



**Verified Carbon
Standard**

100 MW BUNDLED WIND POWER PROJECT IN ANANTAPURAM, ANDHRA PRADESH



INFINITE
SOLUTIONS

Document Prepared by Infinite Solutions

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity consists of a bundle of 50 Wind Electric Generators (WEG) of Gamesa Wind Turbines Private Limited make in Anantapuram District, Andhra Pradesh. 40 machines of 2 MW capacity have been set up by Guttaseema Wind Energy Company Private Limited (GWECPL) and the other 10 machines of 2 MW have been setup by Vayuputhra Energy Private Limited (VEPL). The Project is owned by Guttaseema Wind Energy Company Private Ltd. and Vaayuputra Energy Private Ltd. which is part of Greenko Group. The project activity generates power by using the kinetic energy of wind, thus resulting in zero emissions during electricity production. The generated electricity from the implemented WEGs is supplied to the Southern Power Distribution Company of AP Limited. Both companies have entered Power Purchase Agreement (PPA) with State utility i.e., Southern Power Distribution Company of AP Limited for a period of 20 years from the date of implementation of project.

Project Name	No. of WTGs	Capacity	Location
Guttaseema Wind Energy Company Private Ltd.	40	80 MW _{AC}	Andhra Pradesh
Vayuputra Energy Private Ltd.	10	20 MW _{AC}	Andhra Pradesh

Only part of 40 MW has been commissioned.

As a result, for the project capacity 100 MW, GHG emission reductions by project is estimated to be approximately 192,849 tCO_{2e} per year and total GHG emission reductions of 1,928,490 tCO_{2e} for the crediting period, thereon displacing 205,860 MWh/year amount of electricity from the grid. However as only 40 MW power is commissioned yet, hence GHG emission reductions by already commissioned project is estimated to be approximately 77,139 tCO_{2e} per year and total GHG emission reductions of 771,390 tCO_{2e} for the crediting period, thereon displacing 82,344 MWh/year amount of electricity from the grid.

GHG emission reduction by the Project in this monitoring period. The monitoring period is from 01-January-2021 to 31-December-2022 (Inclusive of both days). The total amount of electricity generated 153,767.99 MWh and GHG emission reductions or removals in this monitoring period are 144,048 tCO_{2e}.

Audit Type	Period	Program	VVB Name	Number of years
Validation+ Verification	22-March-2018 to 03- October -2019 (Inclusive of both days)	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	01 Year 06 months 12 days
Verification	04- October-2019 to 31-December-2020 (Inclusive of both days)	VCS	TÜV SÜD South Asia Pvt Ltd	01 Year 02 months 28 days
Verification	01-January -2021 to 31-December-2022 (Inclusive of both days)	VCS	VKU CERTIFICATION PVT. LTD.	02 Year 00 months 00 days
Total				04 Year 09 months 09 days

1.2 Sectoral Scope and Project Type

The bundled project is generating renewable electricity from WEGs. The generated electricity is exported to the grid. The relevant type and category are shown below:

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)

Project Type : I - Renewable Energy Projects

Project Category: Grid-connected electricity generation from renewable sources ACM0002-Version 19.0¹.

The project is not a grouped project nor an AFOLU (Agriculture, Forestry and Other Land Use) project activity.

¹ [58IAGB7SZUDEO2VN6LYM30K41HFPRQ \(unfccc.int\)](https://unfccc.int/58IAGB7SZUDEO2VN6LYM30K41HFPRQ)

1.3 Project Proponent

Organization name	Guttaseema Wind Energy Company Private Ltd.
Contact person	Murali Krishnam Raju M
Title	AGM - Commercial
Address	PLOT NO. #1131/A, ROAD NO. 36, JUBILEE HILLS, HYDERABAD – 500033, TELANGANA, INDIA.
Telephone	+91 40 40300100
Email	muraliraju.m@greenkogroup.com

