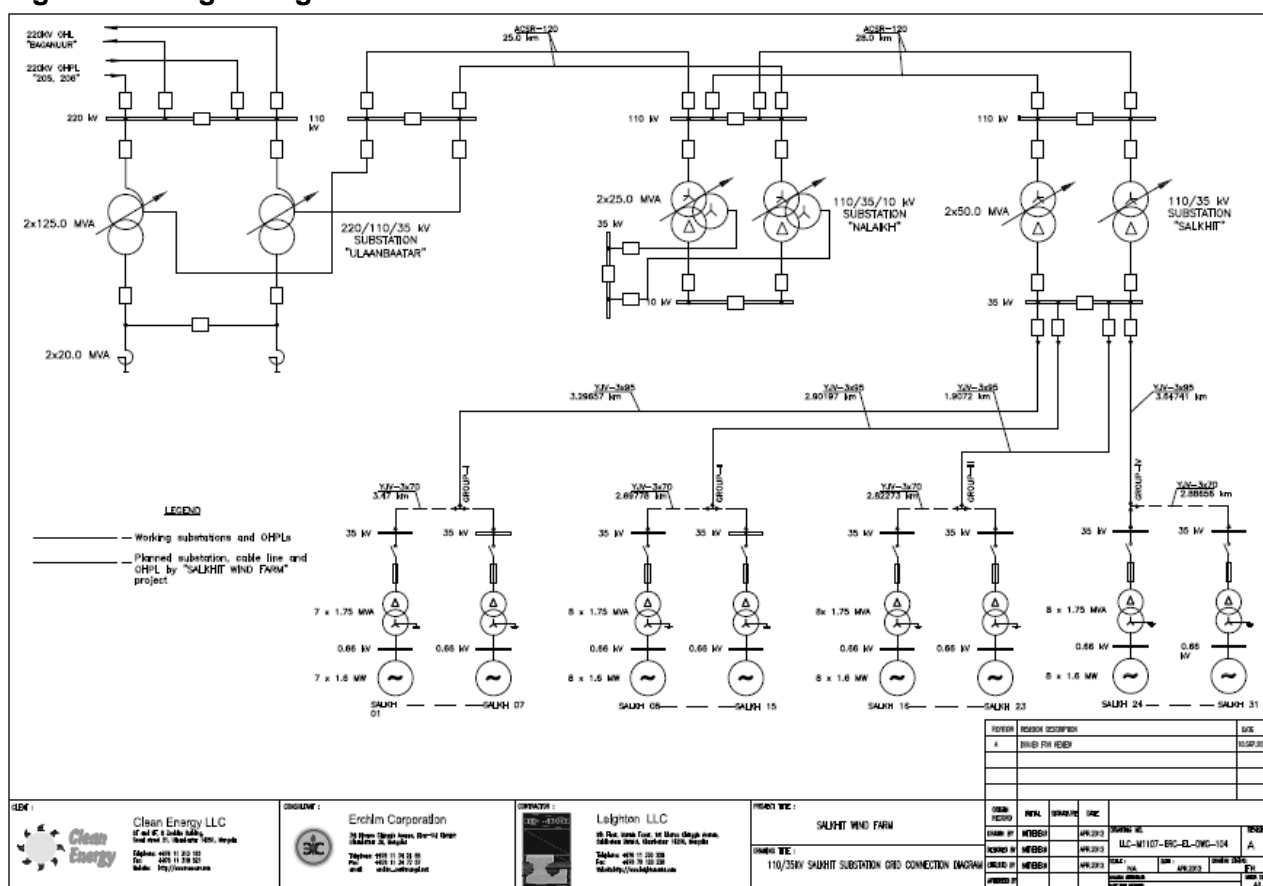


Figure 2.2 Single Diagram of the Salkhit Wind Farm



The detailed monitoring points of the Salkhit Wind Farm can be seen from the Figure 2.2. 31 WTGs are divided into 4 strings (one group with 7 WTGs and three groups with 8 WTGs). They are connected to the 110/35 kV Salkhit substation through 35kV underground cable network. Generated electricity is transmitted from the Salkhit substation through 110kV double circuit high voltage transmission line to 110/35/10 kV Nalaikh substation with further connection to the 220/110/35 kV Ulaanbaatar substation from where the electricity is distributed.

