



RENEWABLE ENERGY POWER PROJECTS BY ATRIA POWER



Document Prepared by: Kosher Climate India Private Limited

Project Title	Renewable Energy Power Projects by Atria Power
Version	02
Date of Issue	31-December-2019
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed project activity involves the installation of Wind and Solar Power Projects in Karnataka State of India. The purpose of the project activity is to generate clean electricity with utilization of wind & solar energy. The total installed capacity of the project is 148.8 MW; which involves operation of three wind projects of 39.6 MW capacity each (total capacity of 118.8 MW) and 1 Solar power plants with total capacity of 30 MW located at Karnataka, India. All the three wind projects are located in the same region and connected to Atria 33/220 kV pooling substation at Basavana Bagewadi. The pooling substation is connected with KPTCL 220/110/33/11 kV receiving substation at Basavana Bagewadi. The solar power project is connected with KPTCL 66/11 kV Kogali substation. The wind and solar power projects are promoted by subsidiaries of Atria Power Corporation Pvt. Limited. The details of which are as follows:

Wind Project Name	Project Promoters	Capacity (MW)	Purpose	Grid	District
Project 1	Atria Wind Power (Basavana Bagewadi) Pvt Ltd	39.60	Sale to Third Party	National	Vijayapura
Project 2	Atria Wind Power (Bijapur 1) Pvt Ltd	39.60	Sale to Third Party	National	Vijayapura
Project 3	Atria Wind Power (Chitradurga) Pvt Ltd	39.60	Sale to Third Party	National	Vijayapura

Solar Project Name	Project Promoters	Capacity (MW)	Purpose	Grid	District
Project 4	Atria Solar Power (Chamarajnagar) Pvt Ltd	30	Sale to Third Party	National	Bellary

All the projects are already commissioned and running.

Project Promoters (Wind)	Installed Capacity	WTGs	Feeder	Commissioning Date
Atria Wind Power (Basavana Bagewadi) Pvt Ltd	39.6 MW	9 x 2.2 MW	Feeder 1	18.04.2018
		9 x 2.2 MW	Feeder 2	18.04.2018
Atria Wind Power (Bijapur 1) Pvt Ltd	39.6 MW	9 x 2.2 MW	Feeder 3	18.04.2018
		9 x 2.2 MW	Feeder 4	18.04.2018
Atria Wind Power (Chitradurga) Pvt Ltd	39.6 MW	9 x 2.2 MW	Feeder 5 & 6	27.04.2019
		9 x 2.2 MW	Feeder 5 & 6	29.04.2019

Project Promoters (Solar)	Installed AC Capacity	Installed DC capacity	Commissioning Date
Atria Solar Power (Chamarajnagar) Pvt Ltd	30 MW	37.5 MWp	25.01.2018

All the projects are connected with Indian national grid. The electricity generated by the each project is sold to third party via wheeling agreement with DISCOM. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. Since wind power is Greenhouse Gas (GHG) emissions free, the power generated will prevent the anthropogenic gas emissions generated by fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas.

There was no activity at the site prior to implementation of the project activity. Hence the scenario existing prior to the project activity is same as baseline scenario which is continual use of highly carbon intensive electricity in the regional grid.

The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only. The project activity leads to an annual average emission reduction of 314,814 tCO₂ per year or 3,148,137 tCO₂ for the chosen crediting period of 10 years.

The current monitoring period chosen is from 25-January-2018 to 30-November-2019 (inclusive of first & last date) and the GHG emission reductions calculated are 352,015 tCO₂

1.2 Sectoral Scope and Project Type

Sectoral Scope: 01- Energy Industries (Renewable/Non-Renewable Sources)

Project Type: Type I

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources, version 19.0

The project is not a grouped project; it consists of 3 independent wind power projects and 1 independent solar power project by 4 project developers with combined capacity of 148.8 MW.

1.3 Project Eligibility

The project applies scope as per the version 3.7 of the VCS Standard.

The project reduces CO₂ emission which is the six Kyoto Protocol greenhouse gases.

The project activities supported by CDM methodology ACM0002 which is a methodology approved under a VCS approved GHG program, CDM

Hence, the project is eligible under VCS standard v3.7

The project requested registration with the VCS Program before 31 December 2019. Hence, scope under VCS standard v3.7¹ is applicable for this project.

1.4 Project Design

The project is not a grouped project; it consists of 3 independent wind power projects and 1 independent solar power project by 4 project developers with combined capacity of 148.8 MW.

Each wind project contain multiple instances ie, 18 WTGs from each wind projects.

Eligibility Criteria

Not applicable as the project is not a grouped project. .

¹ As per the summary of effective dates, the version 3.7 scope can be used for the projects that submitted for request for registration on or before 31st December 2019.

Ref: <https://verra.org/wp-content/uploads/2019/09/VCS-V4-Summary-of-Effective-Dates.pdf>

1.5 Project Proponent

Organization name	Atria Wind Power (Basavana Bagewadi) Pvt Ltd
Contact person	Kaushik Surender Rao
Title	Director
Address	11, Commissariat Rd, Ashok Nagar, Bangalore- 560025, Karnataka, India
Telephone	+91 80 4941 1411
Email	info@atriapower.com

Organization name	Atria Wind Power (Chitradurga) Pvt Ltd
Contact person	Kaushik Surender Rao
Title	Director
Address	11, Commissariat Rd, Ashok Nagar, Bangalore- 560025, Karnataka, India
Telephone	+91 80 4941 1411
Email	info@atriapower.com

Organization name	Atria Wind Power (Bijapur 1) Pvt Ltd
Contact person	Kaushik Surender Rao
Title	Director
Address	11, Commissariat Rd, Ashok Nagar, Bangalore- 560025, Karnataka, India
Telephone	+91 80 4941 1411
Email	info@atriapower.com

Organization name	Atria Solar Power (Chamarajnagar) Pvt Ltd
Contact person	Kaushik Surender Rao
Title	Director
Address	11, Commissariat Rd, Ashok Nagar, Bangalore- 560025, Karnataka, India
Telephone	+91 80 4941 1411
Email	info@atriapower.com

1.6 Other Entities Involved in the Project

Organization name	Kosher Climate India Private Limited
Role in the project	Consultant /Bundling Agency
Contact person	Vamsi Krishna
Title	Global Business Head
Address	#109, 2nd Floor, 27th Main, HSR Layout, Bangalore- 560102
Telephone	080-25720814
Email	vamsi@kosherclimate.com

1.7 Ownership

The Project is owned by individual project proponents and Kosher Climate India Pvt. Ltd is the bundling agency. The individual PPs are the sole owner of project activity, however they have authorised Kosher Climate India Pvt. Ltd to act as the project participant on their behalf. Further the Ownership is demonstrated through the following documents.

Commissioning certificates for the Wind & Solar projects in the name of individual PP

Power Purchase Agreement with respective State Electricity Board for sale of electricity by the individual PPs.

1.8 Project Start Date

The start date for this project is 25-January-2018. This is the day on which the commissioning of the solar project (which is earliest commissioning amongst all the individual projects which are part of this Large Scale Project)

1.9 Project Crediting Period

25-January-2018 to 24-January-2028 will be the 1st crediting period.

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	-
Large project	√

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
25-Jan-2018 to 24-Jan-2019	196,505
25-Jan-2019 to 24-Jan-2020	306,973
25-Jan-2020 to 24-Jan-2021	330,582
25-Jan-2021 to 24-Jan-2022	330,582
25-Jan-2022 to 24-Jan-2023	330,582
25-Jan-2023 to 24-Jan-2024	330,582
25-Jan-2024 to 24-Jan-2025	330,582
25-Jan-2025 to 24-Jan-2026	330,582
25-Jan-2026 to 24-Jan-2027	330,582
25-Jan-2027 to 24-Jan-2028	330,582
Total estimated ERs	3,148,137

Total number of crediting years	10
Average annual ERs	314,814

1.11 Description of the Project Activity

The project activity envisages implementation of a 3 x 39.6 MW wind power project and 1 x 30 MW solar power project as given below:

Wind Project Name	Project Promoters	Capacity (MW)	Number of WTG	Capacity of WTG	WTG Make
Project 1	Atria Wind Power (Basavana Bagewadi) Pvt Ltd	39.60	18	2.2	Vestas (V110)
Project 2	Atria Wind Power (Bijapur 1) Pvt Ltd	39.60	18	2.2	Vestas (V110)
Project 3	Atria Wind Power (Chitradurga) Pvt Ltd	39.60	18	2.2	Vestas (V110)

Solar Project Name	Project Promoters	AC/DC Capacity	Module Make	Module Capacity & number	Inverter Make	Inverter capacity & number
Project 4	Atria Solar Power (Chamarajnagar) Pvt Ltd	30 MW/ 37.5 MWp	Canadian Solar/JA Solar	325Wp - 67385 330Wp - 47273	Gamesa Electric	1375 kW - 20 1250 kW - 2

The electricity generated by the project will be exported to the INDIAN National grid. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The project proponent plans to avail VERs benefits for the project.

The project activity is in line with the sustainable development priorities of the country. The electricity generated from the wind farm will be exported to the INDIAN grid and sold to the

state electricity utility, thereby marginally contributing to reducing the energy demand supply gap in the Country.

The life time of the both wind & solar project is 25 years.

Wind Energy Technology

The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The project activity is the installation of an environmentally safe and sound technology since there are no GHG emissions associated with the electricity generation.

The technical specifications of the WTGs have been provided as below

Project 1, 2 & 3": Vestas's wind energy technology by implementing V110 model 2200kW WTGs

Vestas V110-2.2 MW	
Operational Data	
Rated power:	2,200.0 kW
Cut-in wind speed:	3.0 m/s
Cut-out wind speed:	20.0 m/s
Re cut-in wind speed:	18.0 m/s
Wind Class	IEC S
Standard operating Temperature	-20 °C to 45 °C
Rotor	
Diameter:	120.0 m
Swept area:	11310 m ²
Number of blades:	3
Air brake	Full blade feathering with 3 pitch cylinders
Electrical	
Frequency	50/60 Hz
Generator type	4-pole (50 Hz)/6-pole (60 Hz) doubly fed generator, slip ring
Gear box	
Type:	one planetary stage and two helical stages

Tower	
Hub Height	110 m
Nacelle dimension	
Height for transport	4 m
Height installed (incl. CoolerTop®)	5.4 m
Length	10.4 m
Width	3.5 m
Hub Dimension	
Max. transport height	3.6 m
Max. transport width	4 m
Max. transport Length	4.2 m
Blade Dimension	
Length	59 m
Max. chord	3.9 m
Max. weight per unit for transportation	70 tonne

Solar Energy Technology:

The technology employed, converts solar energy to electrical energy. In solar power generation, solar radiation is converted into electrical energy. The project activity is the installation of an environmentally safe and sound technology since there are no GHG emissions associated with the electricity generation.

