

50 MW TSETSII WIND FARM IN MONGOLIA

Document Prepared By Value Network Venture Advisory Services LLP

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1 PROJECT DETAILS

1.1 Summary Description of the Project and its Implementation Status

50 MW Tsetsii Wind Farm in Mongolia (hereafter referred to as the Project) is located in Tsogttsetsii Soum, in the South Gobi region of Mongolia. The project owner is Clean Energy Asia LLC (CEA).

The project started construction on 14/09/2016 and starts commercial operation on 27/11/2017 and fully operation on 08/05/2018.

The proposed project has a total installed capacity of 50.0 MW consisting of 25 wind turbines with unit capacity of 2.0 MW. The project involves Vestas make V110-2.0MW WTG model (25 WTGs) of make 2.0 MW each WTGs. The expected annual power delivered to the grid is 2,01,918 MWh. The power generated will be delivered to the National Power Transmission Grid (NTPG) Limited under a power purchase agreement.

The scenario existing prior to the start of the implementation of the project activity is the same as the baseline scenario as identified in section 2.3, i.e. electricity would have otherwise been generated by the operation of power plants connected to NTPG and by the addition of new generation sources of NWTG. When the proposed project is put into operation, the power generated will substitute a part of power supply in NTPG which is dominated by fuel-fired power plants and thus reduce greenhouse gas (GHG) emission through avoiding CO₂ emissions produced by NWTG. The estimated annual average emission reduction is 1,75,870 tCO₂e. The VCS crediting period of the Project is from 27/11/2017 to 26/11/2027, totally 10 years. The estimated emission reduction during this period is 17, 58,700 tCO₂e. The emission reduction during this monitoring period from **27/11/2017 to 31/03/2019** is **1, 70,352 tCO₂e**.

The proposed project will contribute to sustainable development mainly by:

- Reducing the emission of CO₂ and other pollutants compared with fuel-fired power plant;
- Creating local employment opportunities during the construction (more than 30 people) and operation (4 people) of the proposed project and improving the living standard of local people;
- With the help of the road, which was constructed due to the proposed project, agriculture and other products could be transported easily from the villages to city by Local farmers. It can reduce poverty, which is very important to South Gobi, a poverty-stricken region energy resources of NTPG;
- The implementation of the proposed project will help to change the energy structure, and thereby, contribute to the development of local economy;

To construct such a large-scale wind power plant, the project owner spends a lot to purchase wind turbines and other auxiliary equipment such as transformers and distributed control system etc. The huge investment provides an opportunity for the expansion of related industrial branches

and factories, hence stimulates the growth of wind power industry and development of wind power technology in Mongolia.

1.2 Sectoral Scope and Project Type

The Project falls in the sectoral scope 1: energy industries (renewable-/non-renewable sources). The Project is not a grouped project.

1.3 Project Proponent

Organization name	Clean Energy Asia LLC
Contact person	Turbold Enkhtuvshin
Title	Project Owner
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1.4 Other Entities Involved in the Project

Organization name	Value Network Venture Advisory Services LLP
Role in the project	Consulting Company
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Title	Director
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1.5 Project Start Date

27/11/2017 (project started operational date)

1.6 Project Crediting Period

The VCS crediting period of the Project is from 27/11/2017 to 26/11/2027, totally 10 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	√

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 2017(27/11/2017 to 31/12/2017)	16,854
Year 2018	1,75,767
Year 2019	1,75,767
Year 2020	1,75,767
Year 2021	1,75,767
Year 2022	1,75,767
Year 2023	1,75,767
Year 2024	1,75,767
Year 2025	1,75,767
Year 2026	1,75,767
Year 2027(01/01/2027 to 26/11/2027)	1,59,006
Total estimated ERs	17,57,763
Total number of crediting years	10
Average annual ERs	1,75,767

1.8 Description of the Project Activity

a) Technology to be employed before the proposed project:

The proposed project is to utilize wind resources for electricity generation in South Gobi, Mongolia. The scenario existing prior to the start of the implementation of the project is to provide

the same annual electricity output as the project by NTPG, including CO₂, which is dominated by the fossil-fuel fired power plants.

The baseline scenario is the same as the scenario existing prior to the start of implementation of the proposed project activity.

b) Technology to be employed by the proposed project:

The project involves the installation of 25 sets of 2 MW wind turbines. The total installed capacity of the project is 50 MW. Estimated annual power generation is 2,01,918 MWh. The Project will achieve average greenhouse gas (GHG) emission reductions of 1,75,767 tCO₂e annually by displacing power generation by fossil fuel-fired power plants connected into the NTPG. The estimated annual operation hours are 8760 hrs and the estimated plant load factor is 46.073%.

Technical parameters of the wind turbines employed by the Project are illustrated in Table A.1.

Table. Technical parameters of the wind turbines

Technical Specification of Wind Turbines	
Rated capacity	2.0 MW
Impeller diameter	110 m
Swept Area	9503 m ²
Cut-in wind speed	3 m/s
Re cut- in wind speed	18 m/s
Cut-out wind speed	20 m/s
Generator type	4-pole (50 Hz)/6-pole (60 Hz) doubly fed generator, slip rings
Tower type	tubular steel tower
Manufacturer	Vestas
Designed Lifetime	20 Years
Tower Hub Height	80 mtrs

Each turbine will be equipped with one transformer. The power to be generated by the turbines will be delivered to the 110kV on-site substation by 35kV transmission lines. The on-site substation will increase the voltage of the electricity generated from 35 kV to 110 kV, where it will be transported to the grid connection point at Tavan Tolgoi Substation via a 34 km transmission line. A monitoring point will be set within plant where electricity meter is installed to measure the net power supply of the proposed project.