Organization name	Vaayuputra Energy Private Ltd
Contact person	Murali Krishnam Raju M
Title	AGM - Commercial
Address	PLOT NO. #1131/A, ROAD NO. 36, JUBILEE HILLS, HYDERABAD – 500033, TELANGANA, INDIA.
Telephone	+91 40 40300100
Email	muraliraju.m@greenkogroup.com

1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Project Consultant
Contact person	Mr. Jimmy Sah
Title	Head – Sustainability
Address	214-215 Milinda Manor, Opp. Next Treasure Island, 2 RNT Marg, Indore – 452001, India
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1.5 Project Start Date

Project Start Date: 22-March-2018;

The project start date is the date on which first WTG of the project was commissioned.

1.6 Project Crediting Period

Crediting Period Start date : 22-March-2018

Crediting Period End date : 21-March-2028 (Inclusive of both days)

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

1.7 Project Location

Guttaseema Wind Energy Company Private Ltd. and Vayuputhra Energy Private Ltd. have established wind mills in multiple villages in Anantapuram District, Andhra Pradesh and the details of physical location of each sub project in the bundled project activity are furnished below.

The Geo-Coordinates of the WTGs already commissioned.

Guttaseema Wind Energy Company Private Limited					
Sl. No.	WTG Loc. No.	Latitude	Longitude	Villages	Commissioning Date
1	WTG-G01	N14° 27'37.5"	E77° 12'8.7"	Rudrampalli, Borampalli, Elagalavanka and Basavapuram villages of Anantapuram District in Andhra Pradesh	07-February-2019
2	WTG-G02	N14° 27'54.9"	E77° 12'10.7"		07-February-2019
3	WTG-G03	N14° 28'4.8"	E77° 12'9.3"		07-February-2019
4	WTG-G06	N14° 28'13.2"	E77° 12'52.8"		07-February-2019
5	WTG-G08	N14° 28'41.10"	E77° 13'17.60"		22- March-2018
6	WTG-G09	N14° 28'15.6"	E77° 12'52.50"		07-February-2019
7.	WTG-G10	N14° 29'20.5"	E77° 13'11.4"		22- March-2018
8	WTG-G11	N14° 29'43.00"	E77° 14'33.80"		22- March-2018
9	WTG-G12	N14° 29'24.20"	E77° 14'31.10"		22- March-2018
10.	WTG-G23	N14° 29'32.10"	E77° 15'28.50"		22- March-2018

Vayuputhra Energy Private Limited					
Sl. No.	WTG Loc. No.	Latitude	Longitude	Villages	Commissioning Date
1.	WTG-V01	N14° 28'3.10"	E77° 14'53.00"	Rudrampalli, Borampalli, Elagalavanka and Basavapuram villages of Anantapuram District in Andhra Pradesh	23- March-2018
2.	WTG-V02	N14° 27'48.00"	E77° 14'50.20"		23- March-2018
3.	WTG-V03	N14° 27'37.80"	E77° 14'51.90"		23- March-2018
4.	WTG-V04	N14° 27'15.10"	E77° 14'29.00"		23- March-2018
5.	WTG-V05	N14° 26'57.10"	E77° 14'5.60"		07-February-2019
6.	WTG-V06	N14° 27'41.0"	E77° 13'42.50"		07-February-2019
7.	WTG-V07	N14° 28'5.6"	E77° 14'4.9"		23- March-2018
8.	WTG-V08	N14° 28'17.1"	E77° 13'40.6"		23- March-2018
9.	WTG-V09	N14° 27'47.2"	E77° 12'59.2"		23- March-2018
10.	WTG-V10	N14° 27'3.5"	E77° 12'30.1"		23- March-2018