The technical specifications of the solar power plant have been provided as below:

Solar PV Module	
Module Make	Canadian Solar/JA Solar
Module Rating	325 Wp & 330 Wp
Number of modules	325Wp – 67,385 Nos 330Wp – 47,273 Nos

Total Capacity	37,500 kWp
Specification	https://www.canadiansolar.com/upload/2e46a5e4e1c8ba14/9da8c57eb4c725d5.pdf http://www.jasolar.com/uploadfile/2018/0927/20180927023402370.pdf
Inverter	
Inverter Make	Gamesa Electric
Inverter rating	1375 kW & 1250 kW
Number of inverter	1375 kW – 20 Nos 1250 kW – 2 Nos
Total Capacity	30,000 kW
Model	Gamesa E-1.25v1 & E-1.4MVA (1.375 MW)_Var_Rev_2
Inverter Transformer	
Rating	450 V/33kV
Capacity	6 MVA & 4.5 MVA
Number of transformer	6 MVA – 5 Nos 4.5 MVA – 1 No
Total Capacity	34.5 MVA
Power transformer	
Rating	33kV/66 kV
Capacity	31.5 MVA
Number of transformer	1
Total Capacity	31.5 MVA

Emission Reductions from anthropogenic sources:

The renewable power generated from the wind & solar project sites will be displacing the electricity generated from thermal power stations feeding into INDIAN grid and will be replacing the usage of fossil fuels for meeting the power demand in the region. Since wind & solar power are Green House Gas (GHG) emissions free, the power generated will prevent the anthropogenic GHG emissions generated by the fossil fuel based thermal power stations

comprising coal, diesel, furnace oil and gas. The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only.

1.12 Project Location

Indicate the project location and geographic boundaries (if applicable) including a set of geodetic coordinates. For grouped and AFOLU projects, coordinates may be submitted separately as a KML file.

The project activity is located in Karnataka state of India. The table provides details of location of each project:

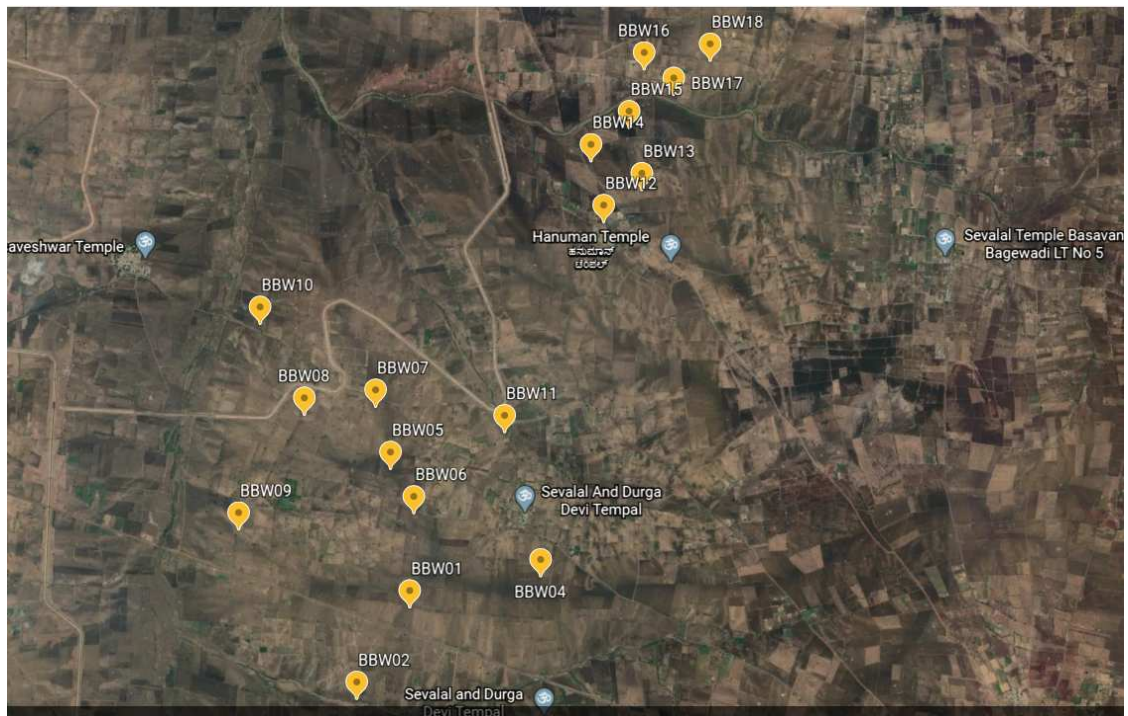
Project	Project Promoters	Capacity	Location
Project 1	Atria Wind Power (Basavana Bagewadi) Pvt Ltd	39.60 MW	Basavana Bagewadi Taluk Vijayapura District, Karnataka
Project 2	Atria Wind Power (Bijapur 1) Pvt Ltd	39.60 MW	Basavana Bagewadi Taluk Vijayapura District, Karnataka
Project 3	Atria Wind Power (Chitradurga) Pvt Ltd	39.60 MW	Basavana Bagewadi Taluk Vijayapura District, Karnataka
Project 4	Atria Solar Power (Chamarajnagar) Pvt Ltd	30 MW	Kogalli village, Hagaribommanahalli Taluk, Bellary District, Karnataka.

The geographical coordinates of the Wind projects are given below:

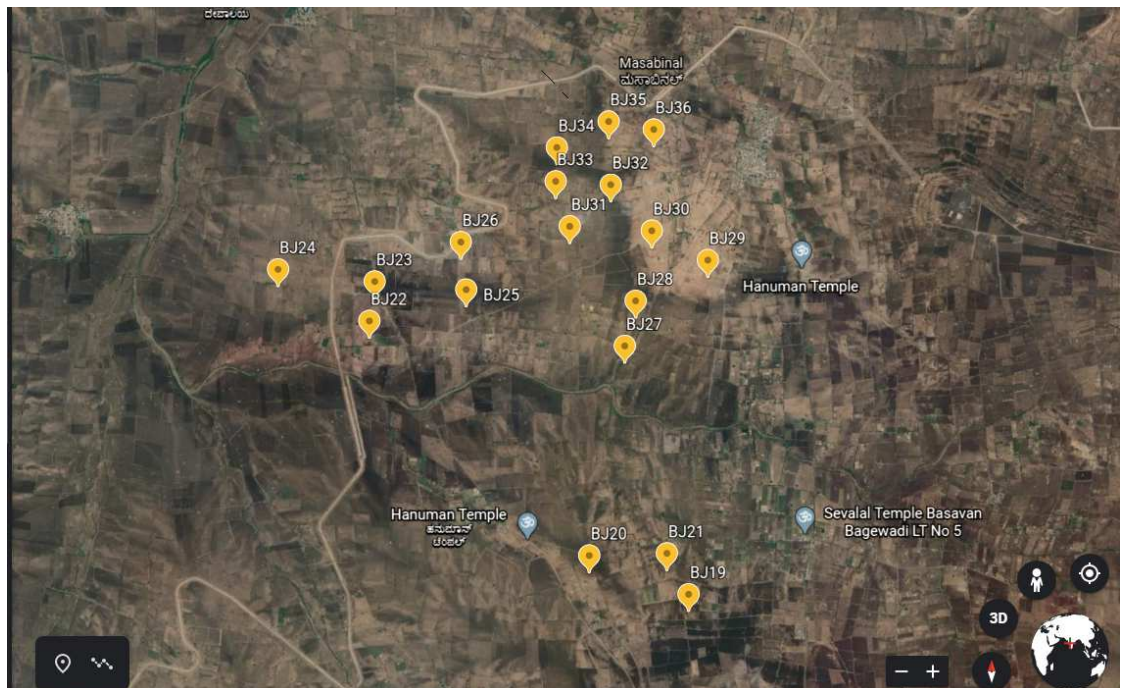
Project	New Turbine No	Feeders	WTG Coordinates	
			Latitude (° N)	Longitude (° E)
Project 1	BBW01	1	16.5970	75.9161
	BBW04	1	16.5998	75.9284
	BBW09	1	16.6040	75.9000
	BBW06	1	16.6055	75.9165
	BBW05	1	16.6095	75.9143
	BBW07	1	16.6151	75.9129
	BBW08	1	16.6144	75.9062

Project 2	BBW10	1	16.6226	75.9020
	BBW11	1	16.6128	75.9250
	BBW02	2	16.5887	75.9111
	BBW16	2	16.6456	75.9381
	BBW18	2	16.6464	75.9443
	BBW14	2	16.6373	75.9331
	BBW13	2	16.6347	75.9379
	BBW17	2	16.6433	75.9409
	BBW15	2	16.6403	75.9367
	BBW12	2	16.6318	75.9343
	BBW03	2	16.5998	75.9284
	BJ24	3	16.6507	75.9174
	BJ31	3	16.6545	75.9445
	BJ35	3	16.6638	75.9481
	BJ36	3	16.6631	75.9523
	BJ32	3	16.6582	75.9483
	BJ33	3	16.6585	75.9432
	BJ22	3	16.6461	75.9259
	BJ34	3	16.6615	75.9433
	BJ23	3	16.6496	75.9264
	BJ26	4	16.6531	75.9344
	BJ29	4	16.6515	75.9573
	BJ27	4	16.6439	75.9496
	BJ25	4	16.6489	75.9349
	BJ30	4	16.6541	75.9521
	BJ20	4	16.6253	75.9463
	BJ21	4	16.6255	75.9535