Responsibility, Data Collection Procedures and Quality Control

The technical team, comprised of CE engineers and technicians, are in charge of operation and meter reading. The daily logs are archived electronically and in hard-copy with signatures of the shift team and sent through email to the operation team. Meters were read in accordance with the PPA. The monthly compile is completed by engineers from both parties, the electricity seller (CE) and the buyer (Grid company), on the first day of each month. The monthly joint report records the

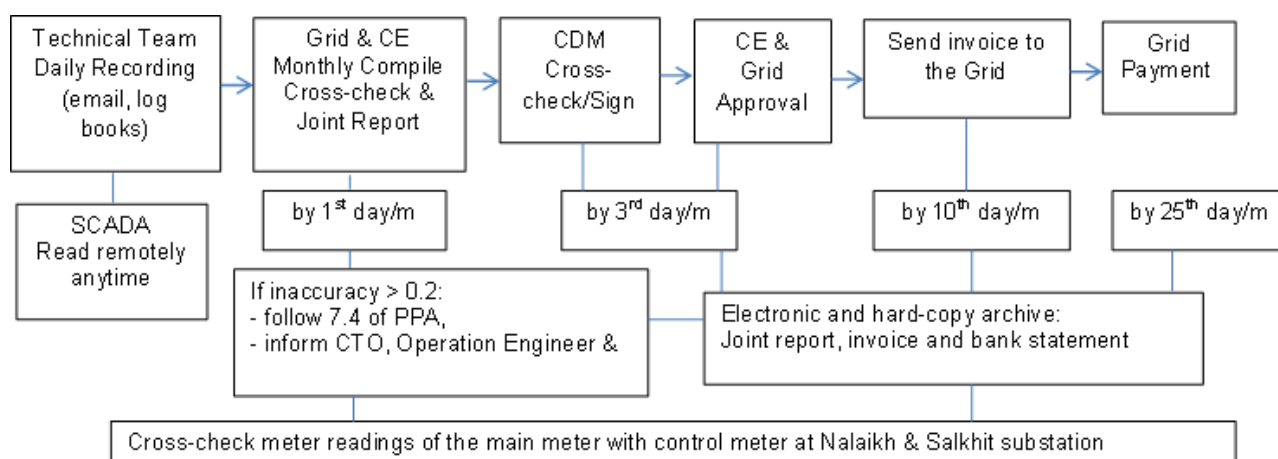
electricity export and import and presents the final confirmed quantities from the main and control meter at Nalaikh substation. The cross-checked results are reported to the Operations Manager for sign-off and approval from the Chief Technical Officer. Only after final double-confirmation, the monthly joint reports are signed and stamped by both parties.

The accuracy of meters is within the required standard of 0.2.

Figure 3.1 describes the monitoring system with tasks, roles and responsibilities. The detailed organizational chart is shown in Figure 3.2. All data were correct and signed off, approved and stored. Regular improvements have been made on the monitoring process.

There are 3 main procedures related with the monitoring system. The monthly meter reading and invoicing procedure approved on 1 Oct 2013 specifies all roles and responsibilities for monthly meter reading, reporting and invoicing with deadlines as shown in the Figure 3.1. Information Exchange Procedure and the Shift Change Procedure specify requirements for daily operation. Emergency procedures are included in the Information Exchange Procedure, but separate Emergency Response Plan has been developed.