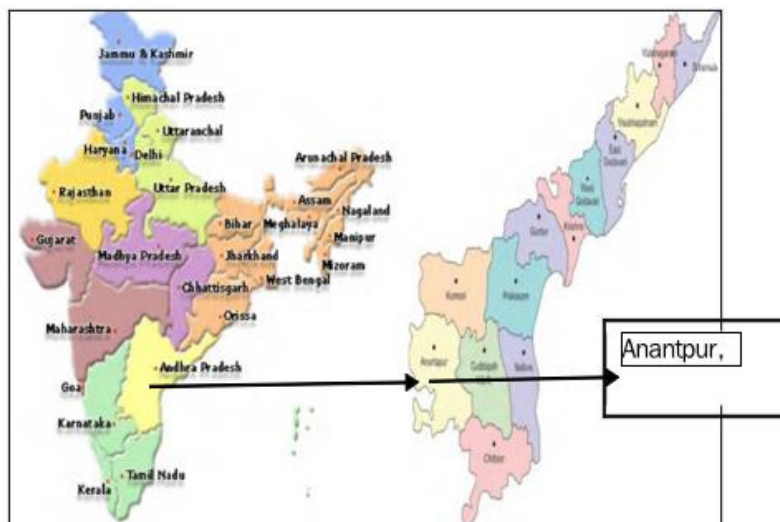


Figure 1 Project Location

The Geo-Coordinates of the WTGs yet to be commissioned²: -

Guttaseema Wind Energy Company Private Limited				
Sl. No.	WTG Loc. No.	Latitude	Longitude	Villages
1	WTG-G05	14° 28' 30.72" N	77° 11' 56.544" E	Rudrampalli, Borampalli, Elagalavanka and Basavapuram villages of Anantapur District in Andhra Pradesh
2	WTG-G04	14° 28' 17.4" N	77° 12' 4.068" E	
3	WTG-G07	14° 28' 26.94" N	77° 13' 23.26" E	
4	WTG-G13	14° 30' 24.336" N	77° 13' 44.68" E	
5	WTG-G14	14° 29' 59.208" N	77° 13' 50.77" E	
6	WTG-G15	14° 29' 7.08" N	77° 14' 28.716" E	
7	WTG-G16	14° 28' 55.884" N	77° 14' 24.504" E	
8	WTG-G17	14° 28' 45.192" N	77° 14' 28.5" E	
9	WTG-G18	14° 28' 37.416" N	77° 14' 16.51" E	
10	WTG-G19	14° 27' 27.252" N	77° 14' 3.588" E	
11	WTG-G20	14° 29' 0.06" N	77° 15' 16.16" E	
12	WTG-G21	14° 28' 48.072" N	77° 15' 29.016" E	
13	WTG-G22	14° 29' 14.388" N	77° 15' 34.164" E	
14	WTG-G24	14° 29' 49.344" N	77° 15' 37.152" E	
15	WTG-G25	14° 31' 31.332" N	77° 15' 20.736" E	
16	WTG-G26	14° 28' 59.988" N	77° 16' 12.504" E	
17	WTG-G27	14° 29' 13.596" N	77° 16' 15.78" E	
18	WTG-G28	14° 29' 21.336" N	77° 16' 44.076" E	
19	WTG-G29	14° 29' 29.724" N	77° 16' 49.476" E	
20	WTG-G30	14° 29' 37.824" N	77° 16' 43.752" E	
21	WTG-G31	14° 29' 55.896" N	77° 16' 12.36" E	
22	WTG-G32	14° 30' 5.832" N	77° 16' 9.948" E	
23	WTG-G33	14° 30' 17.064" N	77° 15' 59.364" E	
24	WTG-G34	14° 30' 35.496" N	77° 16' 3.324" E	

² project not commissioned due to land acquisition.

