Project design document form for CDM project activities

(Version 05.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Salkhit Wind Farm
Version number of the PDD	3
Completion date of the PDD	24/11/2014
Project participant(s)	Clean Energy LLC Swedish Energy Agency
Host Party	Mongolia
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral scope: 01 Energy industries Applied methodology: ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 12.1.0
Estimated amount of annual average GHG emission reductions	178,778 tonnes of CO2 equivalent (tCO2e).

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The objective of the proposed Salkhit wind farm (the proposed project activity) is to generate renewable electricity using wind power resources and to sell the generated output to the Central Energy System (CES, or the grid) on the basis of a power purchase agreement (PPA). In addition, the proposed project also aims to introduce renewable energy generation from wind in Mongolia, as the proposed project will be the first grid connected wind farm in Mongolia. The proposed project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO2 emissions from electricity generation by fossil fuel power plants that is supplied to Grid.

"Clean Energy" LLC (the Developer)[1] is planning to install a wind farm in the area called Salkhit uul, which translates as "windy mountain", about 70 km southeast of the country's capital Ulaanbaatar. The proposed project is expected to have a capacity of 49.6 MW and generate (net) 168.5 GWh of electricity per year.

Thus, the project scenario is the installation of 49.6 MW of renewable energy power generation capacity, and the net annual supply to the Grid of 168.5 GWh of electricity generated from renewable energy.

The baseline scenario, which is the same as the scenario existing prior to the implementation of the proposed project activity, is the generation of electricity by grid-connected power plants.

As the Grid is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions. Following the baseline methodology, the emission reductions are estimated to be approximately 178,778 tonnes of CO2 equivalent (tCO2e) per year once the proposed project activity is fully operational.

Sustainable development

As the very first wind farm in Mongolia the proposed project will greatly assist the country in stimulating the commercialisation of grid-connected renewable energy technologies and markets. The proposed project will, therefore, help reduce GHG emissions versus the coal-dominated business-as-usual scenario. Furthermore, the project will improve air quality and local livelihoods and promote sustainable renewable energy industry development.

The specific goals of the project are to:

- generate electricity;
- help to stimulate the implementation of wind power in Mongolia;
- reduce greenhouse gas emissions in Mongolia compared to a business-as-usual scenario;
- create local employment opportunity during the assembly and installation of wind turbines, and for operation of the wind farm;
- reduce other pollutants resulting from the power generation industry, compared to a business-as-usual approach, such as SO2 and soot.

A.2. Location of project activity

A.2.1. Host Party

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[1] In the GSP PDD, the developer was expected to be Newcom LLC. "Clean Energy" LCC has been set up as a joint venture by Newcom and other shareholders as the special purpose vehicle for the implementation of the proposed project activity.

Mongolia

A.2.2. Region/State/Province etc.

>>
Tuv Aimag

A.2.3. City/Town/Community etc.

>>
Sergelen Soum

A.2.4. Physical/Geographical location

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Salkhit Mountain, Tsagduult and Shar Huviin Nuruu, approximately 70 km southeast of 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 grid substation. The nearest residential areas are 5 and 8 km away, where railway station employees and herders live.

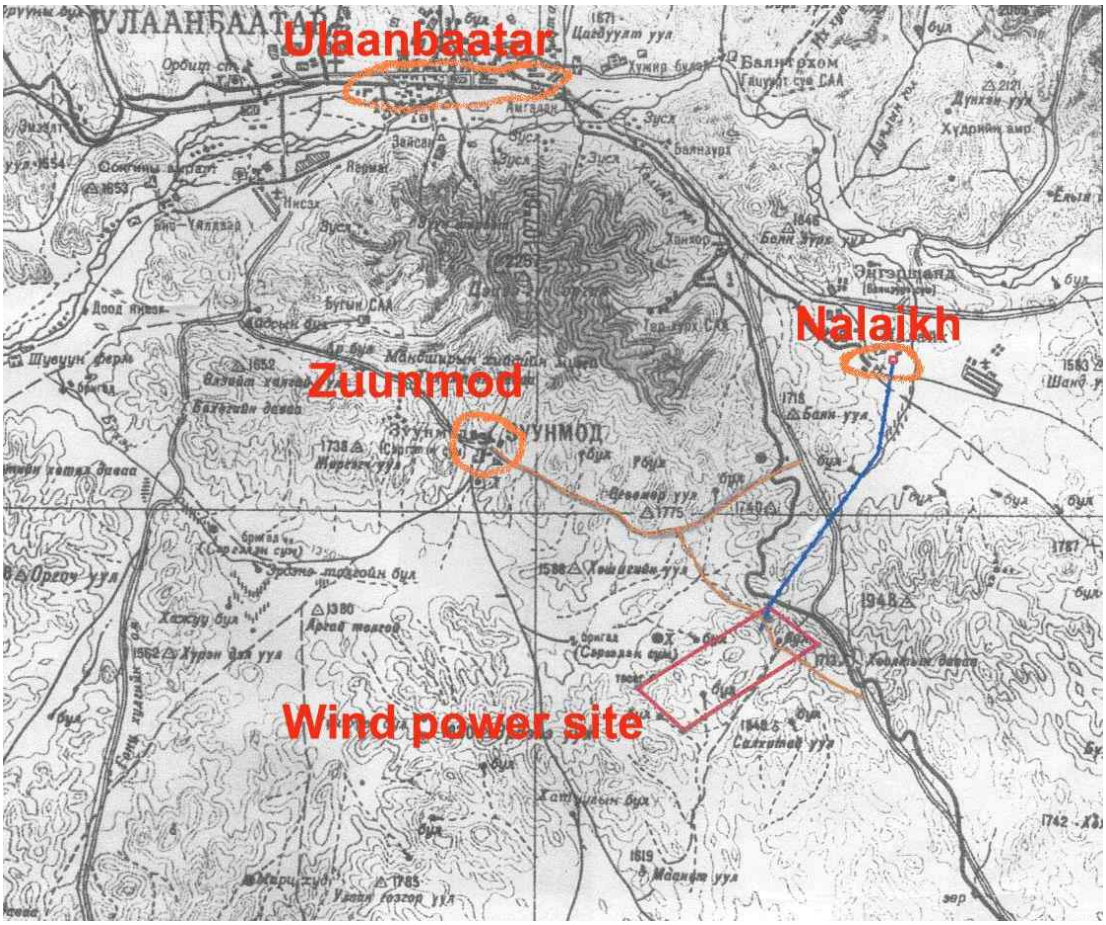
The co-ordinates of the corners of the project area are[2]:

ID	N_UTM	E_UTM	Latitude N	Longitude E
1	5261508.314	662393.517	47°29'12.191"	107°9'20.652"
2	5265489.182	659214.379	47°31'23.887"	107°6'50.008"
3	5268588.781	656163.100	47°33'6.894"	107°4'32.148"
4	5273593.598	661484.230	47°35'44.204"	107°8'53.200"
5	5275429.414	663769.396	47°36'41.560"	107°10'45.020"
6	5276076.235	663831.431	47°37'2.440"	107°10'48.860"
7	5275229.964	666055.381	47°36'33.006"	107°12'34.170"
8	5273367.039	669513.437	47°35'29.480"	107°15'17.090"
9	5268415.281	672344.145	47°32'46.518"	107°17'25.532"
10	5268389.831	672234.719	47°32'45.799"	107°17'20.265"
11	5267919.879	672431.300	47°32'30.400"	107°17'29.000"

Figure 1 shows the location of the project.

[2] The detailed co-ordinates of the project area boundary are given in the Universal Transverse Mercator (UTM) geographic co-ordinate system. They have also been converted here to latitude/longitude in degrees, minutes, and seconds.

Figure 1 Map showing the location of the project activity



Note: The site is indicated by the red border; the required high voltage line in blue; and the access roads which will be improved in orange.

A.3. Technologies and/or measures

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The purpose of the Proposed Project Activity is the generation of electricity from wind and the supply of this electricity to the Grid. The project scenario is the installation of 31 wind turbines with an aggregate capacity of 49.6 MW. The wind turbine equipment is selected through competitive bidding and is of good practice. Therefore, the establishment and operation of the proposed project activity will promote technology transfer and utilization of advanced technology in Mongolia.

Table 1 Technology specifications

Manufacturer	GE
Model	GE 1.6xle 82.5
Power rating	1600 kW
Rotor diameter	82.5 m
Hub height	80 m

All turbines are connected to the 35/110 kV onsite substation. The onsite (Salkhit) substation is connected via a 110 kV double circuit transmission line to the grid (Nalaikh) substation, where it is transferred to the Grid.

The Proposed Project Activity is estimated to supply on average approximately 168.5 GWh of renewable electricity per year to the Grid once fully operational. The expected load factor was determined by Global Energy Concepts LLC (GEC) in 2007 using NRG wind measurement equipment using detailed onsite information and long-term local wind data, having carried out wind data collection on site since October 2004, in accordance with EB guidance on plant load factors

(EB48 Annex 11). However, this calculation was conducted for small sized turbines of 58 meters height, while the turbine selection changed to a bigger size with 80 meter height. Therefore a new capacity factor calculation was made by Sgurr Energy Ltd, an independent consulting company, in 2011 as part of the feasibility study. According this study on preliminary energy yield and wind regime report, overall capacity factor is 38.8%.