Figure 3.1 Monitoring System Diagram: Roles and Responsibilities



Abbreviations

SCADA	Supervisory Control and Data Acquisition
Grid	National Electricity Transmission Grid State Owned Stock Company (old name on the PPA is "Central Regional Electricity Transmission Grid")
CDM	Clean Development Mechanism
m	month
CTO	Chief Technical Officer
OM	Operations Manager

Invoices are sent to the Grid company based on the signed joint report, and payments are made in accordance with the signed joint report and invoice. Finance and accounting team makes sure all payments are transferred on time in accordance with the submitted invoice. Signed monthly joint reports are compiled and archived by the finance team for accounting purpose. All payments from the electricity sale are transferred to the revenue account only; so, the payments can be tracked online against the invoiced amount.

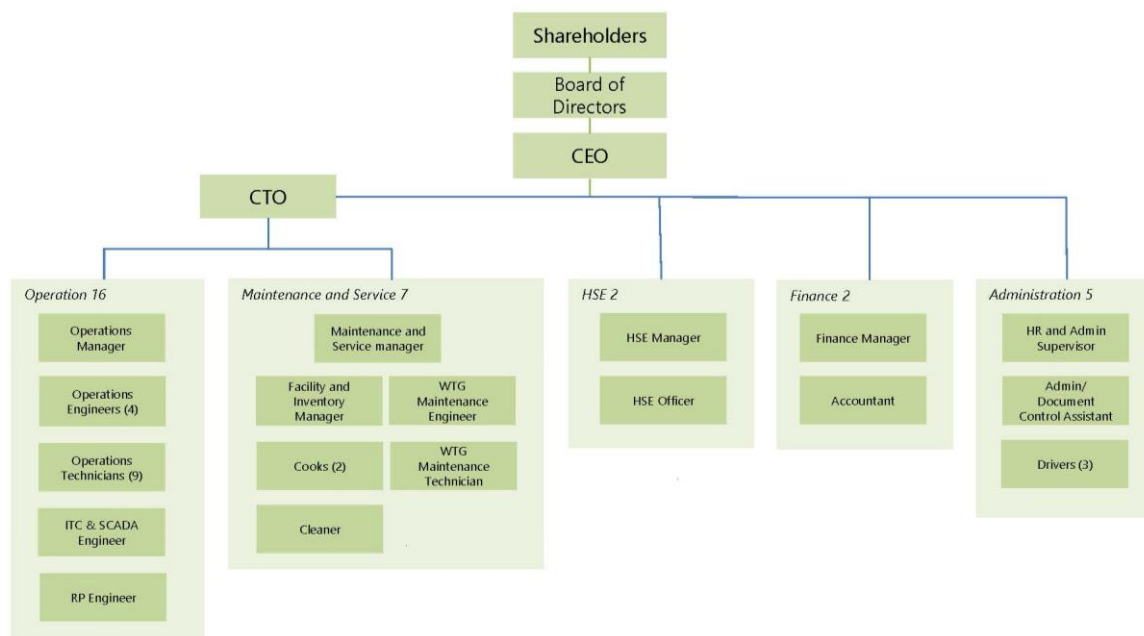
Meter data reading

Meters at Salkhit substation can be read remotely from the site computer through a communication line. Both Grid Company and Clean Energy have been reading meter data by remotely since February 2016. Meters at Salkhit substation can record on memory the accumulated kilowatt-hours. In January 2016, CE installed additional 6 meters at substation for internal use monitoring. Manual meter readings have been used as the main source for invoicing. The meter for monitoring of the emission reductions is the same as used for electricity sales to the Grid and the metering data will be cross-checked with sales data.

Meters and Calibration

A1800 ALPHA meters from Elster were installed at both the Nalaikh and Salkhit substations. These are world-class, highly accurate, robust, system ready meter suited for commercial and substation application. Accuracy class is 0.2.