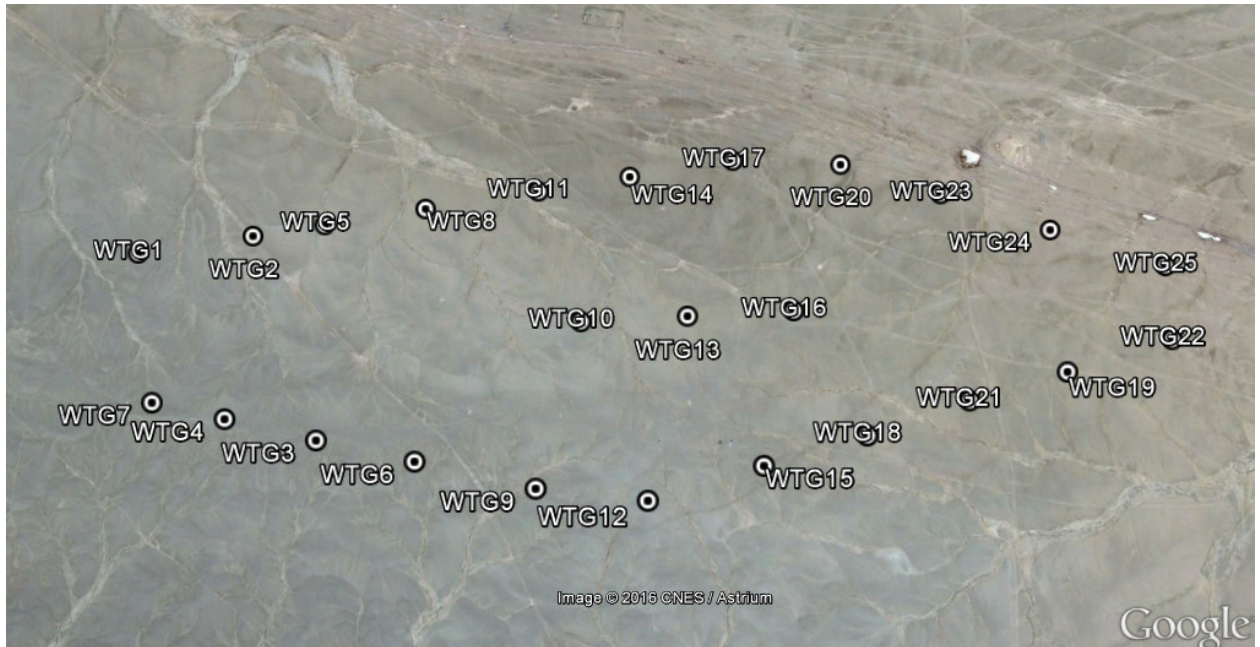
Strict environmental protection measures will be adopted according to EIA report, and the technology applied is environmentally safe, sound and will not bring negative impact to the local ecosystem.

1.9 Project Location

The proposed project is located Tsogtsetsii Soum, South Gobi, Mongolia. The coordinates of the proposed project location are $43^{\circ} 33' 6.904''$ to $43^{\circ} 33' 58.186''$ North latitude and $105^{\circ} 34' 50.16''$ to $105^{\circ} 38' 28.0176''$ East longitude. The site is 1,587-1,597m above sea level.

Fig. 1 shows the location of the project.





1.10 Conditions Prior to Project Initiation

The scenario existing prior to the start of the implementation of the project activity is same as the baseline scenario as described below.

Electricity delivered by the project activity to the NTPG would have otherwise been generated in grid-connected fossil fuel-based power plants resulting in Green House Gas (GHG) emissions in the absence of the project activity. The project activity therefore, by displacing relatively carbon intensive grid electricity (primary emission source with a Combined Margin Emission Factor of 0.871tCO₂e/MWh) with renewable wind power electricity, reduces GHG emission that would have occurred in the baseline

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is a state-supported project in the field of renewable energy and meets the relevant provisions of the Renewable Energy Law of the Mongolia. The generation of power from NTPG will meet the requirement of national laws and regulations, also financially viable.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The approval of Environmental Impact Assessment (EIA), Due diligence Report (FSR), and the Land documents of the project owner are evidences for legislative right. Besides, the purchasing

contract of turbine generator, and the purchasing power agreement are the evidences for the ownership of the plant, equipment and process generating.

1.12.2 Emissions Trading Programs and Other Binding Limits

The Project didn't do CDM process. The project proponent chose a clear VCS crediting period from 27/11/2017 to 26/11/2027 which has not created another form of environmental credit.

1.12.3 Other Forms of Environmental Credit

The Project has not been registered as a CDM project in UNFCCC or any other platform.

1.12.4 Participation under Other GHG Programs

The Project has not been registered as a CDM project in UNFCCC or any other platform.

1.12.5 Projects Rejected by Other GHG Programs

N/A

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is not a grouped project.