The generation and consumption of the Proposed Project Activity is monitored continuously through an electronic control and monitoring system in the onsite office. For the purpose of invoicing for generation and consumption, electricity meters in the grid substation are used. The grid substation is operated by the Grid Company, and data is monitored by the Grid Company and the Developer. The data from the grid substation is used for the calculation of emission reductions, and invoices are used for cross-referencing.

Prior to the implementation of the project activity, the electricity was generated by grid-connected power plants. Without the implementation of the project, this scenario would have continued and this is considered the baseline scenario.

As the Grid is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions, estimated following the baseline methodology below.

A.4. Parties and project participants

Party involved (host) indicates 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)
Mongolia (host)	Clean Energy LLC (private entity)	No
Sweden	Swedish Energy Agency (public entity)	No

A.5. Public funding of project activity

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There is no public funding from Parties included in Annex I for the construction of this project. However, Appendix 2 includes some information about the public funds received in the project preparation.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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Methodology

- Approved consolidated baseline and monitoring methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 12.1.0 (EB58 Annex 7, 26 November 2010, valid from 17 Sep 2010 onwards)

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 (EB63 Annex 19, valid from 16 Oct 2009 onwards);
- AM Tool 01 “Tool for the demonstration and assessment of additionality” version 5.2 (EB39 Annex 10, valid from 26 Aug 2008 onwards);

- AM Tool 02 “Combined tool to identify the baseline scenario and demonstrate additionality” version 2.2 (EB28 Annex 14, valid from 26 Aug 2008 onwards) (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 (EB41 Annex 11, valid from 2 Aug 2008 onwards) (this tool is not applicable to the project).

B.2. Applicability of methodology and standardized baseline

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This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

Therefore, the methodology is applicable as the Proposed Project Activity is the installation of a Greenfield, grid-connected wind power plant (a).

The methodology is applicable under the following conditions:

Criteria	Applicability	Conclusion
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit	The Proposed Project Activity is the installation of a wind power plant.	OK
In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2 to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	Not applicable. The Proposed Project Activity is a Greenfield plant and does not represent a capacity addition, retrofit or replacement.	OK

In case of hydro power plants, one of the following conditions must apply: • The project activity is implemented in an existing single or multiple reservoirs, with no change in any of the reservoirs; or • The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of the reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m2; or • The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	Not applicable. The Proposed Project Activity is a wind power plant.	OK
In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m2 all the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m2; • Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project[3] that collectively constitute the generation capacity of the combined power plant;	Not applicable. The Proposed Project Activity is a wind power plant.	OK

[3] This requirement can be demonstrated, for example, (i) by the fact that water flow from upstream power units spilling directly to the downstream reservoir, or (ii) through the analysis of the water balance. Water balance is the mass balance of water fed to power units, with all possible combinations of multiple reservoirs and without the construction of reservoirs. The purpose of such water balance is to demonstrate the requirement of specific combination of multiple reservoirs constructed under CDM project activity for the optimization of power output.This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum three years prior to implementation of CDM project activity.

• Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m2, is lower than 15MW; • Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.		

The methodology is not applicable to the following:

Criteria	Applicability	Conclusion
Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;	Not applicable. The Proposed Project Activity does not involve switching from fossil fuels to renewable energy at the site of the project activity.	OK
Biomass fired power plants	Not applicable. The Proposed Project Activity is a wind power plant.	OK
Hydro power plant[4] that result in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2	Not applicable. The Proposed Project Activity is a wind power plant.	OK

In addition, the applicability conditions included in the tools applied and referred to above apply as follows:

Tool / Criteria	Applicability	Conclusion
AM Tool 1 / Once the additionally tool is included in an approved methodology, its	The chosen methodology prescribes the use of this tool. There are no further	OK

[4] Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

application by project participants using this methodology is mandatory.	applicability criteria for using the tool.	
AM Tool 7 / This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The Proposed Project Activity is the installation of a wind power plant supplying electricity to the Grid.	OK
AM Tool 7 / In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex-I country.	The project electricity system is located in a non-Annex I country.	OK

Any conditions for the application of the tools are addressed in the sections below where the tools are used, sections B.5 and B.6, showing that the tools are applicable to the Proposed Project Activity. In addition, it is noted that:

- the Proposed Project Activity is a Greenfield project, therefore the "Combined tool to identify the baseline scenario and demonstrate additionality" is not required to identify the baseline scenario of the Proposed Project Activity; and
- the Proposed Project Activity is a wind power project, therefore there are no fossil fuels used for electricity generation, so there are no CO2 emissions and leakage from combustion of fossil fuels, and thus the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" is not applicable to the Proposed Project Activity.

B.3. Project boundary

Spatial boundary

The spatial extend of the project boundary includes the project site and the Central Energy System (the grid), which the project activity is connected to.

In AM Tool 07 the project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (i.e. the renewable power plant location) and that can be dispatched without significant transmission constraints. In accordance with Step 1 of AM Tool 07 the largest grid definition is used, which is the Central Energy System. The Central Energy System is not connected to other systems in the host country[5]. Since the publication for stakeholder comment, the DNA has published a grid emission factor calculation, which confirms the above delineation of the electricity systems.

[5] The electric power system in Mongolia consists of four independent electric power systems: Central, Western, Eastern and Altai-Uliastai energy system. The Central Energy System (CES) is the main system that supplies energy to the capital city covering over 90% of the country's total energy consumption. ('In-Depth Review of Energy Efficiency Policies and Programmes: Mongolia', Energy Charter Secretariat, 2011, p.30);

The project electricity system is connected to grids in other host countries (Russia and China) and electricity transfers from the connected systems are taken into account. Electricity transfers from connected electricity system to the project electricity system are defined as electricity imports and electricity transfers to connected electricity systems are defined as electricity exports. For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO2 per MWh. There are net imports from Russia, but no transfers to/from China.

Emission sources and gases

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 3.

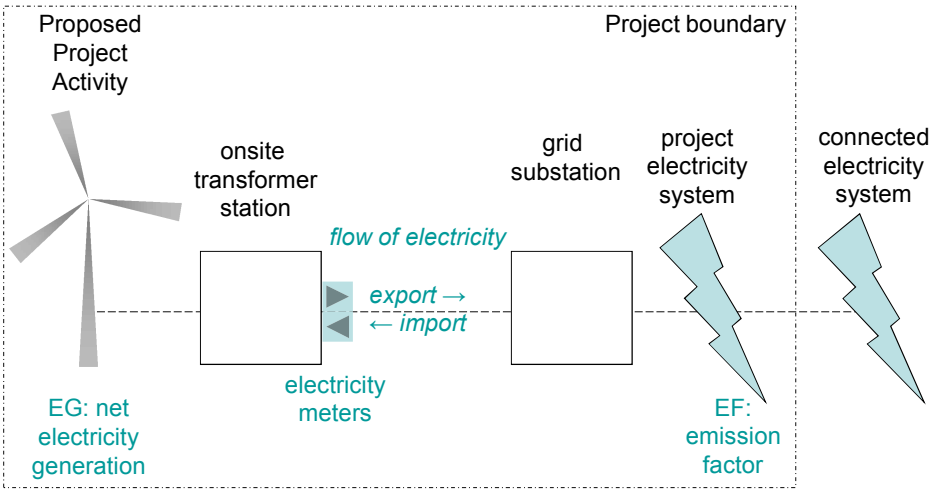
Following the methodology, only CO2 emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account for determining the baseline emissions. According to the methodology, project emissions from geothermal, solar thermal and hydro power plants need to be taken into account; there are no project emissions for a wind power plant.

Table 3 Emission sources and GHG included in the project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Source 1	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
		…		
	Source 2	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
		…		
	…	…		
		…		
		…		
Project scenario	Source 1	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
		…		
	Source 2	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
		…		
	…	…		
		…		
		…		

In line with the guidelines for completing the PDD (version 07), a flow diagram of the project boundary is presented in Figure 3 below. The flow diagram physically delineates the project boundary, includes the flow of electricity and represents the emissions included (EF: emission factor) and the monitoring variable (EG: net electricity generation).

Figure 3 Flow diagram and the project boundary



B.4. Establishment and description of baseline scenario

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The Proposed Project Activity is the installation of a new grid-connected renewable power plant, and is not a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit. Therefore, the baseline scenario according to the methodology is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The selected methodology prescribes the baseline scenario, thus no further analysis is required.[6] The baseline is determined and the combined margin calculated in Section B.6 below.

B.5. Demonstration of additionality

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CDM consideration

The starting date of the Proposed Project Activity is after 02 Aug 2008, therefore, the EB guidelines on the demonstration and assessment of prior consideration of the CDM (EB 62 Annex 13), paragraphs 2 to 5 apply.

The starting date of the Proposed Project Activity is after the publication of the PDD for global stakeholder consultation. Therefore, in accordance with para 2 no separate notifications of prior consideration are required.