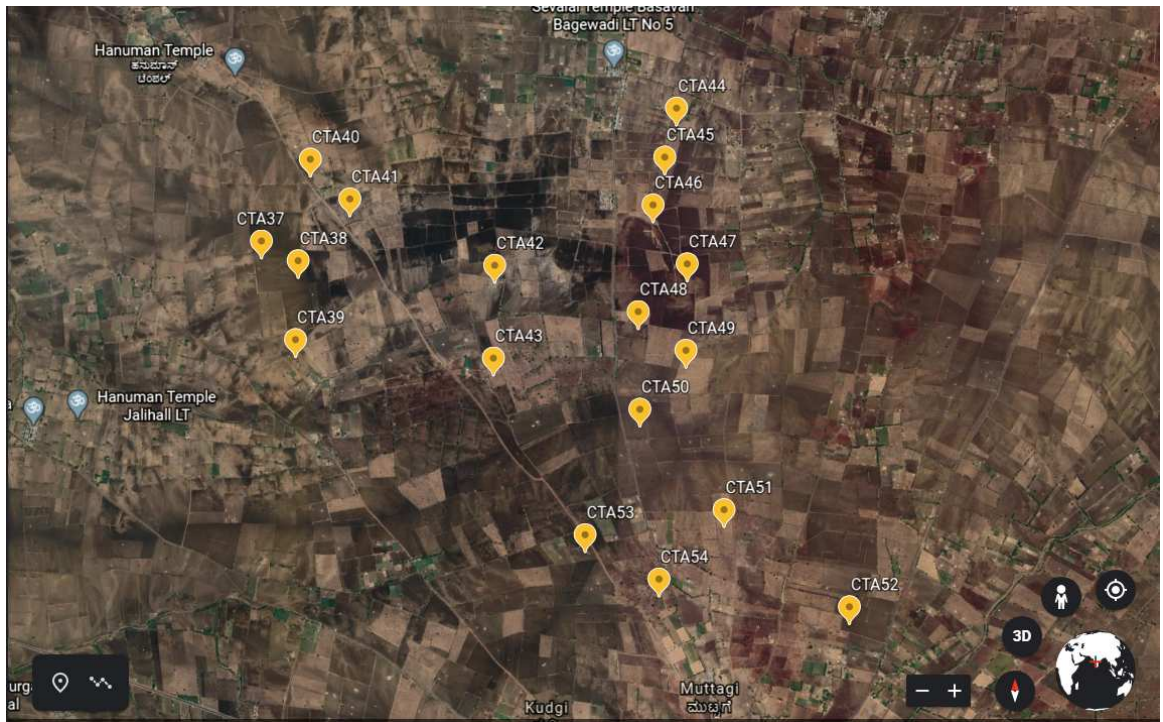
	BJ28	4	16.6479	75.9506
	BJ19	4	16.6219	75.9555
Project 3	CTA41	5	16.6191	75.9484
	CTA40	5	16.6217	75.9457
	CTA42	5	16.6148	75.9582
	CTA48	5	16.6118	75.9679
	CTA46	5	16.6187	75.9689
	CTA45	5	16.6218	75.9697
	CTA47	5	16.6149	75.9712
	CTA44	5	16.6250	75.9705
	CTA50	5	16.6055	75.9680
	CTA38	6	16.6151	75.9449
	CTA37	6	16.6164	75.9424
	CTA39	6	16.6100	75.9447
	CTA43	6	16.6088	75.9581
	CTA53	6	16.5974	75.9643
	CTA54	6	16.5945	75.9693
	CTA49	6	16.6093	75.9711
	CTA51	6	16.5990	75.9737
	CTA52	6	16.5927	75.9822



Project 1



Project 2



Project 3

Geographical coordinates of the Solar project is as below:

Project	Solar power plant Coordinates	
	Latitude (° N)	Longitude (° E)
Project 4	14.95	76.14



Project 4

1.13 Conditions Prior to Project Initiation

The project is Greenfield project. There was no project installed prior to commissioning of this project. The project activity is set up to produce clean power from the Wind Turbine Generators (WTGs) and Solar Photovoltaic power plant. The project activity involves supply, erection, commissioning and operation of 3 x 39.6 MW Wind power projects and 30 MW solar power project.

The project does not generate any GHG emissions and hence it can be said that the project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

In the absence of the project activity the equivalent amount of electricity sold to grid would have been generated by grid connected power plants (which is predominantly based on fossil fuels) and by the addition of new generation sources.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

The Indian Electricity Act, 2003², does not restrict the choice of fuel for power generation. Moreover, it does not mandate electricity generation from wind projects, although there are

² http://www.cea.nic.in/reports/electricity_act2003.pdf

specific state policies to promote the utilisation of renewable sources of energy, so as to cut dependence on coal, which is the mainstay fuel for power generation in India. Hence no national or sectoral policies prevent the implementation of either the baseline or the project activity. Given that the project activity is generation of electricity using wind or solar energy and exporting the same to the grid system, which is also fed by other fuel sources such as fossil and non-fossil types. Emission reductions due to the project activity are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Emission reductions are related to the electricity exported by the project and the actual generation mix in the grid system.

All the four projects have received necessary approvals for development and commissioning for each Wind Project & Solar Project from the state Nodal agencies and is in compliance to the local laws and regulations.

The Project has received all the necessary approvals for development and commissioning for the wind and Solar project from the State Nodal Agency and is in compliance to the local laws and regulations.

As per Central Pollution Control Board (CPCB) circular No B-29012/ESS(CPA)/2015-16 dated 07.03.2016, NOC from pollution control board is not required for the renewable energy projects which are come under white category. Intimation to concerned SPCB / PCC shall suffice.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project is neither registered nor seeking registration under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

The project activity is not rejected by other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project is not included in any emissions trading program or any other mechanism that includes GHG allowance trading, and include details about any such programs or mechanisms.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period.

1.17 Additional Information Relevant to the Project

Leakage Management

Not Applicable.

Commercially Sensitive Information

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

Sustainable Development

Social wellbeing: The project helps in generating employment opportunities during the construction and operation phases. The project activity leads to development in infrastructure in the region like development of roads and also may promote locals business with improved power generation. The project proponent will contribute 2% of net revenue realised from sale of VERs towards community development initiatives.

Economic wellbeing: The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits. The project activity will also help to reduce the demand supply gap in the state.

Environmental Wellbeing: The project activity will generate power using zero emissions wind based power generation which helps to reduce GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities.

Technological wellbeing: The successful operation of project activity would lead to promotion of wind based power generation and would encourage other entrepreneurs to participate in similar projects.

Further Information

Not applicable as, there are no information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

The project is renewable energy project. There were no harm identified from the project and hence no mitigations measures are applicable.

2.2 Local Stakeholder Consultation

Local stakeholder consultation was conducted as a part of Environmental and social impact assessment study. No negative comments received from the stakeholder. The ESIA report is submitted to DOE for verification.

PP also conducted another stakeholder consultation on 01/10/2019 and 02/10/2019. PP decided the date and venue for local stakeholder consultation and informed local stakeholder regarding the meeting. The followings are the local stakeholders for the project activity:

- Local community
- Local village administration
- Technology suppliers
- Local vendors
- Local NGOs

Since project 1, 2 & 3 are located in same region, the stakeholder consultation for these 3 projects are conducted combinedly. Invitation notices were put up in the local panchayats at least a week in advance of the consultations. In the introductory speech, the representatives of Atria Power welcomed the gathering and informed the stakeholders about the project activity; project's associated benefits with respect to CO₂ emission reductions and explained the purpose of conducting the stakeholder meeting in order to gather the views and comments of the local stakeholders on the project activity. Subsequent to the introductory speech, comments were received from the stakeholders.

Project	Meeting date	Location
Project 1, 2 & 3	01/10/2019	Atria Pooling station, Basavana Bagewadi, Vijayapura District, Karnataka
Project 4	02/10/2019	Site office, Kogli Village Hagaribommanahalli Taluk, Bellary District, Karnataka.

Only doubts and clarification requests are received from the stakeholders and representative from the Atria power has clarified all the doubts asked by the stakeholders. The questions asked by stakeholders and response by Atria power has explained below:

Project 1, 2 &3

Questions by stakeholder	Clarification by Atria Power
--------------------------	------------------------------

<i>Can the wind power generated from the wind mill be supplied to households?</i>	No, the electricity generated from the wind mills are at high voltage which are not suitable for households. However, the power supplied to grid and the electricity from the grid is supplied to households after voltage reduction.
<i>Is the wind turbines are safe?</i>	Yes, the wind power technology is proven and turbines are operating successfully throughout the world. Moreover, the wind turbines are purchased from reputed manufacturer ie, Vestas. Hence, there is no safety risk because of wind turbines
<i>Will the additional CSR activities be undertaken in our village?</i>	Depends on the annual CSR budget, the CSR activities will be taken based on the priority of the activity. The local people will be consulted to check the priority requirements.

Project 4

Questions by stakeholder	Clarification by Atria Power
<i>Will additional jobs be provided?</i>	Currently all the vacancies are filled. If any new opening is comes in the future then the new recruitment will happen.
<i>Will the preference be given to local people?</i>	Yes, preference will be given to the local people only. Only if the person with required skills are not available locally then the people from other location will be recruited.
<i>Will the additional CSR activities be undertaken in our village?</i>	Depends on the annual CSR budget, the CSR activities will be taken based on the priority of the activity. The local people will be consulted to check the priority requirements.
<i>What is the life of the solar power plant?</i>	The life time of the Power plant is about 25 years.

No negative feedback was received from any of the stakeholders. All of them supported the initiative and appreciated the project proponent for carrying out such an activity in the region. Hence no comments warranting action from the project proponent were received.

The project proponent also maintain a grievance register at the site. Stakeholders can anytime provide their inputs or concerns over the project. The site manager is responsible for addressing the grievances received from stakeholders. The same is informed during the stakeholder consultation meeting. Also PP will consult stakeholders annually to check the requirements of any development activities in the villages and PP will allot the CSR fund to activities based on the need basis. This mechanism will ensure to continue to engage with local stakeholder in an ongoing proactive manner.

2.3 Environmental Impact

In the applicable EIA notification i.e. S.O. 3067³, dated 01/12/2009, Ministry of Environment, Forests and Climate Change (MoEFCC), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted. The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment, Forest and Climate Change, Government of India.

Further, as per the prevailing Ministry of Environment and Forest laws, the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated 14 September (2006), 38 activities are required to undertake environmental impact assessment studies. Environmental Impact Assessment study is not required for wind & solar project as there is no negative environmental impact due to the project activity and wind & solar energy are the cleanest sources of energy.

2.4 Public Comments

The project is listed in the VCS project pipeline database (Pipeline database ID: PL2065⁴). The draft PD was uploaded and the commenting period for the project is 30-November to 30 December 2019

No comments received during the commenting period.

2.5 AFOLU-Specific Safeguards

Not applicable.

³ <http://parivesh.nic.in/writereaddata/ENV/EnvironmentalClearance-General/5.pdf>

⁴ https://www.vcsprojectdatabase.org/#/pipeline_details/PL2065

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The methodology applied for the project is Approved Large Scale Consolidated Methodology: ACM0002 “Grid-connected electricity generation from renewable sources” (Version 19.0, EB100)⁵

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

- Methodological Tool: Tool to calculate the emission factor for an electricity system - Version 7.0, EB 100, Annex 6⁶.
- Methodological Tool: Tool for the demonstration and assessment of additionality - Version 07.0.0, EB 70 Annex 8⁷.

3.2 Applicability of Methodology

The following steps will show the applicability of the project under this methodology.