Leakage Management

N/A

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

The proposed project will contribute to sustainable development mainly by:

- Reducing the emission of CO₂ and other pollutants compared with fuel-fired power plant;
- Creating local employment opportunities during the construction (more than 200 people) and operation (65 people) of the proposed project and improving the living standard of local people;
- With the help of the road, which was constructed due to the proposed project, agriculture and other products could be transported from the mountains to city by Local farmers. It can reduce poverty;
- The implementation of the proposed project will help to change the energy structure, and thereby, contribute to the development of local economy;
- To construct such a large-scale wind power plant, the project owner spends a lot to purchase wind turbines and other auxiliary equipment such as transformers and distributed control system etc. The huge investment provides an opportunity for the expansion of related industrial branches and factories, hence stimulates the growth of wind power industry and development of wind power technology in Mongolia.

Further Information

N/A

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

1. Baseline & Monitoring methodology:

Approved consolidated baseline and monitoring methodology ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources” (Version 19.0).

2. Reference:

“Tool for the demonstration and assessment of additionality” (Version 07.0)

“Tool to calculate the emission factor for an electricity system” (Version 07.0)

More information on the methodology and tools listed above is available at the following website:

<http://cdm.unfccc.int/methodologies/index.html>

2.2 Applicability of Methodology

The baseline and monitoring methodology ACM0002 (Version 19.0) 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). The project belongs to option (a).

The methodology is applicable under the following conditions:

Table. Justification of the choice of the methodology

Methodology Criteria	Justification	Remarks
This methodology is applicable to grid connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	The project is to install a greenfield wind farm and hence comply with the above applicability criterion.	Applicable
The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity	The project is to install a greenfield wind farm and hence comply with the above applicability criterion.	Applicable

additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit 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, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.		
In case of hydro power plants, one of the following conditions shall apply:¹ (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m²; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m²; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using	The criterion is not applicable to this project. The project is a wind power project.	Not Applicable

equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m²; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.		
In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or 1. (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of 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	The criterion is not applicable to this project. The project is a wind power project.	Not Applicable

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 five years prior to implementation of CDM project activity.		
The methodology is not applicable to: (a) 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; (b) Biomass fired power plants/units.	The criterion is not applicable to this project. The project is a greenfield wind power project.	Not Applicable
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The criterion is not applicable to this project. The project is a greenfield wind power project.	Not Applicable

Therefore, the methodology ACM0002 (Version 19.0) is applicable to the Project.

2.3 Project Boundary

Spatial boundary

According to ACM0002 (Version 19.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the VCS project power plant is connected with.

The proposed project activity is connected to the power grid, which is part of the NTPG. Therefore, the spatial extent of the Project boundary also includes all the power plants physically connected into the NTx`PG. The Figure following indicates the project boundary.

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

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation in fossil fuel fired power that is displaced due to the project activity.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
Project	The proposed project activity.	CO ₂	No	The proposed project is a zero-emission wind power project. Not applicable
		CH ₄	No	Not applicable
		N ₂ O	No	Not applicable

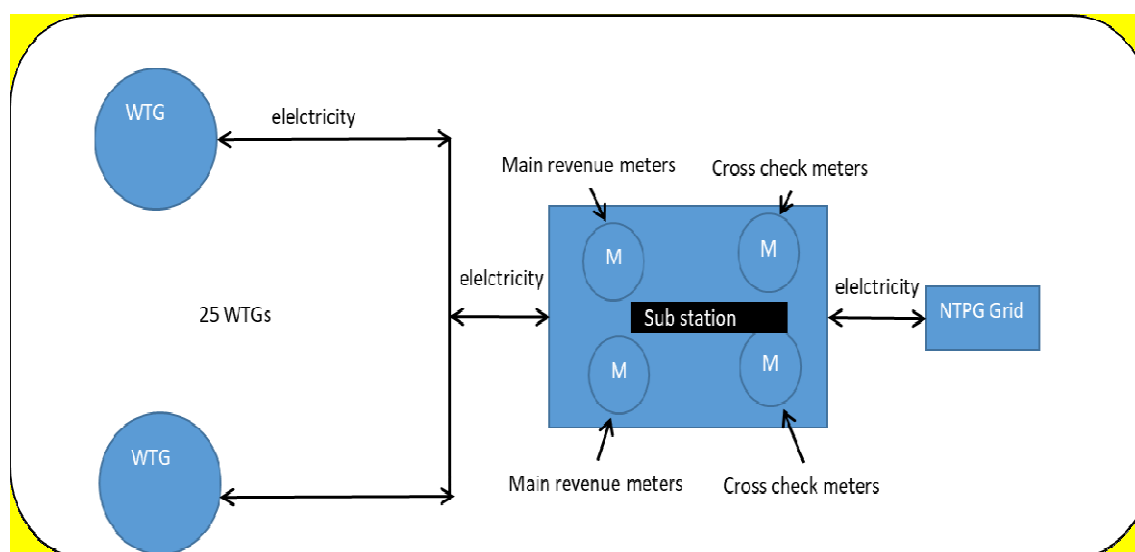


Fig : - Project Boundary

2.4 Baseline Scenario

According to ACM0002 (Version 19.0), if the project activity is the installation of a new grid-connected renewable power plant (the proposed project is a newly built wind power project), the

baseline scenario 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 project activity is the installation of a new grid-connected renewable power plant/unit, and is not a modification/retrofit of an existing plant/unit, therefore, the baseline scenario is provision of the equivalent amount of electricity generated by NTPG connected power plants and 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”.