Figure 3.2 Organizational structure of Clean Energy LLC



All meters at Nalaikh substation and Salkhit substation were calibrated by certified body, the Mongolian Agency for Standardization and Metrology. All meters at Nalaikh are checked for accuracy by the National Electricity Grid (NETG or Grid company). All meters at Nalaikh Substation and 6 meters at Salkhit substation were calibrated before commercial operation date. The certificates of Approval for the meters were issued on 06/06/2013 valid for 8 years till 06/06/2021. CE installed 6 meters for internal purposes to calculate internal use and electricity loss on electrical equipment. Those additional electrical meters are not for delivered energy only for internal usage and loss. Those 6 meters were calibrated body, the Mongolian Agency for Standardization and Metrology, after commercial date. The certificates of Approval for 2 meters were issued on 2015/09/16 valid 8 years till 2023/09/16, for another 2 meters issued on 2016/01/28 valid for 8 years till 2024/01/28, and the other 2 meters issued on 2017/01/15 valid for 4 years till 2021/01/15, respectively.

Both meters at Nalaikh and Salkhit substation will be calibrated in accordance with the national regulations. As specified by the PPA, inspection, testing and calibration should be in accordance with the “Code of Energy Utilization” and other relevant rules and regulations.

The frequency of calibrations is in accordance with the national regulations. A1800 Alpha meters are factory-calibrated and periodically perform self-tests that verify the meter is operating properly¹. Errors are displayed on the LCD. The detailed information about self-test can be found from “A1800 Alpha Meter” Technical Manual Rev. 02 published in 2011 by Elster Metronica (page 77).

The meters have been maintained according to the appropriate industry standards. No errors were detected during the monitoring period on any meters both at Nalaikh and Salkhit substation. The net electricity generation output registered by the main meter alone is used for the purpose of billing and emission reduction verification as long as the error in the meters is within the agreed limits.

¹ Elster Electricity (2005), A1800 Alpha Meter Family Product Bulletin, p. 27

The main and control meters at Nalaikh substation were jointly inspected and sealed on 25 June 2013 on behalf of the parties concerned. On 18 February 2016, Grid company connected meters to computer unit for reading data by remotely and CE had supervised during connection work. After connection work the meters were sealed by both parties with numbers shown in the Table 4.

On 11st of October 2017, Grid company and CE found control meter of Salkhit-A was not sending data by remotely. Grid company and CE has been checked meter connection, removed sealing numbered as E20989 and found connection from main meter of Salkhit-A to control meter of Salkhit-A was loosed. CE has been supervised during tighten loosed connection. After tighten loosed connection, meter was sealed by both parties with number as E20936, shown in the Table 4.

Table 4. Nalaikh Meter Sealing, 11 Oct 2017

Line	Salkhit-B /control/	Salkhit-B	Salkhit-A	Salkhit-A /control/
Meter no.	01258916	01229304	01229303	01258912
Meter model	A1802RAL-P4G-DW-4	A1805RAL-P4GB-DW-3	A1805RAL-P4GB-DW-3	A1802RAL-P4G-DW-4
CE sealing no.	E20982	E20987	E20936	E20998
NETG sealing no.	ΠX ²	ΠX	ΠX	ΠX

The technical team regularly undertakes examinations from the National Dispatch Center to obtain certificates for operating the wind farm under the Central Electricity System. The technical team also attends various operation related trainings for health and safety.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

(Copy this table for each data or parameter.)

Data/Parameter	EF_grid, CM, y
Unit	tCO ₂ e/MWh
Description	The combined margin emission factor of the electricity grid
Source of data	Registered PDD
Value(s) applied	1.061
Choice of data or measurement methods and procedures	Reading a data of the Electric Meter
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	Fixed for the duration of the first crediting period.

D.2. Data and parameters monitored

(Copy this table for each data or parameter.)

Data/Parameter	EG_facility,y
Unit	MWh
Description	Quantity of net electricity generation supplied by the Project plant/unit to the grid in year y
Measured/calculated/default	Measured

¹ Elster Electricity (2005), A1800 Alpha Meter Family Product Bulletin, p. 27

² Or PKh in English.