Applicability Criteria	Applicability status
This methodology is applicable to grid-connected renewable power generation project activities that: (a) install Greenfield power plant; (b) involve a capacity addition to (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s)/unit(s); (d) involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) involve a replacement of (an) existing plant(s)/unit(s)	The proposed project activity is a Green field, Indian grid connected renewable power plant. Therefore, it confirms to the said criteria
The methodology is applicable under the following conditions: 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	The project activity is the installation of a new grid connected renewable wind & solar power project. Thus, it meets the first applicability condition
In the case of capacity additions, retrofits, rehabilitations	The proposed project activity is

⁵ <http://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

⁶ http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf/history_view

⁷ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

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 or 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	the installation of a new wind & solar power plants/units. Therefore, the said criteria is not applicable
In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or (b) The project activity is implemented in an 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 calculate equation (3), is greater than 4 W/m². (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density of any of the reservoirs, calculated using 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 4W/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% of the total installed capacity of integrated hydro power project	The proposed project activity is the installation of a wind & solar power plants/units. Therefore, the said criteria is not applicable
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	The proposed project activity is the installation of a wind & solar power plants/units. Therefore, the said criteria is not applicable

generation capacity of the integrated hydro power project; or (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 indifferent 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;	The proposed project activity is the installation of a wind & solar power plants/units. Therefore, the said criteria is 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 proposed project activity is the installation of a wind & solar power plants/units. Therefore, the said criteria is not applicable
In addition, the above applicability conditions the applicability conditions of tool referred in the methodology ACM0002, version 19.0 has been referred here under:	
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 that is 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).	This condition is applicable. OM, BM and CM are estimated using the tool for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power	Since the project activity is grid connected, this condition is

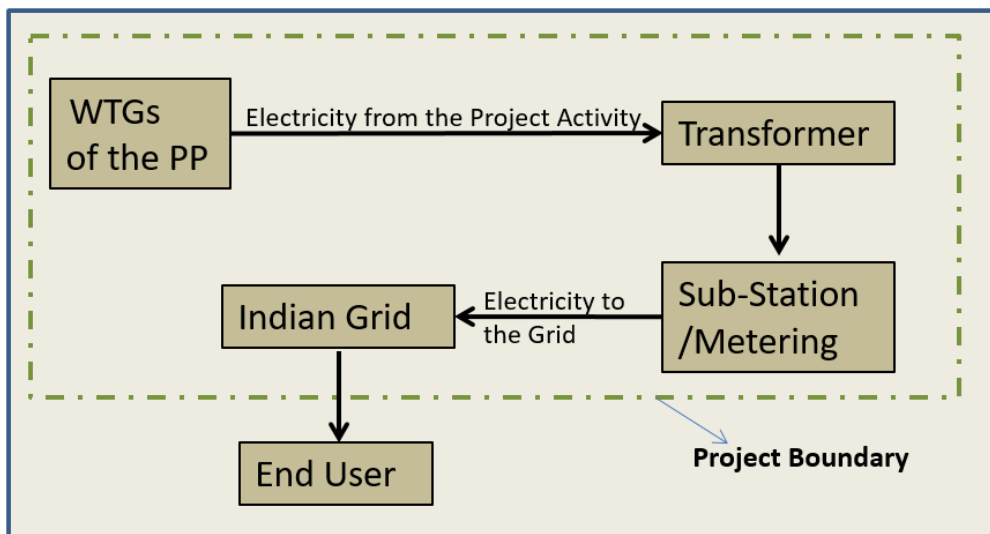
plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in “Appendix 2: Procedures related to off-grid power generation” should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	applicable and the emission factor has been calculated accordingly.
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 activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity
Under this tool, the value applied to the CO ₂ emission factor of bio fuels is zero	The project activity is a grid connected wind power project and therefore, this criterion is not applicable for the project activity

3.3 Project Boundary

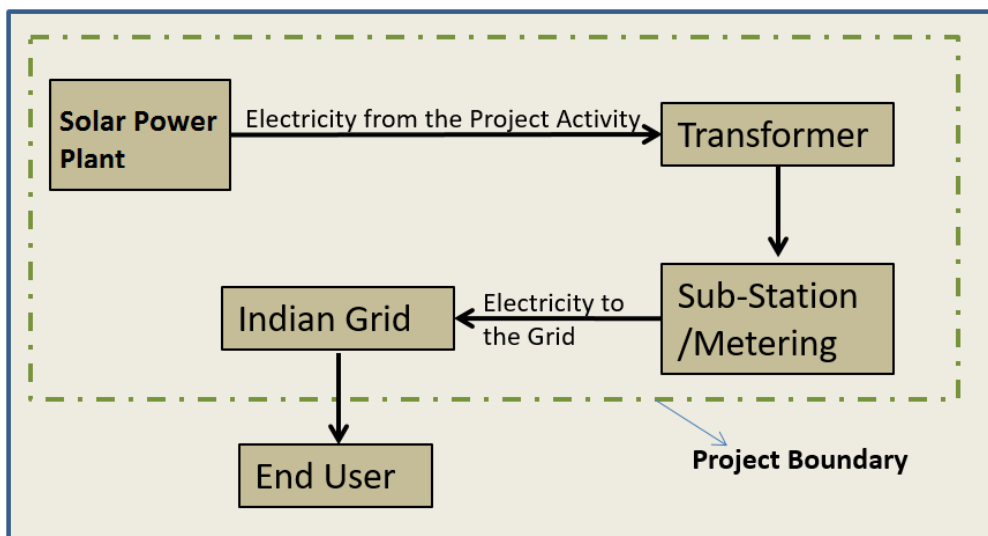
Source		Gas	Included?	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
Project	For dry or flash steam geothermal power plants, emissions of CH ₄ and CO ₂ from non condensable gases contained in geothermal steam	CO ₂	No	Not Applicable
		CH ₄	No	Not Applicable
		N ₂ O	No	Not Applicable

Source	Gas	Included?	Justification/Explanation
For binary geothermal power plants, fugitive emissions of CH₄ and CO₂ from non condensable gases contained in geothermal steam For binary geothermal power plants, fugitive emissions of hydrocarbons such as n-butane and isopentane (working fluid) contained in the heat exchangers CO₂ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants For hydro power plants, emissions of CH₄ from the reservoir	CO ₂	No	Not Applicable
	CH ₄	No	Not Applicable
	N ₂ O	No	Not Applicable
	CO ₂	No	Not Applicable
	CH ₄	No	Not Applicable
	N ₂ O	No	Not Applicable
	CO ₂	No	Not Applicable
	CH ₄	No	Not Applicable
	N ₂ O	No	Not Applicable

Project Boundary (Same for all three independent Wind Projects of the Bundle Project):



Project Boundary for solar power project



3.4 Baseline Scenario

As per the approved consolidated Methodology ACM0002 (Version 19.0, EB 100, Annex 6) para 22:

“If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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”, Version 7.0, EB 100, Annex 4.

The project activity involved setting up of WTGs to harness the power of wind to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied to the electricity grid by the operation of grid-connected power plants (mainly by fossil fuel fired plants) and by the addition of new generation sources, as reflected in the combined margin (CM) calculations.

Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publically available.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9368 tCO ₂ /MWh	Combined margin CO ₂ emission factor for the	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO ₂ Emission

		project electricity system in year y	Database, Version 14.0 published by Central Electricity Authority (CEA), Government of India
EF _{grid,OM,y}	0.9610 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2015-16, 2016-17 & 2017-18) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 14.0, published by Central Electricity Authority (CEA), Government of India
EF _{grid,BM,y}	0.8644 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 14.0, published by Central Electricity Authority (CEA), Government of India

The baseline case is in compliance with all applicable legal and regulatory requirements references.

3.5 Additionality

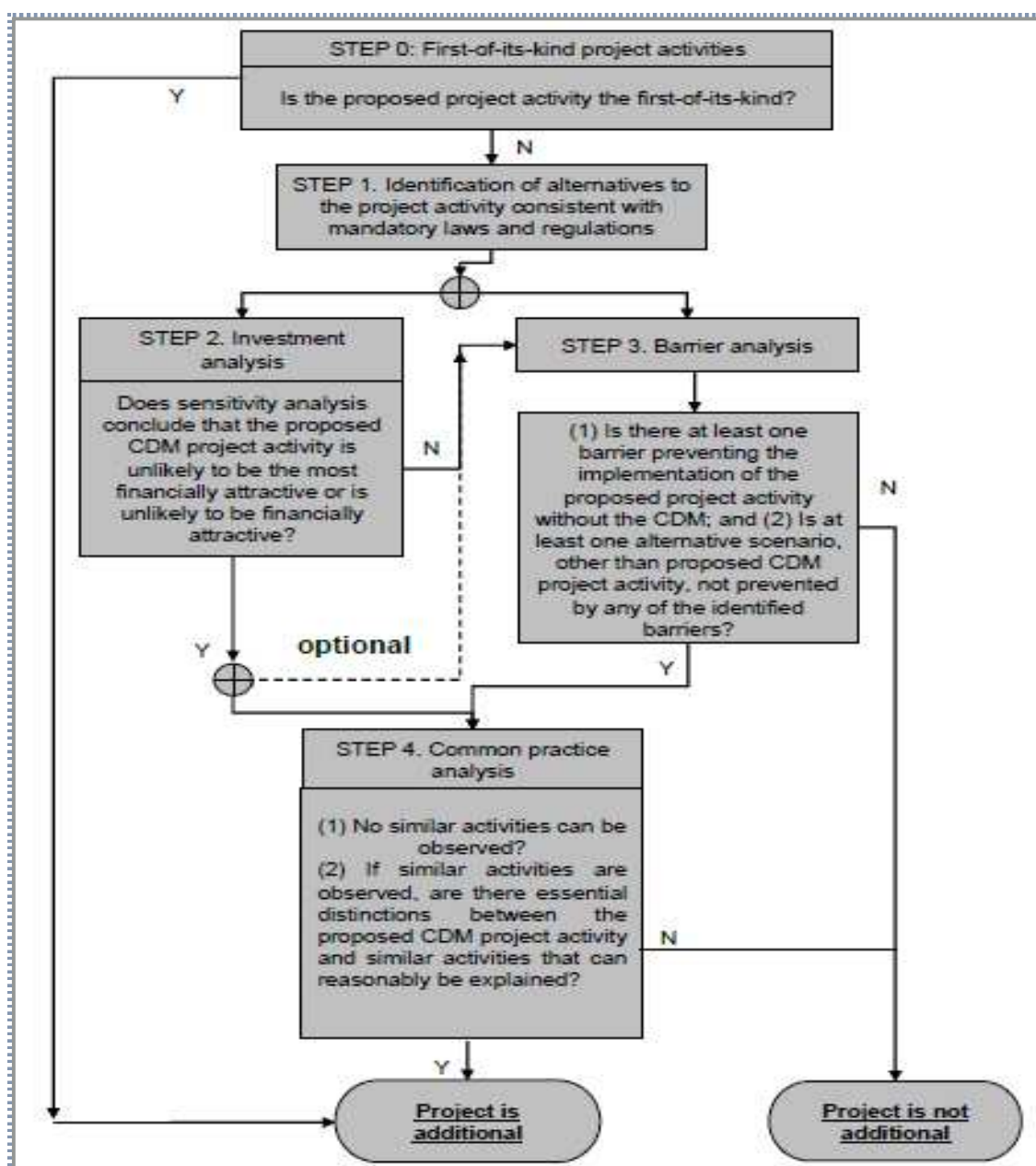
The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology or standardized baseline.