In accordance with the ACM0002 methodology, baseline emissions are equal to power delivered to the grid, multiplied by the baseline emission factor. The baseline emission factor is equal to the combined margin: a weighted average of the operating margin emission factor and the build margin emission factor. See Section 2.5 for details.

2.5 Additionality

Demonstration and assessment of additionality

According to the “Tool for the demonstration and assessment of additionality” (Version 07.0) approved by EB, the additionality of the project is demonstrated and assessed through the following steps.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project is not first-of-its-kind, therefore proceed to Step 1.

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

The methodology ACM0002, prescribe the baseline for the project activity which is an installation of new grid connected power plant and hence no further analysis is required for identification of alternatives.

Step 2: Investment analysis

The purpose of this step is to determine whether the project activity is not: a) The most economically or financially attractive; or b) Economically or financially feasible, without an additional revenue/funding, possibly from the sale of volunteer emission reductions (VERs). The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

The “Tool for the Demonstration and Assessment of Additionality (Version 07.0)” proposal three analysis methods which are:

(Option I) Simple cost analysis;

(Option II) Investment comparison analysis;

(Option III) Benchmark analysis;

Since the project will earn revenues not only from the VERs sales but also from electricity sales, the simple cost analysis method is not appropriate. Investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. The Alternative d) is purchasing electricity from NTPG rather than investment a new project. Therefore, Option II is not appropriate. The project will use benchmark analysis method (Option III) based on the consideration that benchmark IRR of the power sector is available.

Sub-step 2b. Option III. Apply benchmark Analysis

In accordance with the “Guidelines on the assessment of investment analysis” (version 9.0) a default value for the expected return on equity is used for the benchmark. The relevant benchmark for energy projects in Mongolia (Group 1 as given in the guidelines) is 16.25%. However, the investment analysis is carried out in nominal terms; hence the value provided in the guidelines is adjusted by adding the inflation rate 0.49%¹. Thus the applied benchmark is 16.82%.

On the basis of the benchmark, calculation and comparison of financial indicators are carried out in sub-step 2c.

Sub-step 2c. Calculation and comparison of financial indicators

1) Basic parameters for calculation of financial indicators

Based on the Due Diligence report (DDR), the main input values for the investment analysis are shown in the Table .

Table : Financial Parameters of the project

Parameters	Unit	Value	Source
Total Project cost	[US\$'000s]	120,680	Due Diligence report & cost certificate

¹ <https://www.statista.com/statistics/727562/inflation-rate-in-mongolia/>

Debt from JICA (a)	[US\$'000s]	60,823	Due Diligence report & cost certificate
Debt from EBRD (b)	[US\$'000s]	23,653	Due Diligence report & cost certificate
Total Debt (a+b)	[US\$'000s]	84,476	Due Diligence report & cost certificate
Equity	[US\$'000s]	36,204	Due Diligence report & cost certificate
Total project capacity	MW	50	Due Diligence report
Energy Yield	MWh	201800	Due Diligence report
PPA tariff	USD/MWh	94	Due Diligence report & PPA
<i>Annual O&M cost</i>	[US\$'000s]	1359	Due Diligence report & O & M contract with vestad
Average Fluctuation ratio of O&M cost	%	4.3	Due Diligence report & O & M contract with vestad
Contingency - as % of budgeted O&M Costs	%	10	Due Diligence report
Land lease p.a. (MNT)	[MNT'000s]	54,240	Due Diligence report
Admin p.a.	[US\$'000s]	1,368	Due Diligence report
Insurance	[USD'000s]	199	Due Diligence report
Offtake Related	[USD'000s]	150	Due Diligence report
Capex	[USD'000s]	239	Due Diligence report
Interest Rate- JICA	%	2.3%	Due Diligence report & The interest rate on term loan is as per loan agreement

Interest Rate- EBRD	%	5.5%	Due Diligence report & The interest rate on term loan is as per loan agreement
Plant Load factor	%	46.073%	Due Diligence report
Tenure of term loan	Years	15	The tenure is as per term loan agreement
Equity funding	[USD'000s]	36,204	<i>Due Diligence report</i>
Interest Income Tax Rate	%	10%	<i>Due Diligence report</i>
VAT onshore rate VAT offshore rate (Gross up)	%	10.0% 11.1%	<i>Due Diligence report</i>
Withholding tax rate	%	20.0%	<i>Due Diligence report</i>
PPA terms	Years	25	<i>Due Diligence report & PPA</i>

2) Comparison of IRR for the proposed project and the financial benchmark

The financial analysis shows that without the revenue of VERs, the Equity IRR (after tax) is 13.1%, much lower than the benchmark. It indicates that there is significant investment barrier. However, the revenue from the sale of VERs is expected to have a significant impact on the IRR. Although some uncertainties still exist, investors would gain reasonable financial return to reduce the risk.

Table. Equity IRR (after tax)

Parameters	Value
IRR without VCS revenue	13.1%
Benchmark	16.82%

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by varying the following key parameters to analyze the impact on the project IRR:

- Electricity generation (MWh)
- Tariff (USD/MWh)
- Project costs (USD)
- O&M costs (USD)

The sensitivity analysis to determine effect on the IRR was done using the following scenarios:

Parameters\ Range	+10%	0%	-10%
<i>Electricity generation (MWh)</i>	16.8	13.1	8.9
<i>Tariff(USD/MWh)</i>	17.5	13.1	8.4
<i>Project costs (USD)</i>	10.8	13.1	15.8
<i>O&M costs (USD)</i>	12.0	13.1	14.2

It is noteworthy that the with +10 % increase in Tariff, the IRR crosses the benchmark value, however, since the PPA is fixed for 25 years, so this situation is not realistic and thus the IRR will be below the benchmark value.