In addition, the timeline below indicates continuing and real actions to secure CDM status for the project in parallel with its implementation.

Table 4 Timeline of the project implementation

Time	Project phase
2004	Started wind speed measurements
Sep 2006	EIA approved by the Ministry of Nature, Environment and Tourism (MNET)
Apr 2007	CDM consultancy contract signed with CRM
Mar 2007	Obtained construction license from the Energy Regulatory Authority (ERA)

[6] VVM v1.2 para 105.

Apr 2007	Signed contract with Tuv Nord for carrying out the validation process
May 2007	Signed Power Purchase Agreement (PPA) with Central Regional Electricity Transmission Network, State Owned Stock Company (CRETN)
Jul–Aug 2007	Conducted stakeholder consultation
Sep 2007	Conducted online international stakeholder consultation
Oct 2007	Obtained LOA from the host country
Mar–Nov 2008	Completed Environmental and Social Impact Assessment (ESIA) by Black & Veatch
Dec 2009	Signed shareholders agreement with EBRD
May 2010	Registered "Clean Energy" LLC as a foreign investment company
Dec 2010	Amended PPA with CRETN
February 2011	Feasibility study completed by Sgurr Energy
Apr 2011	Tender for Engineering, Procurement and Construction (EPC) contract
31 May 2011	"Access Road" contract signed. This is the project start date because the starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun.
11 Nov 2011	Renewed LOA from the host country
16 Nov 2011	Turbine supply contract signed.

Additionality

According to the selected methodology the additionality of the Proposed Project Activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the Board. The Tool consists of the steps below.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Realistic and credible alternatives to the project activity that can be part of the baseline scenario are defined through the following sub-steps:

Sub-step 1a. Define alternatives to the project activity:

The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.[7]

The Proposed Project Activity is the installation of a new grid-connected renewable power plant, and is not a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit. Therefore, the selected methodology prescribes the baseline scenario – the baseline scenario according to the methodology is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Sub-step 1b. Consistency with mandatory laws and regulations:

The alternative is realistic and feasible and complies with applicable laws and regulations.

Step 2. Investment analysis

[7] VVM v1.2 para 105.

The project participants selected Step 3.

Step 3. Barrier analysis

If this Step is used, determine whether the proposed project activity faces barriers that:
(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives.

The identified barriers are only sufficient grounds for demonstration of additionality if they would prevent potential project proponents from carrying out the proposed project activity undertaken without being registered as a CDM project activity. If the CDM does not alleviate the identified barriers that prevent the proposed project activity from occurring, then the project activity is not additional. Use the following Sub-steps:

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

There are no grid-connected wind farms operational in Mongolia other than the proposed project activity.[8] The proposed project activity therefore faces barriers due to prevailing practice – the project is the "first of its kind".

Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The identified barriers do not affect the alternatives, as they represent business as usual. Indeed prevailing practice would be to increase the utilisation rate of the existing plant, or install new thermal power plant in line with the current grid-connected capacity.

Step 4. Common practice analysis

The proposed project activity is a first-of-its kind project as shown above, therefore the project is not common practice.

In conclusion, all the steps above are satisfied, the Proposed Project Activity is not the baseline scenario, and the Proposed Project Activity is additional in accordance with the Additionality Tool.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Project emissions

According to the methodology**,** for most renewable energy project activities, PE_y = 0. However, the methodology prescribes project emission calculations for geothermal, solar thermal and hydro

[8] Below are the evidence that the proposed project is the first-of-its-kind:

(i) Official confirmation from Energy Regulatory Authority (ERA, Aug 2011) on construction license;
(ii) Official confirmation from CRETN (Aug 2011) about PPA;
(iii) Second National Communication, 2010 (p.74);
(iv) 'In-Depth Review of Energy Efficiency Policies and Programmes: Mongolia', Energy Charter Secretariat, 2011, (p.75);
(v) Grid emission factor calculations published by the DNA in 2010 confirms that no wind farms are connected to the grid. The calculation was carried out by an international consultant Casper van der Tak as part of the World Bank Project on "Capacity Building for Development and Implementation of Carbon Finance Projects", implemented at the Ministry of Nature, Environment and Tourism of Mongolia.

power plant. As a wind power plant, therefore, there are no project emissions according to the methodology:

$PE\_y = 0$ (1)

Baseline emissions

According to the methodology**,** the baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

$BE\_y = EG\_PJ,y \times EF\_grid,CM,y$ (2)

Where:
BE_y is the baseline emissions in year y (tCO2/yr).
EG_PJ,y is the 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 is the combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version[9] of the "Tool to calculate the emission factor for an electricity system" (tCO2/MWh).

Calculation of EG_PJ,y

As the proposed project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, the following applies:

$EG\_PJ,y = EG\_facility,y$ (3)

Where:
EG_PJ,y is the 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).
EG_facility,y is the quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).

Baseline emission factor

In line with the methodology, the baseline emission factor is calculated as a combined margin (EF_grid,CM,y), consisting of the combination of operating margin (EF_grid,OM,y) and build margin (EF_grid,BM,y,) factors according to the following steps defined in the "Tool to calculate the emission factor for an electricity system".

Details of the calculations and data are presented in Annex 3 of the PDD and the EF calculation spreadsheet.

Step 1. Identify the relevant electricity systems

The power generated from the Proposed Project Activity will be supplied to the Central Energy System (the grid), which the project activity is connected to.

In AM Tool 07 the project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (i.e. the renewable power plant location) and that can be dispatched without significant transmission

[9] See section B.1. for the version.

constraints. In accordance with Step 1 of AM Tool 07 the largest grid definition is used, which is the Central Energy System. The Central Energy System is not connected to other systems in the host country.

The project electricity system is connected to other grids in other host countries (Russia and China) and electricity transfers from the connected systems are taken into account. Electricity transfers from connected electricity system to the project electricity system are defined as electricity imports and electricity transfers to connected electricity systems are defined as electricity exports. For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO2 per MWh. There are net imports from Russia, and no transfers to/from China.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, as there are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data in Annex 3 shows that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

Electricity exports are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I is chosen.

Step 3. Select a method to determine the operating margin (OM)

According to the tool, the calculation of the operating margin emission factor (EF_grid,OM,y) is based on one of the following methods:

(a) Simple OM; or
(b) Simple Adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM

According to the Tool, the simple OM method (option a) can only be used if low-cost / must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. This criterion is met (see Annex 3) and therefore the project participants chose to use the simple OM method (option a).

The Simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. The project participants have chosen to use the ex-ante option, and EF_grid,OM,y is fixed for the duration of the first crediting period.

Ex ante option: If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

Step 4. Calculate the operating margin emission factor according to the selected method

(a) Simple OM

The Simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating sources serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated by one of the following options:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The fuel consumption and the total electricity generation of the thermal plants connected to the grid are available. Therefore, Option B can not be used and thus A is chosen.

Option A - Calculation based on average efficiency and electricity generation of each plant

Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OMsimple,y} = \Sigma_m (EG_{m,y} * EF_{EL,m,y}) / \Sigma_m EG_{m,y} \quad (4)$$

Where:
$EF_{grid,OMsimple,y}$ = Simple operating margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)
m = All power units serving the grid in year y except low-cost / must-run power units
y = The relevant year as per the data vintage chosen in step 3 Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

Determination of $EF_{EL,m,y}$

The emission factor of each power unit m should be determined as follows, using Option A1:

Option A1. If for a power unit m data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL,m,y} = \Sigma_i (FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y}) / EG_{m,y} \quad (5)$$

Where:
$EF_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
m = All power units serving the grid in year y except low-cost/must-run power units
i = All fossil fuel types combusted in power unit m in year y
y = The relevant year as per the data vintage chosen in Step 3 Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports should be treated as one power plant m.

On the basis of the data available, the three-year average operating margin emission factor is calculated as a full-generation-weighted average of the emission factors:

EF_grid,OMsimple,y = 1.121 tCO2/MWh

Step 5. Calculate the build margin (BM) emission factor

In terms of vintage of data, the project participants chose the ex-ante option (as for the OM calculation), and EF_grid,BM,y is fixed for the duration of the first crediting period:

Option 1: ex-ante. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);
b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);
c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});
   Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

Given the small size of the Mongolian Grid, the most recent 5 plant is chosen as this would represent a larger, more representative subset. Indeed, the Central Electricity System consists of 5 plant. Thus $SET_{5\text{-units}}$ comprises the larger annual generation and should be chosen as SET_{sample}, the group of power units when calculating the build margin.

However, the date when the power units in $SET_{5\text{-units}}$ started to supply electricity to the grid is more than 10 years ago. Indeed, the most recent addition was Power station-4, in 1991. Therefore, the following steps are also applied:

d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity,

starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample-CDM}$) the annual electricity generation ($AEG_{SET-sample-CDM}$, in MWh);
If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET-sample-CDM} \geq 0.2 \times AEGtotal$), then use the sample group $SET_{sample-CDM}$ to calculate the build margin. Ignore steps (e) and (f).