25	WTG-G35	14° 30' 42.3" N	77° 15' 45.864" E
26	WTG-G36	14° 31' 41.772" N	77° 15' 40.392" E
27	WTG-G37	14° 31' 55.164" N	77° 15' 44.568" E
28	WTG-G38	14° 32' 6" N	77° 15' 33.192" E
29	WTG-G39	14° 32' 8.196" N	77° 14' 18.708" E
30	WTG-G40	14° 32' 19.68" N	77° 14' 19.032" E

1.8 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources

Reference: ACM0002: Version 19.0³

Tools referred with above methodology and applicable for project activity are:

- Methodological Tool 07: Tool to calculate the emission factor for an electricity system - Version 07.0 (EB 100, Annex 04)⁴
- Methodological Tool 01: Tool for the demonstration and assessment of additionally - Version 07.0.0 (EB 70, Annex 08)⁵.

1.9 Participation under other GHG Programs

The Project has not participated in any other GHG programs

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

- Emission Trading Programs and Other Binding Limits: The project is not a part of any emission trading program as confirmed by the project proponent through the declaration of no double counting certificate.
- Other Forms of Environmental Credit: The project activity has not availed any other form of environmental credit as confirmed by the project proponent through the declaration of no double counting. Furthermore, the project activity is not availing any benefits from CDM/GS/GCC/UCR/RECs mechanism which can be confirmed from the link below:

https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

CDM: CDM-Home (unfccc.int)

<https://www.goldstandard.org/>

<https://projects.globalcarboncouncil.com/>

<https://www.ucarbonregistry.io/>

³ 58IAGB7SZUDEO2VN6LYM30K41HFPRQ (unfccc.int)

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

Registries | I-REC Standard (irecstandard.org)

- The project Activity is a wind power project and does not involve any supply chain in the project such as manufacturers, wholesalers, distributors and retailers. So, no indirect upstream and downstream GHG emissions are involved in the project activity. Thus, the Scope 3 emissions are not applicable in this project activity.

1.11 Sustainable Development Contributions

Contribution to sustainable development:

Ministry of Environment and Forests, Govt. of India has stipulated the social wellbeing, economic wellbeing, environmental wellbeing and technological wellbeing as the four indicators for sustainable development for Clean Development Mechanism (CDM) projects.

- **Social well-being:** The project activity generates clean power, without emitting any GHGs during its operations. Hence, it leads to a cleaner environment, reducing the adverse impacts of GHG emissions on the people. It reduces a part of the electricity deficit being faced in the region and improves infrastructural development in the areas around the project activities.
- **Environmental well-being:** Wind being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the project activity also helps in avoiding significant amount of GHG emissions.
- **Economic well-being:** The project activities contribute to an investment of nearly INR 658.80 million which would increase the economic activity of the local area. The generated electricity is fed into the Grid through the local grid which would improve the grid frequency and availability of electricity to the local consumers. This is providing new opportunities for the industries to set up in the area thereby improving local employment and leading to overall development.
- **Technological well-being:** The project activities employ the best available technology and it led to the promotion of wind technology into the region, demonstrating the success of wind based renewable energy generation, which is fed into the nearest sub-station (part of the Indian Grid), thus increasing energy availability and improving quality of power under the service area of the substation.
- **Further Information**

There are no information or incidents that will have bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission.

The project activity "100 MW Bundled Wind Power Project in Anantapuram, Andhra Pradesh" is located at Anantapuram district of State: Andhra Pradesh, Country: India.

The project is contributing in sustainable development by generating electricity and reduction of CO₂ emissions due to implementation of project activity and generates employment to the local stakeholders. Through Project activity economic development has been achieved in the project location by creating opportunities of employment during the project lifetime. Project owner monitors the carbon emission with help of the record of electricity generated. This is a voluntary project activity doesn't contribute to achieving any nationally stated sustainable development priorities. There is no compliance for monitoring and reporting the emission reduction and SDG contribution from the project activity.