In case of electricity generation, the +10% increase in generation is not realistic, since the PLF consider is of highest value i.e. 46.073% as provided by the third party who prepared the due diligence report wherein it has compared the PLF from two WTG suppliers where the other one has quoted a PLF of 45%. Moreover, the grid availability & current grid load carrying capacity does not allow to generate more. So even, with 10% increase in generation seems to meet the benchmark, but it is possible and the IRR will remain below that.

We can conclude from the above analysis that, the equity IRR (after tax) will not surpass the benchmark within $\pm 10\%$ variation range. However, the revenue from the VERs will greatly improve the financial performance of the proposed project.

Step 3 Barrier analyses

This step is not adopted.

Step 4 Common practice analyses

According to "Methodological tool: demonstration and assessment of additionality", the project is to use wind power for electricity generation. Therefore, the project belongs to the Measures (b) "Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies)". Common practice should be identified as the follow 4 steps:

Step 4.1: Calculate applicable output range as $\pm 50\%$ of the design output or capacity of the proposed project activity.

The designed capacity of the proposed project is 50 MW, hence the applicable output range for common practice analysis is 25MW ~ 75MW.

Step 4.2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} . Registered VCS project activities and projects undergoing validation shall not be included in this step;

The default applicable geographical area should be the entire host country. So, the applicable geographical area is confined within Mongolia.

Based on the statistics of Mongolia, Wind Farm Installed Capacity at the time of project start date, , which were written by client Due diligence report have indicated that there is 1 projects that deliver the same output or capacity as the proposed project activity and have started commercial operation before the start date of the project (VCS or applying for VCS projects are not included). Since that project is under CDM registered project at UNFCCC, so we exclude it from the analysis, thus there are no project to compare with proposed project from common practice analysis. At the same time, the projects are applying VCS that deliver the same output or capacity as the proposed project activity and have started commercial operation before the start date of the project.

If assumes the number of the projects generating electricity with utilization of other energy sources as N_x (e.g. power generation with utilization of solar, biomass, hydro, etc.), and the number of the project with the same technology as the project as N_{same} . Thus, $N_{all} = N_x + N_{same}$.

According to the "Methodological tool: demonstration and assessment of additionality", N_{all} include neither registered VCS project activities, nor projects activities undergoing validation, nor the similar projects started commercial operation after the start date of the proposed project.

Therefore, $N_{same} = 0$, then $N_{all} = N_x + 0$

Step 4.3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff} .

Based on the analysis above, obviously, the projects generating electricity with utilization of other energy sources are project using different technologies from the proposed project, so $N_{diff} = N_x$ and $N_{same} = N_{all} - N_{diff}$.

Step 4.4: Calculate factor $F = 1 - N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

Based on the above analysis, $F = 1 - N_{diff}/N_{all} = 1 - N_x/N_{all} = 1 - (N_x)/(N_x + 0) = 0 < 0.2$

Step 4.5: The proposed project activity is a common practice within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3.

Since F is less than 0.2, and Nall-Ndiff = Nsame= 0 which is not greater than 3. Therefore, it can be concluded that the project is not a common practice and the project is additional.

Conclusion:

Through analysis in Sub-steps 4a and 4b, the proposed project activity is additional..

2.6 Methodology Deviations

There is no methodology deviations.

3 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions are to be calculated as follows:

$$BE = EG_y \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline Emissions in year y (tCO₂/yr);

EG_{PJ,y} = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr);

EF_{grid,CM,y} = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the .Tool to calculate the emission factor for an electricity system. (tCO₂/MWh)

Calculation of EG_{PJ,y}

The calculation of EG_{PJ,y} is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. The 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, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

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

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

Calculation of $EF_{\text{grid},\text{CM},y}$

The Combine Margin Emission factor for Mongolian Grid is considered from the default Grid emission factor from the report which provided a value of 0.871 tCO₂e/MWh.

3.2 Project Emissions

For wind power projects, the project emissions $PE_y = 0$

3.3 Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected.

3.4 Estimated Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER = BE - PE$$

Where:

ER_y = Emission reduction in year y (t CO₂e/yr)

BE_y = Baseline emission in year y (t CO₂/yr)

PE_y = Project emission in year y (t CO₂e/yr)

Summary of ex ante estimates of emission reductions is shown as below:

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 2017 (27/11/2017 –	16854	0	0	16854

31/12/2017)				
Year 2018	175767	0	0	175767
Year 2019	175767	0	0	175767
Year2020	175767	0	0	175767
Year2021	175767	0	0	175767
Year2022	175767	0	0	175767
Year2023	175767	0	0	175767
Year2024	175767	0	0	175767
Year2025	175767	0	0	175767
Year2026	175767	0	0	175767
Year 2027(01/01/2027 - 26/11/2027)	159006	0	0	159006
Total	1757763	0	0	1757763

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,CM,y}
Data unit	t CO2/MWh
Description	Combined margin CO2 emission factor in year y
Source of data	Standardized baseline :Grid emission factor for Mongolia's national electricity grid https://cdm.unfccc.int/methodologies/standard_base/2015/sb99.html
Value applied:	0.871
Justification of choice of data or description of measurement methods and procedures applied	.
Purpose of Data	Calculation of baseline emissions
Comments	N/A