The most recent addition of capacity on the CES was Power station-4, in 1991. Therefore, when excluding the power units which started to supply electricity to the grid more than 10 years ago, SET_{sample} consists of no plant at all. Also, as there are no operating CDM plant, $SET_{sample-CDM}$ still consists of no plant at all. Therefore, the following steps are also applied:

e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);
f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample-CDM->10yrs}$).

The most recent addition of capacity on the CES was Power station-4, in 1991. Power station-4 comprises more than 20% of the annual electricity generation of the project electricity system, CES. Therefore, the sample group of power units m used to calculate the build margin, $SET_{sample-CDM->10yrs}$, is Power station-4 only.

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows:

$$EF\_grid,BM,y = \sum m (EG\_m,y \times EF\_EL,m,y) / \sum m EG\_m,y \quad (6)$$

Where:
EF_grid,BM,y is the build margin CO2 emission factor in year y (tCO2/MWh)
EG_m,y is the net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
EF_EL,m,y is the CO2 emission factor of power unit m in year y (tCO2/MWh)
m is the power units included in the build margin
y is the most recent historical year for which electricity generation data is available

As the sample group of power units m used to calculate the build margin only includes a single power station, Power station-4, formula (6) is simplified to:

$$EF\_grid,BM,y = EF\_EL,m,y \quad (6\text{-simplified})$$

The CO2 emission factor of each power unit m (EF_EL,m,y) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which electricity generation data is available, and using for m the power units included in the build margin. If the power units included in the build margin m correspond to the sample group $SET_{sample-CDM->10yrs}$, then, as a conservative approach, only option A2 from guidance in Step 4 (a) can be used and the default values provided in Annex 1 of the EF Tool shall be used to determine the parameter η_m,y.

Therefore, Option A2 is applied:

$$EF\_EL,m,y = EF\_CO2,m,i,y \times 3.6 / \eta\_m,y \quad (7)$$

Where:
EF_EL,m,y = CO2 emission factor of power unit m in year y (tCO2/MWh)
EF_CO2,m,i,y = Average CO2 emission factor of fuel type i used in power unit m in year y (tCO2/GJ)
η_m,y = Average net energy conversion efficiency of power unit m in year y (ratio), using the default values provided in Annex 1 of the EF Tool, i.e. 37% for sub-critical coal-fired plant.
m = All power units serving the grid in year y except low-cost/must-run power units
y = The relevant year as per the data vintage chosen in Step 3

The build margin emission factor is calculated using this methodology:

EF_grid,BM,y = 0.885 tCO2/MWh

Step 6. Calculation of the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

The weighted average CM method (option a) should be used as the preferred option.

The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered CDM projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

Option a is the preferred option. While the proposed project activity takes place in a country with less than 10 registered projects, Option b can not be used as the data for the application of step 5 above is available. Therefore option a is chosen.

(a) Weighted average CM

The combined margin emission factor is calculated as follows:

EF_grid,CM,y = EF_grid,OM,y × w_OM + EF_grid,BM,y × w_BM (8)

Where
EF_grid,OM,y is the operating margin CO2 emission factor in year y (tCO2/MWh)
w_OM is the weighting of operating margin emissions factor (%)
EF_grid,BM,y is the build margin CO2 emission factor in year y (tCO2/MWh)
w_BM is the weighting of build margin emissions factor (%).

According to the Tool, the default values for w_OM and w_BM for the wind projects in the first crediting period and the subsequent crediting period are: w_OM = 0.75 and w_BM = 0.25 (owing to their intermittent and non-dispatchable nature).

On the basis of these weights for the first crediting period, the combined margin emission factor is calculated, and fixed ex-ante for the duration of the first crediting period as follows and as shown in Table 8 below:

EF_grid,CM,y = 1.061 tCO2/MWh

Table 8 Emission factor calculation

	CO2 emission factor (tCO2/MWh)	Weighting (%)

Operating margin (see step 4)	1.121	75%
Build margin (see step 5)	0.885	25%
Combined margin	1.061	

These parameters will be recalculated at any renewal of the crediting period.

Baseline emissions (BE_y) now can be calculated as the annual net generation of the Proposed Project Activity (EG_y) multiplied by the combined margin CO2 emission factor (EF_grid,CM,y).

Leakage

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

Emission reductions

Emission reductions are calculated as follows:

ER_y = BE_y – PE_y

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

This section includes a compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remain fixed throughout the crediting period and that are available when validation is undertaken. Following EB guidance, data that is calculated with equations provided in the methodology or default values specified in the methodology are not included in the compilation.

Data / Parameter	**FC_i,y**
Unit	Mass or volume
Description	The amount of fossil fuel i consumed in the project/connected electricity system in year y
Source of data	Ministry of Mineral Resources and Energy
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	This is the most accurate data presenting fuel use in the electricity generating sector. Only locally mined lignite is used in the Central Electricity System.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	**NCV_i,y**
Unit	GJ/mass or volume unit
Description	Net caloric value of fossil fuel type i (only lignite) consumed in the project/connected electricity system in year y
Source of data	Mongolia Second National Communication under the UNFCCC, 2010 (Second National Communication)
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	In accordance with AM Tool 07 regional or national average default values are used. The value is reported in the Second National Communication and is inside the normal range for lignite given by IPCC 2006, and therefore is accepted. Only locally mined lignite is used in the Central Electricity System.

Purpose of data	Calculation of baseline emissions
Additional comment	The NCV of coal (lignite) is reported as 3500 kcal/kg . Using this value, the NCV is equivalent to 14.65 GJ/t, which is within the normal range for lignite according to the IPCC.

Data / Parameter	**EF_CO2,i,y**
Unit	tCO2/GJ
Description	CO2 emission factor of fossil fuel type i (lignite only) in year y
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.091
Choice of data or Measurement methods and procedures	The Carbon content of lignite in Mongolia is not reported in official publications. Therefore, the IPCC default values at the lower level of 95% confidence interval, which are the default value in the tool, are applied.
Purpose of data	Calculation of baseline emissions
Additional comment	The EF of 24.8 tC/TJ is equivalent to 0.091 tCO2/GJ.

Data / Parameter	**EG_y**
Unit	MWh
Description	Net electricity generated and delivered in the project electricity system in year y
Source of data	Ministry of Mineral Resources and Energy, Energy Regulatory Authority
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	This is the most accurate data presenting fuel use in the electricity generating sector. Only locally mined lignite is used in the Central Electricity System.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Following EB guidance, data that is calculated with equations provided in the methodology or default values specified in the methodology are not included in this compilation.

B.6.3. Ex ante calculation of emission reductions

>>

In accordance with the methodology, emission reductions are calculated as follows:

$ER_y = BE_y – PE_y$

Where:
ER_y is the emission reductions in year y (tCO_2e/yr)
BE_y is the baseline emissions in year y (tCO_2e/yr)
PE_y is the project emissions in year y (tCO_2e/yr)

Using the formulae 1 and 2 presented in Section B.6.1., the baseline emissions are calculated from the net electricity supplied by the Proposed Project Activity to the grid and the combined margin emission factor of the grid. The annual net generation is estimated by an independent entity on the basis of local wind measurements; the combined margin emission factor is calculated in section B.6.1. above. The ex-ante calculations of baseline emissions and emission reductions, therefore, are as follows:

BE_y = EG_y × EF_grid,CM,y = 168.5 GWh/yr × 1.061 tCO2/MWh = 178,778 tCO2/yr
ER_y = BE_y – PE_y = 178,778– 0 = 178,778tCO2/yr

The ex-ante calculations are included in the ER calculation spreadsheet.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2012	178,778	0	0	178,778
2013	178,778	0	0	178,778
2014	178,778	0	0	178,778
2015	178,778	0	0	178,778
2016	178,778	0	0	178,778
2017	178,778	0	0	178,778
2018	178,778	0	0	178,778
Total	1251,446	0	0	1251,446
Total number of crediting years	7 years			
Annual average over the crediting period	178,778			178,778
*Note: * Using 12-monthly periods from the start of the crediting period*				

B.7. Monitoring plan

Methodology

- Approved consolidated baseline and monitoring methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 12.1.0 (EB58 Annex 7, 26 November 2010, valid from 17 Sep 2010 onwards)

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data and parameter.)

All data collected as part of the monitoring are archived electronically and kept at least for 2 years after the end of the last crediting period. 100% of the data are monitored if not indicated otherwise in the tables below. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

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
Source of data	Electricity meter
Value(s) applied	168.5 GWh/yr once fully operational

Measurement methods and procedures	Two electricity meters are installed at the substation. The main meter will be owned by the Developer. Both meters will have the capability to be read remotely through a communication line. Both Grid Company and Developer have the right to read either meter. Both meters record on memory the accumulated kilowatt-hours. Electricity meter (bi-directional, recording supply and consumption) at the grid sub-station. Continuous measurement and at least monthly recording, calculated from supply to the grid and import from the grid.
Monitoring frequency	Continuous measurement compiled daily and monthly in daily log and monthly joint reports.
QA/QC procedures	The meter for monitoring of the emission reductions will be the same as used for electricity sales to the grid and the metering data will be cross-checked with sales data. 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 4. The frequency of calibrations is in accordance with the national regulations. The accuracy of the metering equipment is at least 0.2. The monthly net electricity generation supplied to the grid is approved and signed off by the Carbon Finance Specialist and is cross-checked by receipt of sales before being accepted and stored. A back-up meter is installed at the on-site substation.
Purpose of data	Calculation of baseline emissions
Additional comment	The electricity meter at the grid sub-station is the main meter.