Specify the methodology or standardized baseline that establish automatic additionality for the proposed project activity (including the version number and the specific paragraph, if applicable).	NA
Describe how the proposed project activity meets the criteria for automatic additionality in the relevant methodology or standardized baselines.	NA

The proposed project generates power using wind energy which is a renewable, zero emission source of energy. Baseline considerations for the project are based on approved consolidated baseline methodology ACM0002 (Version 19.00).

The project follows section 5.3.2 which requires the project proponent to determine the additionality based on “Tool for the demonstration and assessment of additionality”, Version 07.0.0.

The step-wise approach to establish additionality of the project activity has been followed, details of which are provided in the following paragraphs:



As per the applied methodology requirement, Additionality of the project activity is demonstrated using the Methodological tool “Tool for the demonstration and assessment of additionality” Version 07.0.0. The tool defines the following steps:

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

The proposed project activity is not the first of its kind as implementation of wind power project in the State is not first of its kind.

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

As per the applied ACM 0002 version 19.0; Para 22, *if the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid connected power plant and by the addition of new generation sources.*

As the baseline scenario is prescribed by applied methodology, hence no further analysis is carried out to identify alternatives.

Step 2: Investment Analysis

As per para 29 of “Tool for the demonstration and assessment of additionality” v7.0.0, it is determined that the proposed project activity is not an economically attractive or financially feasible option.

To conduct the investment analysis, Methodological tool: Investment analysis, version 8.0, EB 97 Annex 8 has been referred.

Sub-step 2a: Determine appropriate analysis method

As per “Tool for the demonstration and assessment of additionality” (version 07.0.0), for financial analysis of the project, the following three options are available:

Option I: Simple Cost Analysis

Option II: Investment Comparison Analysis

Option III: Benchmark Analysis

The project will generate revenues from sale of electricity, therefore Option I is not applicable in line with para 32 of the Methodological tool: “Tool for the demonstration and assessment of additionality”, version 7.0. Same applies to the Option II which is applied in case there are alternatives to the project activity as per para 42 of the “Tool for the demonstration and assessment of additionality”, version 7.0.

Since, identified baseline for the proposed project activity is continuation of current practice (i.e. equivalent amount of energy would be generated by grid electricity system through its currently operating power plants and by new capacity addition) and which is outside the direct control of the project participant, hence benchmark analysis (option III), where the returns on investment in the project activity are compared to benchmark returns that are available to any investors in the country is selected as the most appropriate method.

Sub-step 2b: Option III. Apply benchmark analysis

As per Para 15 of EB97, Annex 8 states that Required/expected returns on equity are appropriate benchmarks for equity IRR. The project participant has chosen benchmark analysis to demonstrate the additionality of the project. The project is promoted by limited company and

hence the return on equity and the risks associated with the investments for their shareholder is of primary concern. Hence, in order to analyse the financial viability of the project activity, the prime financial indicator that has been used is the post-tax equity IRR of the project activity.

Selection of Appropriate Benchmark

The benchmark has been considered in accordance with Guidance 17 and 18 of EB97, Annex 8, “The values in the table in the Appendix may also be used, as a simple default option”.

Methodology deployed for arriving at a suitable value of Benchmark using Default Value has been described below:

- As the proposed project activity generates power utilizing wind energy, Group 1 as per para 5a of Appendix of EB97, Annex 8 has been identified as a suitable category.
- The investment analysis has been carried out in Nominal terms. Accordingly, Default value as given in table under the Appendix, EB97, Annex 8 has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India).
- In case of inflation data from RBI, Benchmark has been calculated based on WPI median inflation rate. As per Para 16 of EB97, Annex 8, the inflation forecast should be for the duration of the crediting period. However, since RBI provides forecast inflation only for 5 & 10 years, the project investor has calculated benchmark using 5 year & 10 Years forecast and the most conservative value is considered as Benchmark for the project activity.

The decision-making date for all the 3 independent projects in the bundle is same and the hence applicable inflation rate is same along with resultant benchmark.

The benchmark has been computed in the following manner:

Default Value Benchmark:

The cost of equity is determined by selecting the values provided in the table of the Appendix, i.e. Default values for cost of equity (expected return on equity) in the ‘Methodological tool: Investment analysis’.

The Required return on equity (benchmark) was computed in the following manner:

$$\text{Nominal Benchmark}^8 = \{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$$

Where:

Default value for Real Benchmark = 10.73% (as per Appendix of EB97, Annex 8)

Inflation Rate forecast for by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India.

⁸ As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

Benchmark estimation:

The Cost of Equity has been considered using the “Methodological tool: Investment analysis” available at the time of decision making as well as the latest available value. As a conservative approach, the minimum value of benchmark has been considered as calculated using these 2 approaches.

Table under Appendix in EB97, Annex 8 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **10.73%**⁹

Thus, minimum cost of equity considered for calculation of Benchmark = 10.73%

Inflation Forecast for India as per RBI website¹⁰ and corresponding benchmark values applicable at the time of investment decision time:

Project	Inflation Forecast		Benchmark	
	5 Years	10 Years	5 Years	10 Years
Wind project	4.7%	4.2%	15.93%	15.38%
Solar project	4.95%	4.50%	16.21%	15.71%

Benchmark for combined equity IRR is conservatively taken as **15.38%** which is the minimum of above benchmarks.

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

The period considered for Post Tax Equity IRR calculations is 25 years, which corresponds to the operational lifetime of the project activity.

Depreciation, and other non-cash items related to the project activity, which have been deducted in estimating gross profits on which tax is calculated, is added back to net profits for the purpose of calculating the financial indicator.

As per the section 3.5.5 of the VCS Project Standard v4, the additionality demonstration for all project activity instances shall be combined (e.g., multiple wind turbines shall be assessed in combination rather than individually). As per the VCS requirement, the combined equity IRR is calculated as financial indicator.

However, this project consists of multiple projects (ie, Project 1, Project 2, Project 3 & Project 4) components and project 1, 2 & 3 consist of multiple instances (ie, wind turbines). Each project

⁹ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-27-v8.pdf>

¹⁰ <https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=17616>

<https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=17398>

component is implemented by different legal entity and investment decision time, financial parameters (such as PLF, project cost, tariff etc) are different for each project component. As per the host country requirement, cash flow and tax have been calculated individually for each project. After calculation of post-tax cash flow for each project, all the cash flows are added to obtain the combined cash flow for the project.

The combined equity IRR is calculated considering net cash flow of all 4 projects. The result of combined equity IRR is as below:

Combined Post tax Equity IRR	10.04%
Benchmark Value	15.38%

The combined financial analysis sheet is submitted to DOE.

From the above result it is evident that even the combined equity IRR is still below the benchmark.

The result of sensitivity analysis is given below:

Variation %	-10%	Normal	10%	Variation required to reach benchmark	Value required to reach benchmark
Tariff	7.07%	10.04%	13.22%	16.25%	7.07%
PLF	7.07%	10.04%	13.22%	16.25%	7.07%
Project Cost	13.07%	10.04%	7.74%	-15.73%	13.07%
O&M Cost	10.30%	10.04%	9.74%	NA	10.30%

From the above assessment, it is clear that the even with +/-10% variation of the input parameters, the Post Tax Equity IRR is still below the benchmark.

An analysis has been done to identify the percentage variation at which the financial indicators will equal/breach the benchmark and the probability of its occurrence. Based on sensitivity analysis it can be concluded that the proposed project activity is additional with reasonable variation in values and is not likely to reach the benchmark value. The occurrence of these events is unlikely for the following reasons:

- Tariff:** The Tariff rate of electricity used for investment analysis (i.e. 4.02 INR/kWh, 4.05 INR/kWh, 4.08 INR/kWh& 4.35 INR/kWh for the project 1, project 2, project 3 & project 4 respectively) is sourced from the PIM estimate applicable at the time of investment decision. Furthermore, the project will breach the benchmark value at a tariff variation of 16.25%. However, the actual tariff based on the PPAs signed are lesser than the tariff considered in the financial calculation. Hence, 16.25% increase in tariff is unlikely.

- b) **PLF:** The PLF value considered is based on PIM which is taken from the Third Party PLF report (i.e. 29.01%, 28.37%, 28.21%, & 21.30% for the project 1, project 2, project 3 & project 4 respectively) the IRR breach the benchmark value at a PLF variation of more than 16.25%. The increase in PLF value to breach the benchmark is highly unlikely as the normative PLF for the state of Karnataka published by state electricity regulatory commission recommends PLF as 26%¹¹ for wind projects and 19%¹² for solar project and equity IRR at normative PLF values are less than the benchmark value and given the analysis above its highly unlikely that PLF will increase above breaching value.
- c) **Project Cost:** The project cost considered for investment analysis (i.e. 2900 million INR, 2873 million INR, 2870 million INR & 1835.4 million INR for the project 1, project 2, project 3 & project 4 respectively) is sourced from PIM which is based on the negotiations with Supplier. A variation of -15.73% is required for IRR to breach benchmark which is not possible as the project is already commissioned. The actual hard cost incurred in commissioning of the project itself is realized at 2721.4 million INR, 2726.7million INR, 2681.1 million INR& 1660.8 million INR for project 1, project 2, project 3 & project 4 respectively which are within the sensitivity applied.
- d) **O&M Costs:** The sensitivity analysis reveals that O&M will breach the benchmark at negative values and is hypothetical case. Since the O&M cost is subject to escalation (as evidence by the O&M agreement) and also subject to inflationary pressure, any reduction in the O&M costs is highly unlikely. The O&M contract has been executed higher than the estimated value referred in the IRR spread sheet INR 0.75 Mn/MW from the 3rd year for wind projects and INR 0.375 Mn/MW for solar project.
- The sensitivity analysis proves that varying the parameters does not lead to a Post Tax Equity IRR without carbon credits revenue, which will cross the benchmark value.

The carbon revenue from the project activity would provide significant amount of returns from the sale of the Emission Reductions accrued from the project activity and in turn increase the financial attractiveness of the project activity and hence make the project activity more financially viable.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice analysis

Stepwise approach for common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB84, Annex 7:

- (a) *The projects are located in the applicable geographical area;*
 (b) *The projects apply the same measure as the proposed project activity;*

¹¹ https://www.karnataka.gov.in/kercold/Downloads/COURT-ORDERS-2015/ORDER-Revised_Wind_Tariff_Order-%2024.02.2015.pdf

¹² <https://www.karnataka.gov.in/kercc/Court%20Orders/COURT-ORDERS-2015/Dated%2030.07.2015%20-%20Determination%20of%20tariff%20for%20Grind%20Interactive%20Megawatt%20scale%20Solar%20Power%20Plants.pdf>

- (c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;*
- (d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;*
- (e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;*
- (f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.*

Step (1): Calculate applicable capacity or output range as +/- 50% of the total design capacity or output of the proposed project activity:

The total project capacity of the project is 148.8 MW (39.6 MW x 3 + 30 MW x 1). The capacity of the project activity is 148.8 MW and hence the output range as per the guideline is selected to be 74.4 MW to 223.2 MW.