4.2 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data	Joint monthly electricity generation report between CEA & NTPG grid
Description of measurement methods and procedures applied	Grid-connected electricity generated by the proposed project will be monitored through the electricity meter(s) with accuracy of 0.2S at the project activity site and recorded monthly. .
Frequency of monitoring/recording	The data were measured continuously, recorded hourly and monthly aggregated.
Value applied:	To be monitored
Monitoring equipment	Electricity meter(s) with accuracy of 0.2S
QA/QC procedures applied	According to national standard, meter(s) will be calibrated after 8 years as per Mongolian standard. Data measured by meter(s) will be cross-checked with the sales record.
Purpose of data	Calculation of baseline emissions
Calculation method	Measured directly by electricity meter. The exact data were the electricity delivered to the power grid minus the electricity supplied by the power grid. The data were measured continuously, recorded hourly and monthly aggregated.
Comments	N/A

4.3 Monitoring Plan

The monitoring plan, implemented by the Project owner, is made to ensure that the emission reductions will be monitored transparently and clearly in the crediting period.

1. Monitoring objective

The objective of this monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the project emission reductions during the entire crediting period.

The project owner is responsible for the implementation of the monitoring plan, and the grid company cooperates with the project owner.

2. Monitoring institution

The Project owner will set up a VCS team, the VCS manager of which will be assigned accordingly. The VCS team is charge of collecting, monitoring and verifying the data, while the VCS manager will be assisted by the VCS consultant company. The operational and management structure is as follows:

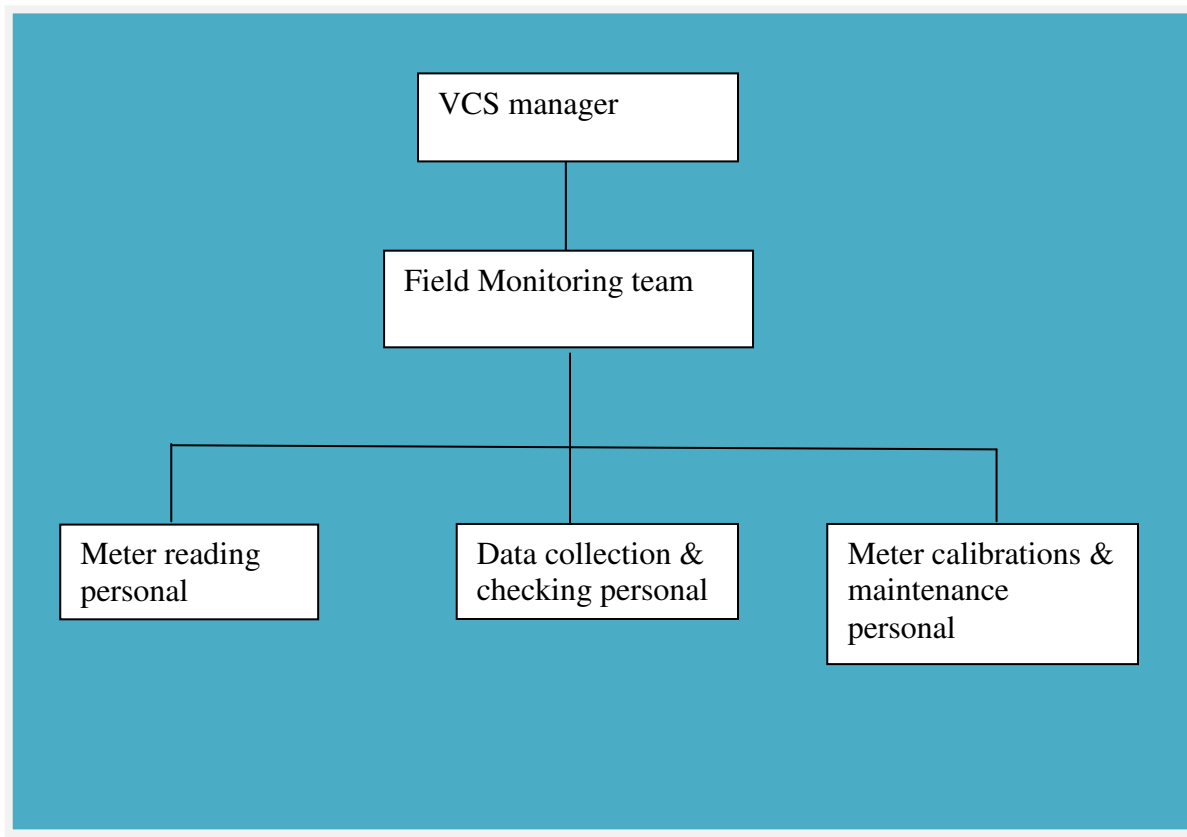


Figure 1. Structure of monitoring personnel

3. The monitoring method and equipments installation

Power generated by the project will be feed into the NTPG through transmission line. Bi-directional electricity meters will be installed on the transform substation to directly and continuously measure the feed-in and down-load electricity by the project activity. The accuracy of monitoring meter(s) is 0.2s.

This measuring method is more conservative and will not affect the additionality of the proposed project. Therefore, the net power supplied to grid by the proposed project should be calculated as “EGfacility,y= EGexport,y - EGimport,y” during the monitoring period, which should be monitored.