B.7.2. Sampling plan

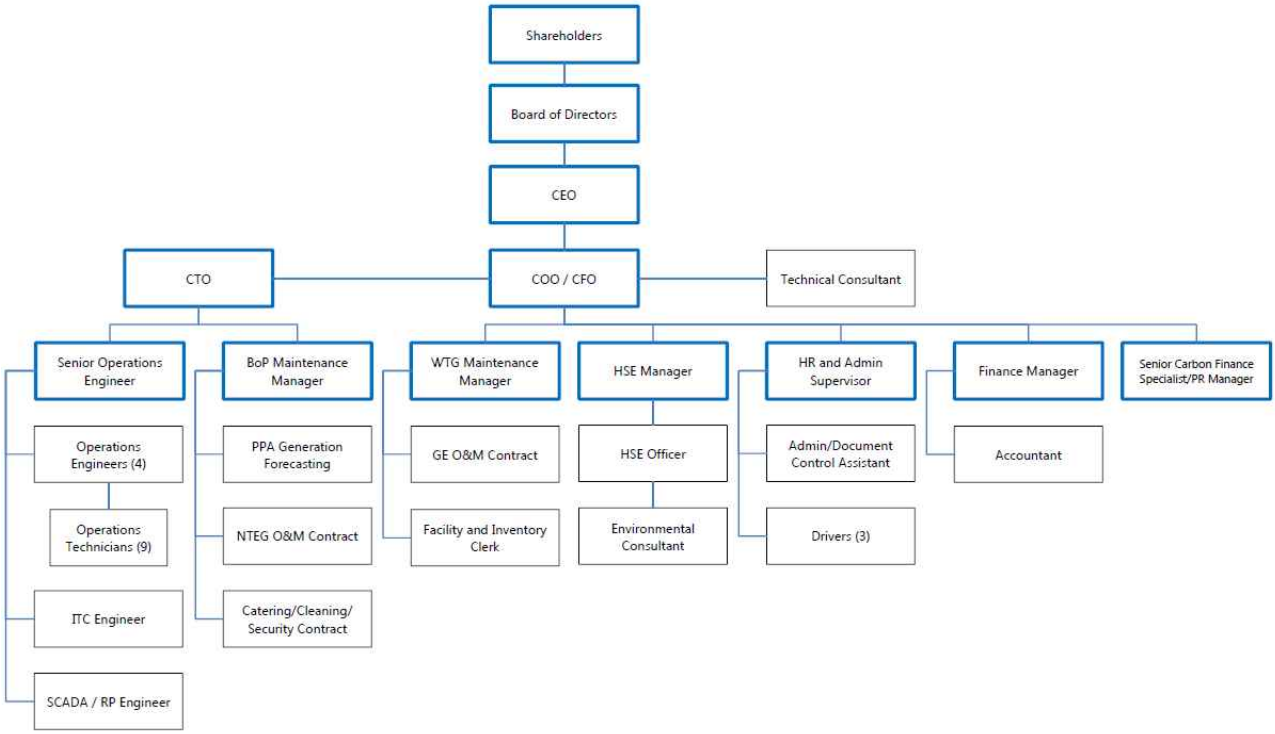
>>
Not applicable.

B.7.3. Other elements of monitoring plan

>>
Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with “Clean Energy” LLC. Technical team will be directly responsible for monitoring and reporting the net electricity generation and supply. The output from this project is monitored and recorded using two meters installed at the grid substation. One is main meter; the other is back up meter. The meter readings are used for both CDM purposes and sales of the electricity generated to the grid company.

The Finance and economy team will oversee the monitoring in partnership with the technical and CDM consultant where necessary and with EPC contractor who will be involved in the operation of the wind farm during the first few years of operation. Organizational chart and monitoring plan is shown on figure 4.

Figure 4. Organizational Chart of Clean Energy LLC and Monitoring Plan



B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
Date of completion of the baseline study and monitoring methodology: 21/02/2012.

Contact information of the entity sand persons responsible:

- Carbon Resource Management Ltd. (CRM) prepared the PDD. CRM Ltd is not a project participant.
- The persons preparing the documentation were:
  - Mr. Christiaan Vrolijk, cv@carbonresource.com, Tel: +44 7919 385 107.
  - Mrs. Bayarmaa Amarjargal, bayarmaa@cleanenergy.mn, Tel: +976 9910 9887

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
31/05/2011

The starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun. The starting date of the proposed project activity is the date of the road construction contract as this is the earliest date of real action as indicated in the timeline in Section B.5.

C.1.2. Expected operational lifetime of project activity

>>

25y-0m (from commissioning)[10]

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
7 year renewable crediting period is chosen. The project is under the first crediting period.

C.2.2. Start date of crediting period

>>
01/10/2012

C.2.3. Length of crediting period

7 y-0m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
A general environment impact assessment (EIA) of the project has been performed by the Ministry of Nature, Environment and Tourism of Mongolia (MNET) in accordance with the law in Mongolia in 2006. A comprehensive Environmental and Social Impact Assessment (ESIA) was conducted in 2008 by Black and Veatch which followed requirements and standards of European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC). Environmental Review was performed on all previous works by Sgurr Energy LLC in 2011 following the Equator Principles and best international practice of the wind sector.

Impact from the project

- The impact of the noise from the project is considered insignificant as the nearest residential area is 4 to 8 km away, where no noise will be observed.
- Any electromagnetic interference of the project is considered insignificant as the nearest residential areas are too far away for such interference to occur.
- The impact of the wind farm on bird populations and migratory birds is minimal. The normal migratory routes are 40-50 km from the site. During the wind resource study period of 3-4 years no migratory bird were spotted in the area.
- Money is set aside for the decommissioning of the wind farm and restoration of the natural environment at the end of the operating period.

Impact reduction from the baseline

- The main impact during operation of the proposed project activity is the displacement of electricity generation by the country's fossil-fuel fired power plants. In this environmental evaluation it was estimated that the project would save approximately 120,000 tonnes of coal, and 150,000 tonnes of CO2 annually. The emission reductions are substation and have been re-calculated in detail in this PDD, following the CDM methodology.
- The second main impact is the reduction in water demand from the power plant. In this environmental evaluation it was estimated that the project would save approximately 1.15 million tonnes of ground water.

[10] As the equipment has not yet been contracted, the default operating life of on wind turbines in accordance with CDM guidance (Tool to determine the remaining lifetime of equipment, version 01, EB50 Annex 15, 16 Oct 2009.

Conclusions

The Chief Investigator of the Ministry of Environment, Nature and Tourism of Mongolia, A. Enkhbat, evaluated the proposal and approved the project with conditions.[11] These conditions include:

- advertise the project to rural residents and the public
- operate the project to international standards, including with regards to labour safety
- obtain approval for the transmission line and substation
- protect soil and plants in the area affected, and restore after construction
- request professional organisations carry out environmental controls during the project

The developer has accepted and will comply with all conditions for the approval.

D.2. Environmental impact assessment

>>

As written in the D.1 above, General EIA was approved in 2006 by the MNET following national requirements. Detailed ESIA was conducted in 2008 by Black & Veatch following investors' requirements. Environmental Review was conducted by Sgurr Energy in 2011 for construction and operation stages as part of the feasibility study. Later in 2012 detailed EIA was conducted again following the national requirements set by the Ministry of Environment and Green Development (MEGD - the current name). This final detailed EIA was approved by the MEGD in 2012 with a positive conclusion. All of the plans and requirements set by these EIAs have been thoroughly followed.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

As part of the approval for the proposed project activity, the Mongolian government requested that rural residents and the public be fully informed of the project. As part of the project undertaken as a CDM project, the project developer, with the project CDM consultant has undertaken a full stakeholder consultation, by informing stakeholders, receiving comments and responding to stakeholders' concerns.

The project developer organised the stakeholder consultation in July-August 2007. Invitations were sent out to over 100 people and 20 environmental NGOs for the consultation meeting. Invitees included: local government officials, village leaders, herders, and NGOs.

The meeting took place on 10 August 2007 in the Cultural Hall, Sergelen Soum, Tuv Aimag, i.e. the central hall for the community to which the wind farm belongs. In addition, the developer visited around 30 households of Sergelen Soum on 19 July to introduce the project and invite them to the meeting. In order to assist stakeholders to be able to take part, given the remoteness of the area, and the fact that the local residents are often nomadic, transport to the meeting was provided.

Over 50 people attended the stakeholder consultation meeting, including the Sergelen Soum governor, a representative of the Ministry of Environment, and 3 NGO representatives.

A questionnaire was also sent out with the invitation.