Step (2): Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

- a) The projects are located in Karnataka state of India. However, each state have different tariff order, thus each state have different investment climate. Therefore, projects located in Karnataka state have been chosen for analysis.
- b) The projects applying same measure (i.e, only renewable energy through wind & solar) are selected as the proposed project activity is wind power project.
- 1) Therefore, all projects applying same measure (b) as the proposed project activity are candidates for similar projects.
- c) The energy source used by the project activity is wind. Hence, only wind energy projects have been considered for analysis.
- d) The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.
- e) The capacity range of the projects is within the applicable capacity range for the chosen projects (74.4 MW to 223.2 MW)
- f) The construction start date of the project is 27/02/2017 (start date as per CDM). As Kyoto Protocol was ratified by India on 26/08/2002¹³, therefore projects which had started commercial operation between 26/08/2002 to project's start date, have been identified.

The projects considered for analysis are sourced from list of commissioned wind & solar projects commissioned till date published in the Karnataka Renewable Energy Development (KREDEL) websites¹⁴.

¹³ http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php

¹⁴ https://kredlinfo.in/wind/commissioned_status.pdf

<https://kredlinfo.in/scrollfiles/Commissioned%20list%20Solar.pdf>

As checked from the solar & wind project database, there is no solar or wind projects available in the list that confirms above condition.

Step (3): *within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .*

CDM/VCS/GS project activities, which have got registered, submitted for registration or are under validation have been excluded in this step. The list of the power plants identified is provided to the DOE. After excluding the registered, submitted for registration and under validation projects the total number of projects. No wind or solar project identified with the capacity range and the commissioning date between 26/08/2002 to 27/02/2017. Hence,

$$N_{all} = 0$$

Step (4): *within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff} .*

From the projects identified above, those projects which employ “different technologies” have been excluded and the number of such projects has been identified as N_{diff} .

Since the project sells the electricity to third parties, the wind & solar projects which are installed with other category power supply (ie, sale to electricity board & captive) are considered as different technology. This is appropriate as per para 12 (d) of common practice tool which defines the different technology based on Investment climate. Since, the third party sale does not have benefits of other mode of power sale such as long term PPA and single point delivery etc.

Therefore, it can be assumed that the investment risk is different for the third party power sale compared to other mode of power sale and hence projects installed with mode of power sale other than third party sale have been considered in N_{diff} . Therefore, these projects come under different investment climate and have been considered under N_{diff} . Since N_{all} itself is zero,

$$N_{diff} = 0$$

Step (5): *calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.*

$$\text{Calculate } F = 1 - N_{diff}/N_{all}$$

$$F = 1 - (0/0) = 1$$

$$N_{all} - N_{diff} = 0 - 0 = 0$$

Outcome of Step 5:

As,

- i. $F = 1$; is greater than 0.2
- ii. $N_{all} - N_{diff} = 0$; is less than 3

Since $N_{all} - N_{diff}$ is less than 3, the project is not a “common practice” within a sector in the applicable geographical area.

Chronology:

The below table represents the chronology of the project activity:

Events related to project implementation	VCS relevant events	Date
Completion of DPR		December 2016 (for solar project) & July 2017 (for wind project)
Board decision for investment & securing carbon credits	Investment decision	10/01/2017 (for solar project) & 30/07/2017 (for wind project)
Placement of the Purchase Orders	Projects' construction Start	27/02/2017 (for solar project) & 16/08/2017 (for wind project)
Commissioning of Project	Start Date	25/01/2018 (COD of solar project) & 18/04/2018 & 27/04/2019 (for wind project)
VCS Compliance	Engaging VCS Consultant	20/09/2019
VCS Compliance	Stakeholder' Meeting	01/10/2019 & 02/10/2019

From the above chronology it is evident that the project proponent has seriously considered the carbon revenue since investment decision and has taken necessary steps to secure carbon benefits in parallel with the implementation of the project activity.

Conclusion:

As described above, the project fulfils all necessary requirements of additionality specified in the ‘Tool for the demonstration and assessment of additionality’ v7.0.0. Hence, the project is additional.

3.6 Methodology Deviations

There is no methodology deviation applied.

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The baseline emission is calculated in line with para 42 of ACM0002, Version 19.0, using equation below

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

Where,

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

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

$EF_{grid,CM,y}$ = Combined margin 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” (t CO₂/MWh)

AS per para 44 of ACM0002, version 19.0, when the project activity is installation of Greenfield power plant, 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 CDM project activity in year y (MWh/yr)

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

The $EG_{facility,y}$ is estimated from the PLF provided as per the third party engineering company report as below:

Project	$EG_{facility,y}$ (MWh)
Project 1	100635
Project 2	98414
Project 3	55976
Project 4	97859
Total	352885

As per section 2.4 above, the combined margin grid emission factor ($EF_{grid,CM,y}$) 0.9386 tCO₂/MWh

Hence the annual baseline emission is calculated as below:

Project	EG _{facility, y} (MWh)	Emission factor (tCO ₂ /MWh)	Baseline emission (tCO ₂)
Project 1	100635	0.9368	94274
Project 2	98414	0.9368	92195
Project 3	55976	0.9368	91675
Project 4	97859	0.9368	52439

Based on the commissioning dates of all the 4 projects, the baseline emission are proportionally estimated as below:

Year	Baseline emissions
	(tCO ₂ e)
25-Jan-2018 to 24-Jan-2019	196,505
25-Jan-2019 to 24-Jan-2020	306,973
25-Jan-2020 to 24-Jan-2021	330,582
25-Jan-2021 to 24-Jan-2022	330,582
25-Jan-2022 to 24-Jan-2023	330,582
25-Jan-2023 to 24-Jan-2024	330,582
25-Jan-2024 to 24-Jan-2025	330,582
25-Jan-2025 to 24-Jan-2026	330,582
25-Jan-2026 to 24-Jan-2027	330,582
25-Jan-2027 to 24-Jan-2028	330,582
Total	3,148,137

4.2 Project Emissions

Describe the procedure for quantification of project emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

The project activity involves in harnessing wind power. As per the approved consolidated Methodology ACM0002 (Version 19.0, EB 100, Annex 6) para 34:

“For most renewable energy power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad \text{Equation (1)}$$

Where;	
PE_y	Project emissions in year y (t CO ₂ e/yr)
$PE_{FF,y}$	Project emissions from fossil fuel consumption in year y (t CO ₂ /yr)
$PE_{GP,y}$	Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO ₂ e/yr)
$PE_{HP,y}$	Project emissions from water reservoirs of hydro power plants in year y (t CO ₂ e/yr)”

As the project activity is the installation of a new grid-connected Wind power plant/ unit and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{FF,y}$, $PE_{GP,y}$, $PE_{HP,y}$ are equal to zero and thus, $PE_y = 0$.

So the emissions from the project are zero

4.3 Leakage

As per applied methodology no source of leakage emissions identified under proposed project activity.

Hence, $LE_y = 0$

4.4 Estimated Net GHG Emission Reductions and Removals

Emission reduction (ER_y):

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between Baseline emission and Project emission & Leakage emission. As per the applied methodology, leakage emissions are

excluded for wind projects and hence the same is not used. The emission reduction is calculated in line with para 57 of ACM0002, Version 19, using equation below:

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO₂/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂/year

Project	Baseline emission (tCO ₂)	Project emission (tCO ₂)	Leakage emission (tCO ₂)	Emission Reduction (tCO ₂)
Project 1	94274	0	0	94274
Project 2	92195	0	0	92195
Project 3	91675	0	0	91675
Project 4	52439	0	0	52439
Total	330,582	0	0	330,582

Based on the commissioning dates of all the 4 projects, the emission reduction are proportionally estimated 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)
25-Jan-2018 to 24-Jan-2019	196,505	0	0	196,505
25-Jan-2019 to 24-Jan-2020	306,973	0	0	306,973
25-Jan-2020 to 24-Jan-2021	330,582	0	0	330,582
25-Jan-2021 to 24-Jan-2022	330,582	0	0	330,582
25-Jan-2022 to 24-Jan-2023	330,582	0	0	330,582
25-Jan-2023 to 24-Jan-2024	330,582	0	0	330,582
25-Jan-2024 to 24-Jan-2025	330,582	0	0	330,582

25-Jan-2025 to 24-Jan-2026	330,582	0	0	330,582
25-Jan-2026 to 24-Jan-2027	330,582	0	0	330,582
25-Jan-2027 to 24-Jan-2028	330,582	0	0	330,582
Total	3,148,137	0	0	3,148,137

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	EF _{OM,y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor of INDIAN Grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 14
Value applied:	0.9610
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with “Tool to calculate the emission factor for an electricity system” using data from Central Electricity Authority of India’s (CEA) “Baseline Carbon Dioxide Emission Database Version 14”. The value used is calculated ex-ante as generation based weighted average of last three years of the operating margin provided in the CEA database. Weighted average $= \frac{\sum_{i=1 \text{ to } n} (\text{Net generation in operating margin in year } i * \text{Simple operating margin in year } i)}{\sum_{i=1 \text{ to } n} (\text{Net generation in operating margin of year } i)}$
Purpose of Data	Baseline Emission calculation
Comments	The operating margin emission factor is a 3-year generation-weighted average (2015-18). The operating Margin is calculated ex ante and fixed during the crediting period

Data / Parameter	EF _{BM,y}
------------------	--------------------

Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor of INDIAN grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 14
Value applied:	0.8644
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with “Tool to calculate the emission factor for an electricity system” using data from Central Electricity Authority of India’s (CEA) “Baseline Carbon Dioxide Emission Database Version 14”. The value is calculated ex-ante as most recent build margin provided by the CEA
Purpose of Data	Baseline Emission calculation
Comments	The Build Margin would be calculated ex ante and fixed during the crediting period. For ex ante calculation the most recent data (2017-18) available has been used and the build margin is thus calculated.

Data / Parameter	EF _{grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor of INDIAN grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 14
Value applied:	0.9368
Justification of choice of data or description of measurement methods and procedures applied	The date has been considered in accordance to the Tool to calculate emission factor of an electricity system. The tool guides to take 75% weightage of EF _{grid,OMsimple} , & 25% weightage of EF _{grid,BM,y} .
Purpose of Data	Baseline Emission calculation
Comments	The combined margin would be calculated ex-ante and fixed for the entire crediting period and the combined margin thus calculated is 0.9368.