The project is wind power project, it has generated 153,767.99 MWh electricity and avoided 144,048 tons of greenhouse gas emissions in the atmosphere during the current monitoring period. So, the project will contribute to the sustainable development, and it is fulfilling SDG 07 and SDG 13.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 153,767.99 MWh, renewable electricity has supplied to Indian Grid during the reported period that helps to increase the renewable energy share in the energy mix	Since Commissioning, about 327,836.99 MWh (118,477+55,592+153,767.99) ⁶ renewable electricity has supplied to Indian Grid that helps to increase the renewable energy share in the energy mix.
2)	13.0	13.2.2 Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By installation of 100 MW wind Energy Power Plant (40 MW has been commissioned), project has prevented the release of 144,048 tons of carbon into the atmosphere during the monitoring period	Prevented the release of 307,122 tons of carbon (110,988+52,076+ 144,048) ⁷ into the atmosphere.

⁶ <https://registry.terra.org/app/projectDetail/VCS/1985>

⁷ <https://registry.terra.org/app/projectDetail/VCS/1985>

2 SAFEGUARDS

2.1 No Net Harm

There was no harm-identified from the project and hence no mitigations measures are applicable.

2.2 Local Stakeholder Consultation

The Local Stakeholder Meetings were organized at the project site substation. The local stakeholder was informed regarding the meeting on 20-January-2018. The following are the stakeholders for the project activity:

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

All the stakeholders have been invited through invitation letters and/ or public notice to attend the stakeholders meeting 28- January-2018. The meeting was organized by the project proponent with the help of the developer Gamesa Wind Turbines Private Limited. All participants were informed in their local language about the salient features and environmental benefits of the project activity. In the introductory speech, the representatives of PP welcomed the gathering and given a brief about the VCS project activity. Gamesa Wind Turbines Private Limited presented the project idea, discussed issues regarding the general energy production with the focus on wind power. Afterwards the presentation by officials was conducted, who explained in detail the aim of the meeting and the process of stakeholder evaluation. Subsequent to the introductory speech, stakeholders were explained about the electricity generation from wind power project/ unit is an environmentally friendly power generation technology contributing to reduction in GHG emissions. They were also explained about the benefits of the wind power project/ unit like, increasing energy availability and improving quality of power and its assistance to the local population by providing employment opportunities to both skilled & unskilled labours. After all the presentations, Project representative and Siemens Gamesa officials answered the stakeholder's questions. In parallel all the comments were collected and documented. There were no negative comments received during the meeting and stakeholders appreciated proactive efforts taken by the project proponent towards reducing emissions.

For ongoing communication, the PP has also placed a grievance register onsite where in the stakeholder can put down his/her complaint, and the same if found genuine will be addressed immediately.

However, there is no negative feedback has been reported within this monitoring period.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Guttaseema Wind Energy Company Private Ltd. (80 MW) and Vayuputhra Energy Private Limited (20 MW) is located at Rudrampalli, Borampalli, Elagalavanka and Basavapuram villages of Anataparam District in Andhra Pradesh. Generation of Electricity is by using Wind energy.

The total capacity of the proposed project activity is 100 MW. The proposed project activity comprises of total 50 WTGs, which comprises of 2 MW capacity each.

Project current status during this monitoring period: -

Project proponent	WTGS - Commissioned	Commissioning Dates
Guttaseema Wind Energy Company Private Ltd. (80 MW)	10 WTGs (20 MW) out of 40 WTGs (80 MW) are commissioned.	22-March-2018 and 07-February-2019
Vayuputhra Energy Private Limited (20 MW)	10 WTGs (2 MW each) are commissioned	22-March-2018 and 23-March-2018
Total	20 WTGs (40 MW)	

In this monitoring period only 40 MW has considered the generation for calculating under emission reduction under VCS mechanism. **Hence, 60 MW (30 WTGs) capacity are yet to be commissioned.** The WTGs are under operation including scheduled shutdowns during the current monitoring period. The breakdown occurred is for a total of 0.20% of total hours of all WTGs and is beyond the control of PP. Therefore, due to this percentage variations of breakdown identified in the current monitoring period also it has no impact in the GHG emissions reductions. The summary

of breakdown details in the current monitoring period has been described in the below table and detailed analysis of the same has been provided in Appendix 2 of the MR.