E.2. Summary of comments received

>>

Comments at the meeting related to further information regarding further explanation of the project itself and the possibility of continued grazing by livestock at the site.

[11] No. 4/2457, September 27, 2006. The documentation is available to the DOE.

A total of 38 questionnaires were returned, all of which agreed with the building of the project. The results of the questionnaires are as follows:

Question: Do you agree with the building of the project? Answers: Yes: 38; No: 0; I do not know: 0 Remarks: Agree with the building of the windfarm. This will supply locally generated energy. It will have environmentally friendly operation, preserving fresh water supplies, non-renewable coal reserves, and will not have a negative impact on wild animals
Question: Do you think the project will have a positive or negative impact on you? Answers: Positive: 19; Negative: 1*; I do not know: 6 (no answer: 12) Remarks: It is important for the local region and country's development. * The person responding negative did agree with the building of the windfarm, but thought the impact would be negative on nature, in particular because of sight spoiling.
Question: Do you think the project has economic benefits? Answers: Yes: 20; No: 10; I do not know: 7 (no answer: 1) Explanation: Construction jobs (18), operation job (13), electricity supply (23), tourism (17). Remarks: Increased employment opportunity and increased tax income.
Question: Do you think the project will have a negative impact on the environment? Answers: Yes: 6; No: 20; I do not know: 10 (no answer: 2) Explanation: Noise (6), sight spoiling (3), wildlife (3), birds (2). Remarks: No harmful impact if proper infrastructure is build, including road.
Question: Do you think the power lines will have a negative impact on the environment? Answers: Yes: 6; No: 16; I do not know: 14 (no answer: 2) Explanation: Noise (7), sight spoiling (2), impact on the national park (1), wildlife (2).
Question: Do you think the government rules or Newcom's business culture guarantees good, safe and clean construction and operation? Answers: Yes: 25; No: 2; I do not know: 9 (no answer: 2) Remarks: We believe the operation of the company will be environmentally friendly and support the company and the project.
Final remarks: We support the project and believe the project will provide various benefits to the development of the country and the region.

E.3. Report on consideration of comments received

>>

All stakeholders responded in favour of the proposed project. However, a number of issues were raised, including noise, sight spoiling and potential impact on wildlife, as well as possibly a negative impact on one stakeholder. The EIA, summarised in Section D above, shows that the impacts will in fact be minimal.

Noise: The EIA shows that the noise will be insignificant, as the nearest residential areas are 4 to 8 km away. While grazing of livestock will continue in the area, the nomadic herders are generally not living in close proximity of the site.

Sight spoiling: While the project may be visible from some distance, this wind farm is located far from the National Park, and far from any habitation centres.

Wildlife/birds: The EIA shows that the impact on wildlife and birds will be insignificant. The migratory routes are far from the site and there are no particular feeding or drinking sites near the proposed wind farm.

The one personal negative impact: related to the impact on nature, in particular sight spoiling. However, the person did agree with the construction of the wind farm.

SECTION F. Approval and authorization

>>

Letter of approval from Mongolian DNA was first issued for the project activity on 10 October 2007 and re-issued on 11 November 2011 before submitting the PDD to the validating DOE. Both LoAs are shown below.

1. First LoA from Mongolian DNA issued in 2007

CDM DNA MONGOLIA

Цэвэр Хөгжлийн Механизмийн Үндэсний Товчоо
Clean Development Mechanism Designated National Authority

2007 оны 10-р сарын 10 № 07/01 Улаанбаатар хот

To: Director of NEWCOM LLC
8F, 8 Zovkhis Building
Seoul Street 6/3
Ulaanbaatar 210628
Mongolia

Ref: Letter of Approval for "Salkhit wind park"

Dear Sir/Madam,

The Designated National Authority for the Clean Development Mechanism on behalf of the Government of Mongolia approves "Salkhit wind park" as a Clean Development Mechanism project, with the following remarks:

- Mongolia accepted to the Kyoto Protocol to the United Nations Framework Convention on Climate Change on 15, December, 1999, and is a Party to the Kyoto Protocol.
- The "Salkhit wind park" contributes to the sustainable development in Mongolia
- Newcom LLC is hereby authorized as Mongolia's participant to voluntarily participate in and carry out the project activity.

MONGOLIA CDM DESIGNATED NATIONAL AUTHORITY

Your sincerely,

A.Enkhbat
Head of CDM DNA for Mongolia

2. Renewed LoA from Mongolian DNA issued in 2011

CDM DNA MONGOLIA

Цэвэр Хөгжлийн Механизмын Үндэсний Товчоо
Clean Development Mechanism Designated National Authority

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UN Street 5/2
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2011 оны 11 сарын 11 № 11/122 Улаанбаатар хот

11 November 2011

To,
BYAMBASAIKHAN BAYANJARGAL
Chief Executive Officer, Clean Energy LLC
9th Floor, Zovkhis Building
Seoul street 21, Sukhbaatar district
Ulaanbaatar, Mongolia

Sub: Letter of Approval for a project under article 12 of the Kyoto Protocol (CDM)
Name of the project: Salkhit Wind Farm
DNA reference number: MONDNA07-1 (PDD_Ver 2)

The CDM National Bureau, coordinated under the Ministry of Nature, Environment and Tourism, acting as the Mongolian Designated National Authority (DNA) confirms that Mongolia:

1. has ratified the Kyoto Protocol on 15th December 1999
2. approves voluntary participation in the CDM project activity mentioned above.
3. by this letter of approval, also authorizes "Clean Energy LLC" to participate as project proponent to the CDM project activity named above;
4. acknowledges that the above mentioned project contributes to sustainable development of Mongolia

"At your and Newcom's request, we revoke the Letter of Approval issued to Newcom LLC (previous project participant) for project named Salkhit Wind Park (previous project title) in October 2007. The reissuance of the Letter of Approval is based on your assurances that the project has not been substantially changed relative to the project design on the basis of which the earlier Letter of Approval to Newcom was issued.
While we trust the following not to apply to you, please note that the government of Mongolia reserves the right to revoke Letters of Approval when appropriate, for example in case projects are found to be in breach of Mongolian laws and regulations provided such breaches, if notified to the project company, are not remedied within a reasonable time period, or when information provided during the host country approval application appears to be substantially incorrect."

Yours sincerely,

Ms.Tsendsuren Batsuuri
Head of CDM National Bureau

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Carbon Resource Management Ltd (CRM)
Street/P.O. Box	5-7 Cranwood Street
Building	Finsgate
City	London
State/Region	-
Postcode	EC1V 9EE
Country	United Kingdom
Telephone	+44 7919 385 107
Fax	-
E-mail	cv@carbonresource.com
Website	http://www.carbonresource.com/
Contact person	Christiaan Vrolijk
Title	Consultant
Salutation	Mr.
Last name	Vrolijk
Middle name	-
First name	Christiaan
Department	-
Mobile	+44 7919 385 107
Direct fax	-
Direct tel.	-
Personal e-mail	christiaanvrolijk@gmail.com

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Clean Energy LLC
Street/P.O. Box	Seoul Street 21
Building	Naiman Zovkhis
City	Ulaanbaatar
State/Region	-
Postcode	14251
Country	Mongolia
Telephone	(+976) 99109887
Fax	-
E-mail	bayarmaa@cleanenergy.mn
Website	www.cleanenergy.mn
Contact person	Bayarmaa Amarjargal
Title	National Carbon Finance Consultant
Salutation	Mrs.

Last name	Amarjargal
Middle name	-
First name	Bayarmaa
Department	-
Mobile	(+976) 9910 9887
Direct fax	-
Direct tel.	-
Personal e-mail	Bayarmaa.amarjargal@gmail.com

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Clean Energy LLC
Street/P.O. Box	Seoul Street 21
Building	Naiman Zovkhis
City	Ulaanbaatar
State/Region	-
Postcode	14251
Country	Mongolia
Telephone	(+976) 7011 1331
Fax	(+976) 7011 1341
E-mail	sukhbaatar@newcom.mn
Website	www.cleanenergy.mn
Contact person	Sukhbaatar Tsegmid
Title	Chief Executive Officer
Salutation	Mr.
Last name	Tsegmid
Middle name	-
First name	Sukhbaatar
Department	-
Mobile	(+976) 9911 6244
Direct fax	(+976) 7011 1341
Direct tel.	-
Personal e-mail	-

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Swedish Energy Agency
Street/P.O. Box	-
Building	Kungsgatan 43
City	Eskilstuna
State/Region	-
Postcode	63104
Country	Sweden
Telephone	+46165442367
Fax	-

E-mail	Nils.henoch@swedishenergyagency.se
Website	http://www.energimyndigheten.se/en/
Contact person	Nils Henoch
Title	Transaction Manager
Salutation	Mr.
Last name	Henoch
Middle name	-
First name	Nils
Department	Swedish CDM & JI Programme International Carbon Market Unit
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	-

Appendix 2. Affirmation regarding public funding

There is no public funding from Parties included in Annex I for the construction of this project. However, some public funds were received during the following stages of project preparation:

PPA negotiations
Being the first proposed wind farm in Mongolia, the IFC provided a grant to co-finance consultant expenses associated with the PPA negotiations and the development of the financial models for the project. The IFC grant does not contribute to the project activity itself.