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}^{15}$
Data unit	MWh/year
Description	Quantity of net electricity supplied by the project activity (wind & solar) to the grid in the year y
Source of data	JMR (Joint Meter Reading) issued by DISCOM
Description of measurement methods and procedures applied	Data Type: Measured & Calculated. Monitoring equipment: Energy meters of accuracy class 0.2s Archiving Policy: Paper & Electronic. The value of net electricity generation supplied to the grid as per Monthly Joint Meter Reading Report forms (B-Forms) the basis for calculation of the emission reductions; which can be cross-checked from the invoice raised to DISCOM Wind The Net electricity supplied to the grid by each wind project is estimated as below Net electricity = Export – Import – Transmission loss The calculation monthly net electricity supplied to grid will be provided in the Joint meter reading <u>B-Form of the respective project/Feeder.</u> OR Total net electricity supplied to grid by the 3 wind projects shall be directly estimated as below Net electricity = Export – Import The calculation monthly net electricity supplied to grid will be provided in the Joint meter reading <u>B-Form taken from bulk meter</u> installed at KPTCL substation Solar The Net electricity supplied to the grid by each wind project is estimated as below Net electricity = Export – Import The calculation monthly net electricity supplied to grid will be provided in the Joint meter reading B-Form itself.
Frequency of monitoring/recording	Measurement: Continuous Recording: Monthly
Value applied:	<u>Annual Estimation:</u> Project 1: 100,635 MWh Project 2: 98,414 MWh Project 3: 97,859 MWh

¹⁵ If the project activity is the installation of a Greenfield power plant, then: $EGPJ,y = EG_{facility,y}$

	Project 4: 55,976 MWh Total: 352,885 MWh												
Monitoring equipment	Energy meters of accuracy class 0.2s												
QA/QC procedures applied	The meter(s) shall be calibrated and maintained by the state utility as per their own schedule, and this frequency of meter calibration is not within the control of the Project Proponent.												
	Calibration of electricity meters is carried out in-line with the Nation standard ¹⁶ which recommends at least once in 5 year calibration or whenever abnormal difference/inconsistency is observed between main meter and check meter.												
	<u>Project 1:</u>												
	Meter Details:												
	<table><tr><th>Details</th><th>Feeder-1</th><th>Feeder-2</th></tr><tr><td>Meter Number</td><td>Main:17166962 Check: 17166964</td><td>Main:17166967 Check: 17166977</td></tr><tr><td>Accuracy</td><td>0.2s</td><td>0.2s</td></tr><tr><td>Location</td><td>Pooling station</td><td>Pooling station</td></tr></table>	Details	Feeder-1	Feeder-2	Meter Number	Main:17166962 Check: 17166964	Main:17166967 Check: 17166977	Accuracy	0.2s	0.2s	Location	Pooling station	Pooling station
	Details	Feeder-1	Feeder-2										
	Meter Number	Main:17166962 Check: 17166964	Main:17166967 Check: 17166977										
	Accuracy	0.2s	0.2s										
	Location	Pooling station	Pooling station										
	<u>Project 2:</u>												
Meter Details:													
<table><tr><th>Details</th><th>Feeder-3</th><th>Feeder-4</th></tr><tr><td>Meter Number</td><td>Main:17166983 Check: 17125600</td><td>Main: 17125701 Check: 17167005</td></tr><tr><td>Accuracy</td><td>0.2s</td><td>0.2s</td></tr><tr><td>Location</td><td>Pooling station</td><td>Pooling station</td></tr></table>	Details	Feeder-3	Feeder-4	Meter Number	Main:17166983 Check: 17125600	Main: 17125701 Check: 17167005	Accuracy	0.2s	0.2s	Location	Pooling station	Pooling station	
Details	Feeder-3	Feeder-4											
Meter Number	Main:17166983 Check: 17125600	Main: 17125701 Check: 17167005											
Accuracy	0.2s	0.2s											
Location	Pooling station	Pooling station											
<u>Project 3:</u>													
Meter Details:													
<table><tr><th>Details</th><th>Feeder-5</th><th>Feeder-6</th></tr><tr><td>Meter Number</td><td>Main:17167007 Check: 17167012</td><td>Main: 17167017 Check: 17167025</td></tr><tr><td>Accuracy</td><td>0.2s</td><td>0.2s</td></tr><tr><td>Location</td><td>Pooling station</td><td>Pooling station</td></tr></table>	Details	Feeder-5	Feeder-6	Meter Number	Main:17167007 Check: 17167012	Main: 17167017 Check: 17167025	Accuracy	0.2s	0.2s	Location	Pooling station	Pooling station	
Details	Feeder-5	Feeder-6											
Meter Number	Main:17167007 Check: 17167012	Main: 17167017 Check: 17167025											
Accuracy	0.2s	0.2s											
Location	Pooling station	Pooling station											
<u>Bulk meter at KPTCL substation (applicable for Project 1,2 &3):</u>													
Meter Details:													
<table><tr><th>Details</th><th></th></tr><tr><td>Meter Number</td><td>Main: 17125678 Check: 17125587</td></tr><tr><td>Accuracy</td><td>0.2s</td></tr><tr><td>Location</td><td>KPTCL Substation</td></tr></table>	Details		Meter Number	Main: 17125678 Check: 17125587	Accuracy	0.2s	Location	KPTCL Substation					
Details													
Meter Number	Main: 17125678 Check: 17125587												
Accuracy	0.2s												
Location	KPTCL Substation												
<u>Project 4:</u>													

¹⁶ (Page number 12 of) http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

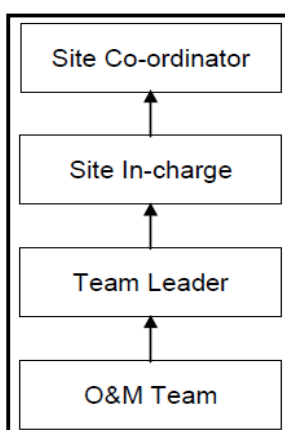
	Meter Details:	
	Details	
	Meter Number	Main: 17002897 Check: 17069213
	Accuracy	0.2s
	Location	KPTCL Substation
Purpose of data	Calculation of baseline emissions	
Calculation method	-	
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.	

5.3 Monitoring Plan

All the three wind projects in the bundle have entered into agreement with the respective WTG Suppliers for the operation and maintenance of WTGs. And the solar project has entered into agreement with the O&M contractor for the operation and maintenance of the project. O&M contractor will provide a monthly report, which includes generation data, major breakdown events and machine availability. Project manager is responsible for recording of monthly meter readings of export and import. Monthly power export and import data will be sent regularly to site in charge of each project separately.

Organizational structure and responsibilities or personnel:

The data for the project is compiled by the O&M Contractor and subsequently stored by the PP, the reporting and data flows as per the below mentioned flow chart starting from Site O&M team which monitors day to day operational data and monthly recording. The reporting responsibilities for the project are described as below;



The Site In-charge will be responsible for carrying out internal auditing and QA/QC. All the values from generation record will be checked with JMR and invoices for consistency. In case there are any non-conformances identified. The Site In-charge will investigate the error and revise the record to correct it. In any case where values have slightest of variation in different records the most conservative value will be taken in the project monitoring report.

Personal Training:

The training for operating and maintaining the plant will be provided to the O&M team whenever there would be necessity or any technological up gradation.

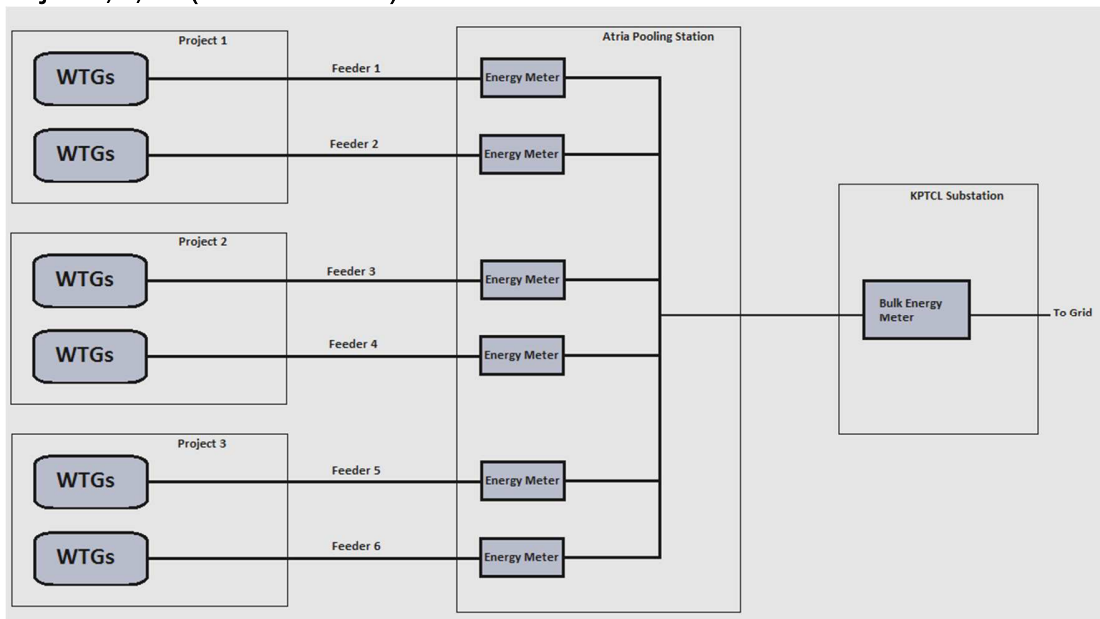
Emergency preparedness:

In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter will be used for readings

Data recording & archiving: The project proponent shall maintain data both in electronic form and hard copies. The monitored data shall be archived till 2 years after the completion of crediting period.

Methods for measuring, recording, storing, aggregating, collating and reporting data and parameters

Project 1, 2,& 3 (Same Procedure):



The above diagram shows the metering arrangements for the wind power projects (project 1,2 & 3). Monthly Joint meter reading is taken from energy meters installed at each feeder at pooling station and bulk energy meter installed at the KPTCL substation by representative of DISCOM and O&M team/service provider (on behalf of the project proponent). It must be noted here that the meter readings as mentioned above shall be calculated as the product of meter multiplication factor and the difference of the current and previous meter readings. There are two different JMR statement will be prepared for the project

Bulk Meter JMR statement: Export & Import reading at the bulk meter installed at substation will be recorded in this.

Feeder JMR statement: Import & export reading of the energy meter reading installed at each feeder in the pooling station will be recorded. Also the net electricity supplied from each feeder will be calculated as below:

Net energy supplied = Feeder Export – Feeder Import – Transmission loss.