4. Quality Assurance and Quality Control (QA/QC)

QA/QC is to ensure the accuracy of data collected through measures including periodic calibration of monitoring meters, corrective actions, and internal audits.

4.1 Calibration

The electric meters will be calibrated by an accredited calibration agency. Calibration certificates of the accredited calibration agency and the relevant calibration documents will be collected by the QA/QC department and transferred to technical department for archiving.

4.2 Corrective actions

If problems which can affect the quality of data occur, the QA/QC department will initiate and supervise the implementation of corrective actions.

4.3. Internal audit

Internal audit is independent. Internal audit procedure will be initiated under any of the following circumstances:

- modification of the monitoring system
- prior to verification

Firstly, the monitoring system will be checked on whether the monitoring system runs properly and whether the monitored results are correct. Secondly, spot check of daily/monthly data report will be undertaken.

5 SAFEGUARDS

5.1 No Net Harm

The Environmental Impact Assessment (EIA) Report for the proposed project was compiled by General Directory of Sunny Trade LLC Consulting company in Mongolia. The EIA Report for the proposed project has been approved by the General expert of Ministry of Environment and Green Development . According to the approval comments of the EIA Report by the General expert of Ministry of Environment and Green Development, the environmental impacts likely to be caused by the proposed project are analyzed.

5.2 Environmental Impact

Construction Phase:

Ecological Impact

Because the impeller of the wind turbine of the proposed project is 112m, the flight height of the bird migration is usually lower 1000m, and to the small birds the flight height is less than 300m based on the information. Therefore, the proposed project has little impact on the birds' migration.

Atmosphere Impact

The main air pollution sources during the construction period include off-gases from the operation of many kinds of machines. And the pollutant source is scattered with little emission. Thus the construction will not cause much negative impact on the local air environment.

Wastewater Impact

The waste water from construction is mainly wastewater from the construction activity and the sewage from construction staff. The construction waste water was mainly sediment waste water, with some measures to reduce the impact, including collecting, depositing etc., and then recycled to clean the construction sites. And the sewage from construction staff is mainly used to green and fall dust. So the wastewater will not have the impact on the local water environment.

Noise impact

During the construction period, the noise of the construction is between 84dB and 105dB, mainly including piling machine, loading shovel and other transport vehicles. Because of the proposed project site is located in the hill and there is few residents. Furthermore, the sensitive region is at a distance of 100km away from the wind farm. According to relative standards, some steps are to be taken to reduce the noise impact. So the noise impact has little impact on the project site.

Solid Waste Impact

The solid wastes in the construction period including the construction wastes and household garbage will be collected. The construction wastes will be treated on site and the household garbage will be moved to a designated site to be disposed properly. So the solid wastes will not have the impact on the environment.

Transportation Impact

There is not heavy transportation load to the project site. Therefore, the transportation impact has little impact on the nearby residents.

Operation Phase:

Ecological Impact

Due to the low noise of the wind turbines, the proposed project has no effect to the birds during the operation period. Because there are no residents and other radio communication facilities within the assessment range, the electromagnetic radiation of the proposed project has little impact on the surrounding environment.

Atmosphere Impact

During the operation period, the emission resources are mainly from the restaurant in the project site. Using the clean fuel and discharge after purification, there is no impact on the local atmosphere impact.

Wastewater Impact

The proposed project has the 1.0 m³/d wastewater, which has been biochemical treatment, used to fall dust with surrounding areas. Hence, the waste water will not have the impact on the local water environment.

Noise impact

There is the noise of the wind turbines operation during the operation time. The nearest resident regions are 400m away from the wind farm, so the noise does not influence the residential districts nearest to the site.

Solid Waste Impact

After the project completed, the solid waste is mainly household garbage with the output 2.4t/a, which should be airtight and stored in the control centre, then moved to the garbage collected site. And the waste oil of wind turbine is about 99kg/a, which is the hazardous waste and should be recycled and disposed by the manufacturer when they have maintained the wind turbine based on the relative hazardous waste disposal regulation. So the solid wastes will not have the impact on the environment.

Conclusion

After the above measures are performed, the negative impacts on environment will be minimized below the requirements of laws and regulations during the construction and operational period.

5.3 Local Stakeholder Consultation

To let the public realize the objective of the proposed project, support and cooperate with construction of the project, and heighten the environmental benefits and social benefits of the proposed project, the project proponent developed a stakeholders' survey of the proposed project in July to Oct 2016, to collect comments and requirement of public in the related region.

The public participation was organized in Sep 2016 for collecting stakeholder's views and opinions mainly focused on the environmental impacts through releasing questionnaire and public announcement, partly by interview one by one:

Newspaper add were published in local newspaper on two occasions, viz. 08/06/2016 & 10/08/2016.

Medium bulletin: made medium bulletin (NTS & SEP documents) in the local residential area near the location site and release bulletin survey of stakeholders in the residential area near the project construction site. The bulletin contents include general description of the proposed project, EIA's non technical summary and Stakeholder Engagement Plan for the local people. This was disclosed during the meeting with the local community

Questionnaire survey: The survey objects include local communities and residents of Tsogttsetsii soum, Umnugobi aimag where construction project of Wind Power Plant to be implemented by Clean Energy Asia, LLCt. During the survey of stakeholders, 20 questionnaires were released, and 20 questionnaires were got back, the response ratio is 100%. In addition, 40 people is interviewed and consulted.