ESIA report
Government of Luxembourg provided a grant to finance the consultant expenses associated with the Environmental and Social Impact Assessment (ESIA) required by the EBRD, in order for them to take part in negotiations regarding financing the project. This Environmental and Social Impact Assessment was more extensive than the standard EIA required by Mongolian law, which had already been carried out and approved. The Luxembourg grant does not contribute to the project activity itself.

Shareholder agreement with EBRD and convertible grant agreement with FMO
In Dec 2009, EBRD agreed to become a shareholder in the proposed project activity, through participation in the project company "Clean Energy" LLC. Through this shareholders agreement Clean Energy LLC is currently 75% owned by Newcom and 25% by EBRD. Out of 75% owned by Newcom, the company signed a convertible grant agreement with FMO, an entrepreneurial development bank of the Netherlands, in Oct 2010 giving it rights for 24% equity in the project at financial close. Therefore, both agreements do not involve public funding.

MCC grant to the Government of Mongolia
In Dec 2009, the MCC Board approved a fund of USD 10.4 million to the Government of Mongolia on supporting renewable energy development. The fund, provided to NDC and CRETN, will (i) support tariff subsidy to temporarily smooth the difference between the estimated cost of power from the proposed project and the estimated cost of power to be paid by consumers by the end of 2013; (ii) upgrade Nalaikh grid substation; and (iii) upgrade SCADA, a fully automatic control system at NDC. As the funding is provided from the US government through MCC to the Government of Mongolia, it does not involve direct ODA for the proposed project.

Appendix 3. Applicability of methodology and standardized baseline

BASELINE INFORMATION

Additional information to that presented in section B.6. is given below and in the EF calculation spread sheet.

Step 3. Select a method to determine the operating margin (OM)

There is currently no generation from low-cost/must-run generation, all 5 plant are fossil fuel-fired plant[12]. Therefore, the Simple OM method is applicable to the proposed project.

Table A1. Operating power plant in Central Energy System of Mongolia

	Power station	Capacity (MW)	Commissioned	Fuel
1	Power station-2 (Ulaanbaatar)	21.5	1961 - 1969	lignite
2	Power station-3 (Ulaanbaatar)	136	1968 - 1982	lignite
3	Power station-4 (Ulaanbaatar)	580	1983 - 1991	lignite
4	Power station of Darkhan	48	1966 - 1986	lignite
5	Power station of Erdenet	28.8	1987 - 1989	lignite

Step 4. Calculate the operating margin emission factor according to the selected method

The operating margin is calculated using Option A1.

[12] All 5 power plants forming the Central Energy System (CES) are coal burning thermal power plants and are not low-cost/must-run generation as they are (i) dispatched dependently from the seasonal load of the grid, and (ii) do not have low marginal generation cost.

(i) *Statistical Indicators of Energy Sector*, Yearly Bulletin from the Energy Regulatory Authority, 2006-2010.

(ii) *Short-term Energy Sector Technical Assistance on Development of Economic Dispatch Operating Procedure*, Economic Policy Reform and Competitiveness Project by USAID, Apr 2011

Table A2. Fuel consumption

	Power station	Year	Fuel consumption for electricity generation (tonnes)
1	Power station-2	2004	133,846
		2005	124,925
		2006	141,218
2	Power station-3	2004	451,141
		2005	467,859
		2006	422,194
3	Power station-4	2004	1,530,236
		2005	1,587,437
		2006	1,550,080
4	Power station of Darkhan	2004	158,679
		2005	163,767
		2006	203,602
5	Power station of Erdenet	2004	76,886
		2005	77,078
		2006	69,528
	Central Energy System	2004	2,350,789
		2005	2,421,066
		2006	2,386,621

Source: Ministry of Mineral Resources and Energy, the fuel shares for heat and electricity are determined from the "Statistical Indicators for Energy Sector", Energy Regulatory Authority

Table A3. Emissions and emission factor

	Power station	Year	FC_lignite (tonnes)	NCV_lignite (GJ/t)	EF_CO2,lignite (tCO2/GJ)	Emissions (tCO2)	EF_EL (tCO2/MWh)
1	Power station-2	2004	133,846			178,361	2.05
		2005	124,925			166,472	1.98
		2006	141,218			188,185	2.09
2	Power station-3	2004	451,141			601,183	1.43
		2005	467,859			623,460	1.43
		2006	422,194			562,608	1.26
3	Power station-4	2004	1,530,236			2,039,166	1.15
		2005	1,587,437	14.65	0.091	2,115,391	1.12
		2006	1,550,080			2,065,609	1.04
4	Power station of Darkhan	2004	158,679			211,453	1.09
		2005	163,767			218,234	1.10
		2006	203,602			271,316	1.30
5	Power station of Erdenet	2004	76,886			102,457	0.99
		2005	77,078			102,713	0.97
		2006	69,528			92,651	0.85
	Central Energy System	2004	2,350,789			3,132,620	
		2005	2,421,066			3,226,270	
		2006	2,386,621			3,180,369	

Note: NCV of lignite is 3500 kcal/kg (conversion to GJ/t is 4.187/1000), Second National Communications

Note: EF_CO2,lignite is 24.8 tC/TJ (conversion to tCO2/GJ is 44/12/1000) according to the IPCC default at lower 95% confidence interval

Source: Ministry of Mineral Resources and Energy

NCV is the net calorific value (energy content) of the locally mined lignite. This value is obtained from the Second National Communications. The NCV is stated to be 3500 kcal/kg. This is equivalent to 14.65 TJ/Gg, which is in the normal IPCC range for lignite (the default value being 11.9, and the total range 5.5 to 21.6). The national value, therefore, is used.

EF_{CO2} is the CO_2 emission factor per unit of energy of the fuel, and it can be calculated by multiplying the carbon emission factor (CEF, carbon content) by 44/12. As no local laboratories in

Mongolia provide the data on carbon content of the coal and lignite, the IPCC default value at the lower level of 95% confidence interval are used, which is the default value in the tool.

Gross generation as well as internal use percentage for each plant is presented in the ERA and Ministry data[13]. For the OM calculations, net generation (and imports) is calculated in Table A4 below. The project electricity system is not connected to other grids in Mongolia. However, imports from outside the country are taken into account, and are listed in Table A4 below.

Table A4. Gross generation, own consumption rate, and net supply in CES

	Power station	Year	Net generation, EG (MWh)	Gross generation (MWh)	Own consumption (%)
1	Power station-2	2004	86,819	105,568	18%
		2005	84,210	101,470	17%
		2006	90,110	108,763	17%
2	Power station-3	2004	420,728	565,267	26%
		2005	435,338	570,860	24%
		2006	446,341	577,788	23%
3	Power station-4	2004	1,780,631	2,149,742	17%
		2005	1,882,004	2,251,201	16%
		2006	1,977,252	2,347,723	16%
4	Power station of Darkhan	2004	194,033	238,928	19%
		2005	197,513	242,020	18%
		2006	208,224	255,961	19%
5	Power station of Erdenet	2004	103,249	135,533	24%
		2005	105,906	137,505	23%
		2006	108,656	140,984	23%
	Central Energy System	2004	2,585,461	3,195,037	
		2005	2,704,971	3,303,056	
		2006	2,830,584	3,431,219	
	Net imports from Russia	2004	130,000	130,000	
		2005	130,000	130,000	
		2006	130,000	130,000	
	Total	2004	2,715,461	3,325,037	
		2005	2,834,971	3,433,056	
		2006	2,960,584	3,561,219	

Source: Ministry of Mineral Resources and Energy

Operating Margin Emission Factor calculations

[13] *Statistical Indicators of Energy Sector*, Yearly Bulletin from the Energy Regulatory Authority, 2007-2010. Ministry of Mineral Resources and Energy (MMRE)

Table A5. Operating margin and build margin calculations

	Power station	Year	Net generation, EG (MWh)	EF_EL (tCO2/MWh)	EF_grid,OMsimple (tCO2e/MWh)
1	Power station-2	2004	86,819	2.05	0.066
		2005	84,210	1.98	0.059
		2006	90,110	2.09	0.064
2	Power station-3	2004	420,728	1.43	0.221
		2005	435,338	1.43	0.220
		2006	446,341	1.26	0.190
3	Power station-4	2004	1,780,631	1.15	0.751
		2005	1,882,004	1.12	0.746
		2006	1,977,252	1.04	0.698
4	Power station of Darkhan	2004	194,033	1.09	0.078
		2005	197,513	1.10	0.077
		2006	208,224	1.30	0.092
5	Power station of Erdenet	2004	103,249	0.99	0.038
		2005	105,906	0.97	0.036
		2006	108,656	0.85	0.031
	Central Energy System	2004	2,585,461		
		2005	2,704,971		
		2006	2,830,584		
	Net imports from Russia	2004	130,000	0.00	0.000
		2005	130,000	0.00	0.000
		2006	130,000	0.00	0.000
	Total, including imports	2004	2,715,461		1.154
		2005	2,834,971		1.138
		2006	2,960,584		1.074
	Aggregate (2004-2006)		8,511,015		
	EF_grid,OMsimple (tCO2e/MWh)				1.121

Based on the calculation above, the simple OM emission factor of CES is calculated ex-ante using a 3-year generation-weighted average is 1.121 tCO_2e/MWh.