Source of data	Electricity meter. The net electricity generation is calculated from supply to the Grid and import from the Grid, as per the registered PDD.
Value(s) of monitored parameter	76,799.316
Monitoring equipment	Electricity meters
Measuring/reading/recording frequency	Continuous measurement compiled daily and monthly in daily log and monthly joint reports.
Calculation method (if applicable)	Net electricity supplied by the Project to the Grid is calculated from supply to the Grid and imports from the Grid using the main meter at the Grid (Nalaikh) sub-station.
QA/QC procedures	<p>The meter for monitoring of the emission reductions is the same as used for electricity sales to the Grid, and the metering data are cross-checked with sales data.</p> <p>The meters will be maintained according to the appropriate industry standards. The metering equipment are calibrated and checked for accuracy by a qualified third party as described in Annex 5 in the PDD. The frequency of calibrations is in accordance with the national regulations. The accuracy of the metering equipment is 0.2%.</p> <p>The monthly net electricity generation supplied to the Grid is approved and signed off by the Senior Carbon Finance Specialist and can be cross-checked with the revenue bank statement.</p> <p>A back-up meter is installed at the on-site substation.</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	The electricity meter at the Nalaikh sub-station is the main meter.

D.3. Implementation of sampling plan

>>Not applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>The baseline emissions are calculated as follows:

$$BE_y = EG_{\text{facility},y} \times EF_{\text{grid},CM,y}$$

Where:

BE_y is the baseline emissions in year y (tCO₂e/yr).

$EG_{\text{facility},y}$ is the quantity of net electricity generation supplied by the CDM project activity in year y (MWh/yr).

$EF_{\text{grid},CM,y}$ is the combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version³ of the "Tool to calculate the emission factor for an electricity system" (tCO₂e/MWh). $EF_{\text{grid},CM}$ was calculated at 1.061 tCO₂e/MWh.

Therefore, baseline emissions can be calculated as follows:

$$BE_y = BE_{2019} = EG_{\text{facility},y} \times EF_{\text{grid},CM,y} = 76,799.316 \text{ MWh} \times 1.061 \text{ tCO}_2\text{e/MWh} = 81,484 \text{ tCO}_2\text{e}$$

Monthly data and calculations are included in the spread sheet in 5977 MR12 Appendix 2.

³ See section B.1. for the version.

E.2. Calculation of project emissions or actual net removals

>>There were no Project emissions for wind power in accordance with the technology.

E.3. Calculation of leakage emissions

>>According to the methodology, no leakage is considered for the Proposed Project Activity.

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	81,484	0	0	0	81,484	81,484

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the PDD (t CO ₂ e)
81,484	96,034

E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”

>>The emission reductions estimated in the registered PDD are 178,778 tCO₂e per year, thus for the current monitoring period of 01/01/2019 to 30/06/2019 (181 days) the estimated emission reductions is $178,778 \times 181 / 365 = 96,034$ tCO₂e. Calculations are shown in the 5977 MR12 Appendix 2.

The actual emission reductions achieved during the monitoring period are lower than that ex-ante estimated volume in the registered PDD.

The main reason for the difference between the ex-ante estimated and the actual achieved reduction is:

- Actual average wind speed records were lower than the estimated average wind speed based on historic wind speed records.

The Project is still facing curtailment from the National Dispatch Centre, limiting production by about 6,551,552 kWh (52 % of delivery loss) during this period.

The curtailment data collected from WindSCADA system. WindSCADA system has function to estimate curtailed energy on current wind speed and weather condition (not included mechanical stoppages).

E.6. Remarks on increase in achieved emission reductions

>>In this monitoring period, not achieved emission reductions.

E.7. Remarks on scale of small-scale project activity

>>Not applicable.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
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 GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, 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).

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		