The survey shows the stakeholders believe that the proposed VER project activity will have positive impacts on the local ecology and employment.. All stakeholders expressed their support to the proposed project. A full list of the filled-in questionnaires is available from the project developer.

A second Local Stakeholder Consultation meeting (LSC) was held on 24/07/2019 at Tsogttsetsii shom (village) at municipality office nearby the WTG locations. An invitation for the LSC meeting in the local newspaper add was placed on 08/07/2019. A total of 20 people from the local community has attended the LSC meeting.

The LSC meeting shows the stakeholders believe that the proposed VER project activity will have positive impacts on the local ecology and employment. All stakeholders expressed their support to the proposed project. A full list of the filled-in feedback form is available from the project developer.



Photo – 1. Local stakeholder consultation meeting

5.4 Public Comments

No public comment has been received.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data	Joint monthly electricity generation report between CEA & NTPG grid

Description of measurement methods and procedures applied	Grid-connected electricity generated by the proposed project has been monitored through the electricity meter(s) with accuracy of 0.2S at the project activity site and recorded monthly.					
Frequency of monitoring/recording	The data were measured continuously, recorded hourly and monthly aggregated.					
Value applied:	1,95,590					
Monitoring equipment	Electricity meter(s) with accuracy of 0.2S					
	Meters name	Meter Type	Meter serial number	Date of calibration	Calibration certificate no	Date of next calibration
	Main export/import meter at Tavantolgoi substation No 1	A1802RAL-P4GB-DW-4	1311267	27/11/2017	54520	2025
	Main export/import meter at Tavantolgoi substation No 2	A1802RAL-P4GB-DW-4	1311265	27/11/2017	54524	2025
	Backup export/import meter at Tavantolgoi substation no 1	A1805RAL-P4GB-DW-4	1311263	27/11/2017	54519	2025
	Backup export/import meter at Tavantolgoi substation no 2	A1805RAL-P4GB-DW-4	1311262	27/11/2017	54522	2025
QA/QC procedures applied	According to national standard, meter(s) will be calibrated in 8 year time interval. Data measured by meter(s) has been cross-checked with the sales record.					
Purpose of data	Calculation of baseline emissions					
Calculation method	Measured directly by electricity meter. The exact data were the electricity delivered to the power grid minus the electricity supplied					

	by the power grid. The data were measured continuously, recorded hourly and monthly aggregated.
Comments	N/A

6.2 Baseline Emissions

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions are to be calculated as follows:

$$BE = EG_y \times EF_{\text{grid,CM},y}$$

Where:

BE_y = Baseline Emissions in year y (tCO₂/yr);

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

$EF_{\text{grid,CM},y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the Tool to calculate the emission factor for an electricity system. (tCO₂/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. The 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, then:

$$EG_{PJ,y} = EG_{\text{facility},y}$$

Where:

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

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

$$EF_{\text{grid,CM,y}} = 0.871 \text{ tCO}_2/\text{GWh}$$

Therefore:

$$\begin{aligned} BE_y &= EG_{PJ,y} \times EF_{\text{grid,CM,y}} = EG_{\text{facility,y}} \times EF_{\text{grid,CM,y}} \\ &= 1,95,590 \text{ MWh} \times 0.871 \text{ tCO}_2\text{e/MWh} = 1,70,352 \text{ tCO}_2\text{e} \end{aligned}$$

Baseline emissions during this monitoring period are shown in the Table below:

The emission reductions ER for the project :

Period		Electricity exported to the grid by the project ($EG_{\text{export,y}}$)	Electricity imported from the grid ($EG_{\text{import,y}}$)	Net electricity supplied to the grid ($EG_{\text{facility,y}} = EG_{\text{export,y}} - EG_{\text{import,y}}$)
From	To	MWh	MWh	MWh
27/11/2017	30/11/2017	135	8.2	126
01/12/2017	31/12/2017	10,193	12.8	10,180
01/01/2018	31/01/2018	10,834	22.4	10,811
01/02/2018	28/02/2018	11,512	6.2	11,506
01/03/2018	31/03/2018	13,042	7.1	13,035
01/04/2018	30/04/2018	11,810	12.0	11,798
01/05/2018	31/05/2018	13,015	8.1	13,007
01/06/2018	30/06/2018	9,829	18.8	9,810
01/07/2018	31/07/2018	11,364	16.8	11,347
01/08/2018	31/08/2018	7,445	17.4	7,427
01/09/2018	30/09/2018	13,238	11.8	13,226
01/10/2018	31/10/2018	14,124	12.1	14,112
01/11/2018	30/11/2018	12,619	10.6	12,608

01/12/2018	31/12/2018	17,567	14.8	17,552
01/01/2019	31/01/2019	15,819	13.8	15,805
01/02/2019	28/02/2019	9,060	34.7	9,025
01/03/2019	31/03/2019	14,231	17.8	14,214

6.3 Project Emissions

For wind power projects, the project emissions $PE_y=0$

6.4 Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected.

For wind power projects, the Leakage emissions $LE_y=0$

6.5 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2017 (27/11/2017 – 31/12/2017)	8,976	0	0	8,976
Year 2018	1,27,369	0	0	1,27,369
Year 2019 (01/01/2019 – 31/03/2019)	34,007	0	0	34,007
Total	1,70,352	0	0	1,70,352