Step 5. Calculate the build margin (BM) emission factor

As explained in section B.6, the sample group of power units m used to calculate the build margin is determined following procedure in the EF Tool:

a) The set of five power units, $SET_{5\text{-units}}$, includes all power units on the project electricity system. $AEG_{SET\text{-}5\text{-}units}$ for the last year is 2,830,584 MWh;
b) AEG_{total} for the last year is 2,830,584 MWh. The set of power units that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total}, $SET_{\geq 20\%}$, includes only Power station-4. $AEG_{SET\geq 20\%}$ for the last year is 1,977,252 MWh, which is 70% of AEG_{total};
c) $SET_{5\text{-units}}$ comprises the larger annual electricity generation and is set as SET_{sample};

However, the date when the power units in $SET_{5\text{-units}}$ started to supply electricity to the grid is more than 10 years ago. Indeed, the most recent addition was Power station-4, in 1991. Therefore, the following steps are also applied:

d) The most recent addition of capacity on the CES was Power station-4, in 1991. Therefore, when excluding the power units which started to supply electricity to the grid more than 10 years ago, SET_{sample} consists of no plant at all. Also, as there are no operating CDM plant,

$SET_{sample\text{-}CDM}$ still consists of no plant at all, thus $AEG_{SET\text{-}sample\text{-}CDM}$ is 0 MWh, or 0% of AEG_{total}. Therefore, the following steps are also applied:

e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system. The most recent addition of capacity on the CES was Power station-4, in 1991. Power station-4 comprises more than 20% of the annual electricity generation of the project electricity system, CES.

f) The $SET_{sample\text{-}CDM\text{->}10yrs}$, therefore, used to calculate the build margin is Power station-4 only.

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$EF\_grid,BM,y = \sum m (EG\_m,y \times EF\_EL,m,y) / \sum m EG\_m,y$

Where:
EF_grid,BM,y is the build margin CO2 emission factor in year y (tCO2/MWh)
EG_m,y is the net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
EF_EL,m,y is the CO2 emission factor of power unit m in year y (tCO2/MWh)
m is the power units included in the build margin
y is the most recent historical year for which power generation data is available

As the sample group of power units m used to calculate the build margin only includes a single power station, Power station-4, this formula is simplified to:

$EF\_grid,BM,y = EF\_EL,m,y$

The CO2 emission factor of each power unit m (EF_EL,m,y) should be determined as per the guidance in Step 4 (a) for the simple OM. If the power units included in the build margin m correspond to the sample group $SET_{sample\text{-}CDM\text{->}10yrs}$, then, as a conservative approach, only option A2 from guidance in Step 4 (a) can be used and the default values provided in Annex 1 of the EF Tool shall be used to determine the parameter η_m,y.

Therefore, Option A2 is applied:

$EF\_EL,m,y = EF\_CO2,m,i,y \times 3.6 / \eta\_m,y$

Where:
EF_EL,m,y = CO2 emission factor of power unit m in year y (tCO2/MWh)
EF_CO2,m,i,y = Average CO2 emission factor of fuel type i used in power unit m in year y (tCO2/GJ)
η_m,y = Average net energy conversion efficiency of power unit m in year y (ratio), using the default values provided in Annex 1 of the EF Tool, i.e. 37% for sub-critical coal-fired plant.
m = All power units serving the grid in year y except low-cost/must-run power units
y = The relevant year as per the data vintage chosen in Step 3

The build margin emission factor is calculated using this methodology:

EF_{BM} = 0.885 tCO_2e/MWh.

Step 6. Calculation of the combined margin emission factor

Option a – Weighted average CM

On the basis of the default weights for the first crediting period, the combined margin emission factor is calculated, and fixed ex-ante for the duration of the first crediting period as follows and as

shown in Table A6 below.

Table A6 Emission factor calculation

	CO2 emission factor (tCO2/MWh)	Weighting (%)
Operating margin (see step 4)	1.121	75%
Build margin (see step 5)	0.885	25%
Combined margin	1.061	

Appendix 4. Further background information on ex ante calculation of emission reductions

Fully described in the B.6.3 and CER/EF calculation in excel sheet.

Appendix 5. Further background information on monitoring plan

I. Responsibility

The responsibility for monitoring lies with “Clean Energy” LLC, who operates the proposed project activity. Technical team will be directly responsible for monitoring and reporting net electricity supplied by the project activity to the grid. Finance and economy team will oversee the monitoring in partnership with relevant parties (e.g. grid company, consultants and EPC contractor when necessary). Wind project staffs will be monitoring, reporting and compiling records of generated electricity, while the Carbon Finance Specialist will cross-check results with a receipt of sales before its being accepted, stored and approved.

II. Training

Wind project staffs at Clean Energy are experienced engineers with more than 8 years of work experience in energy sector. They will follow all guidelines and procedures regarding the monitoring of net electricity as specified in the PPA and PDD.

The Carbon Finance Specialist is experienced. New personnel working on the project will complete training within 3 months of starting work.

A CDM Manual will be compiled within 3 months of registration of the proposed project activity.

III. Data and parameters to be monitored

The data and parameters to be monitored for the CDM project activity are listed in Section B.7.1. of this PDD:

- EG_facility: Net electricity supplied by the project activity to the grid, calculated from supply to the grid and imports from the grid using the main meter at the grid sub-station.

The emission factor is determined ex-ante and fixed for the duration of the crediting period in this PDD.

Some parameters are monitored for purposes other than the CDM, in particular for on-going operational and maintenance requirements of the project.

IV. Installation of electricity meters

The net on-grid electricity generation will be based on the main meter installed at the substation of the grid. The main meter will record supply and consumption of electricity. The meter will have the capability to be read remotely through a communication line. A back-up/control meter will be installed at the substation.

Backup meters will be available at the onsite project office, including meters for each turbine. If in future, additional generating capacity is installed sharing the same transformer, substation and/or transmission line with this proposed project activity, these back-up meters would be used to calculate the share of this proposed project in the total net supply, i.e. supply minus consumption, (and thus emission reductions) at the substation.

V. Compilation of the monitored data and dealing with errors

Technical team will receive the meter readings from the grid sub-station. The meter readings from the main and back up meters as well as the volumes from the sales receipts are compiled and compared.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by (a) first, reading backup meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or operation is performed improperly the Developer and grid company shall jointly prepare an reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative for verification by the DOE; and (c) if the grid company and the Developer fail to agree then the matter will be referred for arbitration according to agreed procedures.

VI. Calibration

. As specified by the PPA, inspection, testing and calibration shall be in accordance with the “Code of Energy Utilization” and other relevant rules and regulations.

The net generation output registered by the main meter alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meters is within the agreed limits.

The meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

All the meters installed shall be tested within 10 days after: the detection of an error; the repair of the meter. If any errors are detected the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

VII. Quality control

Audit

Monthly net electricity supply and consumption data will be approved and signed off by the Carbon Finance Specialist before it is accepted and stored.

The Carbon Finance Specialist cross-checks meter readings from the main meter received and sales receipts, and also compares the data with the meter reading from the back-up meter. The most conservative of the main meter reading and sales receipt is adopted.

The Carbon Finance Specialist also checks the validity of the calibration certificates of the

electricity meters. If the data is correct and the meters calibrated, the data is approved, signed off and stored. If any errors are identified, such errors will be described and corrected, prior to approval, sign off and storage of the corrected data and error descriptions.

This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years.

Meter failure case

In the event of meter failure, the PPA prescribes the course of action to be taken.

VIII. Reporting

The Monitoring Report will describe the monitoring procedures, approved and signed off metering data, corrected errors, and the emission reduction calculations.

With the Monitoring Report, the calibration records are presented for verification.

IX. Record keeping

All data collected as part of the monitoring are archived electronically and kept at least until 2 years after the last CER issuance.

Appendix 6. Summary of post registration changes

There is only one permanent post registration change related to the calibration frequency in section VI. Calibration of the Appendix 5. This was submitted for approval with the second monitoring report. It reflects the actual requirements for Clean Energy LLC with regards to calibration frequency of meters following the national regulations. According to the Project Standard (v.7, p.64), prior Board Approval is not required for the change of calibration frequency for the monitoring equipment not within the control of project participants. The frequency of calibration is per national regulations and industry practice.

The rest of the changes are editorial changes relevant to the requirements of the new PDD form, and do not affect the project design, monitoring plan or applied methodology. These changes include:

- Addition of a Project Participant (Swedish Energy Agency) in the A.4.
- Update of organizaitonal chart in B.7.3.
- Addition of the following sections as per the requirement of the new PDD form (v.5): “Purpose of Data” in B.6.2; “Monitoring frequency” in the B.7.1; EIA in D.2; Section F and Appendix 1.

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Document information

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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