Calculation of Transmission loss:

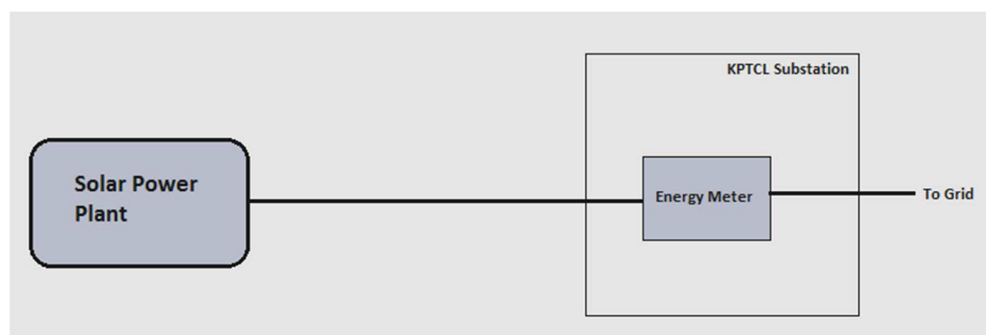
DISCOM will calculate percentage of transmission loss for each feeder every month. The total transmission loss between pooling station and KPTCL substation will be apportioned to each feeder based on the proportion of energy exported from each feeder for the respective month. Example of transmission loss for a month is given below:

Since only these three wind projects are connected to the bulk energy meter in KPTCL substation, the difference between export and import taken from 'Bulk meter JMR statement' shall be directly taken for net electricity supplied by the three wind projects.

ATRIA PERCENTAGE OF LINE LOSSES				
MONTH : August - 2019				
Sl. No.	MONTHLY GENERATION OF INDIVIDUAL METERING POINT	METER READINGS		
		33KV METERING POINTS	MAIN METER	CHECK METER
1	Y= M/S ATRIA WIND POWER (Basavana Bagewadi) Pvt Ltd, 220KV Line 01 Bulk meter	RR No : BGDIPP- 24	4,01,66,000	4,01,80,000
2	X= M/S ATRIA WIND POWER (Basavana Bagewadi) Pvt Ltd, 33KV, F#1 Meter	RR No : BGDIPP-24A	78,72,000	78,70,800
3	X= M/S ATRIA WIND POWER (Basavana Bagewadi) Pvt Ltd, 33KV, F#2 Meter	RR No : BGDIPP-24B	71,79,600	71,79,600
4	X= M/S ATRIA WIND POWER (Bijapur-1) Pvt Ltd, 33KV, F#3 Meter	RR No : BGDIPP-24C	72,28,800	72,27,600
5	X= M/S ATRIA WIND POWER (Bijapur-1) Pvt Ltd, 33KV, F#4 Meter	RR No : BGDIPP-24D	61,27,200	61,26,000
6	X= M/S ATRIA WIND POWER (Chitradurga) Pvt Ltd, 33KV, F#5 Meter	RR No : BGDIPP-24E	82,51,200	82,53,600
7	X= M/S ATRIA WIND POWER (Chitradurga) Pvt Ltd, 33KV, F#6 Meter	RR No : BGDIPP-24F	37,88,400	37,87,200
		TOTAL	4,04,47,200	4,04,44,800
MAIN METER		CHECK METER		
Z=	$\frac{(X - Y) \times 100}{(X)}$	Z=	$\frac{(X - Y) \times 100}{(X)}$	
Z=	$\frac{(4,04,47,200 - 4,01,66,000)}{4,04,47,200} \times 100$	Z=	$\frac{(4,04,44,800 - 4,01,80,000)}{4,04,44,800} \times 100$	
Z=	MAIN METER % LOSS = 0.70%	Z=	CHECK METER % LOSS = 0.65%	
 M/S Atria Wind Power (Basavana Bagewadi) Pvt Ltd		 EXECUTIVE ENGINEER (Ele) O & M Div. HESCOM BASAVANA BAGEWADI		

The JMRs will be stored in Atria head office in hard and soft copies. During the verification, the net energy supplied to grid will be taken from the JMR. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of VERs for the project activity whichever occurs later.

Project 4



The above diagram shows the metering arrangements for the solar power project (project 4). Monthly Joint meter reading is taken from energy meters installed at the KPTCL substation by representative of DISCOM and O&M team/service provider (on behalf of the project proponent). It must be noted here that the meter readings as mentioned above shall be calculated as the product of meter multiplication factor and the difference of the current and previous meter readings.

Import & export reading of the energy meter reading installed KPTCL substation will be recorded. Also the net electricity supplied from the project will be calculated in the JMR as below:

$$\text{Net energy supplied} = \text{Export} - \text{Import}$$

The JMRs will be stored in Atria head office in hard and soft copies. During the verification, the net energy supplied to grid will be taken from the JMR. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of VERs for the project activity whichever occurs later.

Procedures for calibrating equipment:

The energy meters at the feeders are maintained and owned by KPTCL. Neither the project proponent nor the site personnel have any control over it. The meters are calibrated by KPTCL at-least once in five years.

Policies for oversight and accountability:

The energy meter readings will be recorded by KPTCL in presence of project representatives. Meter reading of main meter and check meter are compared for any error in the meter or oversight in recording the meter reading. The JMR is issued by KPTCL and the project proponent does not have any control over it.

Procedures for internal auditing and QA/QC & Procedures for handling non-conformities:

The energy meters at the feeders are maintained and owned by state electricity board. Neither the project proponent nor the site personnel have any control over it. JMR also prepared by KPTCL and hence no internal audit is required on the monitoring.

Sampling approaches:

All the parameters are monitored 100%. No parameter is monitored on sampling basis.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}			
Data unit	MWh			
Description	Calculated (based on the measured values of electricity exported and imported)			
Value applied:	Project 1: 146499.1 MWh Project 2: 98026.8 MWh Project 3: 46204.6 MWh Project 4: 85,034 MWh Total : 375,764.1 MWh			
Comments	Net electricity supplied to the grid by the project activity is sourced from JMR/B.Forms. The calibration details of the energy meter are given below:			
	Project	Energy Meter	PC test/calibration date	Calibration due date
	Project 1	Feeder 1 Main:17166962 Check: 17166964	11/04/2018	10/04/2023
		Feeder 2 Main:17166967 Check: 17166977	11/04/2018	10/04/2023
	Project 2	Feeder 3 Main: 17166983 Check: 17125600	11/04/2018	10/04/2023
		Feeder 4 Main: 17125701 Check: 17167005	10/04/2018	09/04/2023
	Project 3	Feeder 5 Main: 17167007 Check: 17167012	10/04/2018	09/04/2023
		Feeder 6 Main: 17167017 Check: 17167025	10/04/2018	09/04/2023
	Project 1-3	Bulk meter Main: 17125678 Check: 17125587	16/03/2018	15/03/2023
	Project 4	Main: 17002897 Check: 17069213	25/01/2018	24/01/2023
			18/10/2019	17/10/2024

6.2 Baseline Emissions

As per description earlier under this document:

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

$EF_{grid,CM,y}$ is 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) (i.e, 0.9368 tCO2/MWh).

and;

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

Here,

$$BE_y = 375764.1 \text{ MWh} * 0.9368 \text{ tCO}_2/\text{MWh}$$

Net Electricity- Project wise:

Net electricity supplied to grid (MWh)					
Month	Project 1	Project 2	Project 3	Project 4	Total
Jan-18	0.0	0.0	0.0	25.4	25.4
Feb-18	0.0	0.0	0.0	1123.2	1123.2
Mar-18	0.0	0.0	0.0	2761.2	2761.2
Apr-18	801.6	363.6	0.0	4309.5	5474.7
May-18	175.2	109.2	0.0	4116.5	4400.9
Jun-18	2026.4	-0.2	0.0	3861.0	5887.2
Jul-18	17648.7	-65.9	0.0	3517.8	21100.6
Aug-18	20046.1	0.0	0.0	3699.2	23745.2
Sep-18	8308.7	707.9	0.0	4274.4	13291.0
Oct-18	3381.7	6361.9	0.0	3818.1	13561.7
Nov-18	2661.7	5514.9	0.0	3166.8	11343.4
Dec-18	2730.1	6010.9	0.0	4009.2	12750.2
Jan-19	4309.5	5047.7	0.0	4633.2	13990.4
Feb-19	6781.3	6590.7	0.0	5112.9	18484.9

Mar-19	4439.7	4339.9	0.0	5376.2	14155.8
Apr-19	5876.5	5723.0	221.3	5311.8	17132.6
May-19	9189.7	7117.2	3824.7	5536.1	25667.6
Jun-19	11213.2	8314.6	5871.0	3515.9	28914.7
Jul-19	14007.6	12087.9	6375.3	3313.1	35783.9
Aug-19	14945.8	13263.1	11954.7	3047.9	43211.4
Sep-19	10270.9	9135.7	9387.0	3451.5	32245.1
Oct-19	3776.5	3531.8	4052.1	3437.9	14798.2
Nov-19	3908.3	3872.7	4518.6	3615.3	15914.9
Total	146499.1	98026.8	46204.6	85033.7	375764.1

Project wise estimation of baseline emission reduction:

Month	Net Generation (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline emissions (tCO ₂ e)
Project 1	146499	0.9368	137,240
Project 2	98027	0.9368	91,832
Project 3	46205	0.9368	43,284
Project 4	85034	0.9368	79,660
Total			352,015

Vintage wise of baseline emissions:

Year	Net Electricity (MWh)	Grid Emission Factor tCO ₂ /MWh	Baseline Emissions (tCO ₂) EG _{PJ,y} (MWh) x EF _{grid,CM,y} (tCO ₂ /MWh)
2018	115464.6	0.9368	108,167
2019	260299.5	0.9368	243,848
Total	375,764.1	0.9368	352,015

6.3 Project Emissions

The project activity involves in harnessing wind power. So, the emissions from the project are zero.

6.4 Leakage

No leakage emissions have been considered and hence the leakage emission is zero.

6.5 Net GHG Emission Reductions and Removals

As per the applied methodology, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO₂e/year

BE_y = Baseline emission in tCO₂e/year

PE_y = Project emissions in tCO₂e/year

Project wise emission reduction:

Project	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)
Project 1	137,240	0	0	137,240
Project 2	91,832	0	0	91,832
Project 3	43,284	0	0	43,284
Project 4	79,660	0	0	79,660
Total	352,015	0	0	352,015

Vintage wise emission reduction:

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 2018	108,167	0	0	108,167
Year 2019	243,848	0	0	243,848
Total	352,015	0	0	352,015

Comparison of actual emission reduction with actual:

Details	Project 1	Project 2	Project 3	Project 4
Start date of emission reduction (commissioning date)	18-Apr-18	18-Apr-18	29-Apr-19	25-Jan-18
End date of Monitoring period	30-Nov-19	30-Nov-19	30-Nov-19	30-Nov-19
Total days of generation in the monitoring period	592	592	216	675
Estimated emission Reduction As per PDD (tCO ₂ e)	94,274	92,195	91,675	52,439
Estimated ERs for this monitoring period (tCO ₂ e)	152,905	149,532	54,251	96,976
Actual Emission Reduction (tCO ₂ e)	137,240	91832	43284	79660
Difference in Emission reduction	-10.24%	-38.59%	-20.21%	-17.86%

Since actual emission reduction of all the projects are less than estimated emission reduction, no further justification is required.