S.No.	Plant Site	Total Hours	Net operational Hours	Breakdown Hours
1	Guttaseema Wind Energy Company Private Ltd. and Vayuputhra Energy Private Limited	350,400 hours ⁸	349,696 hours/ 99.79% of total hours	704 hours/ 0.20% of total hours

The project is replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 144,048 tCO₂e per year, thereon displacing 153,767.99 MWh/year amount of electricity from the grid over the 10 years crediting period.

The nearest distance from PSS end is of WTG-G10 at approx. 2.9 km and the longest distance from PSS end is of WTG-G01 at approx. 6.5 km. A total of 03 dedicated Feeders are Present in the substation and the energy generation is measured in respective feeder by use of Tri vector meters. Internal available automatic metering system recently installed.

The details are feeders are connected WTGs are as follows:

Feeder Number	WTG number
07	WTG-G11, WTG-G12, WTG-G23
10	WTG-G01, WTG-G02, WTG-G03, WTG-G06, WTG-G08, WTG-G09, WTG-G10
11	WTG-V01, WTG-V02, WTG-V03, WTG-V04, WTG-V05, WTG-V06, WTG-V07, WTG-V08, WTG-V09, WTG-V10

The Voltage generated at the generator is 690V and it is stepped up to 33 kV voltage and the same is connected to PSS. From PSS again, the 33 kV is stepped up to 220 kV and synchronized to the grid. ABT meters are available on 220kV side in PSS for Billing purpose.

The project activity comprises of 21 WEGs of G97-2 MW and 29 WEGs of G114-2 MW WEGs supplied by Gamesa Wind Turbines Private Limited.

⁸ Total hours = 17520 (i.e., 730*24) *Number of WTGs (i.e., 20). So, 17520*20 = 350,400

The salient Features of Gamesa G97 are as follows.

Parameter	Specifications
	Gamesa- G97 - 2.0MW
Power	
Installed electrical output	2,000 kW
Cut-in wind speed	3 m/s
Rated wind speed	11 m/s
Cut-out wind speed	25 m/s
Regulation	Pitch
Rotor	
Diameter	97.0 m
Rotor swept area	7,390.0 m ²
Number of blades:	3
Tip speed:	90 m/s
Generator	
Type	Double Fed Asyn
Speed, max	1,904.0 U/min
Operating voltage	690 V
Frequency	50 Hz / 60 Hz

The salient Features of Gamesa G114 2.0MW WTG are as follows: -

Parameter	Specifications
	Gamesa- G114 CS 2.0MW
Power	
Installed electrical output	2,000 kW
Cut-in wind speed	2.5 m/s
Rated wind speed	10 m/s
Cut-out wind speed	25 m/s
Regulation	Pitch
Rotor	
Diameter	114.0 m
Rotor swept area	10,207.0 m ²
Number of blades:	3
Tip speed:	96 m/s
Generator	
Type	Double Fed Asyn
Speed, max	1,280.0 U/min
Operating voltage	690 V
Frequency	50 Hz / 60 Hz

Transformer details (Gamesa)	2 in No's
Make	ABB
Voltage	33KV/690 V
Rated Power	2350kVA
Power Transformer details	
Make	Prime Meiden
Voltage	220/33kV
Rated Power	1 X 80/100/110 MVA

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

Project deviation applicable:

Deviation 1:

The formula mentioned in the registered PDD for the quantity of net electricity generation supplied by the project plant to the grid was not correct, so it has been corrected in line with JMR. This correction is considered a project deviation for the current monitoring period.

Net electricity supplied is calculated based on the difference between the calculated values of "export", "import" and "transmission loss" on the EB energy meter and at the substation". Transmission loss is calculated on a pro-rata basis as per the readings of the 220KV substation and "primary metering Point".

Net Electricity = Export – Import – Transmission Loss

The net electricity will be calculated by the state electricity board and provided in the monthly generation statement (JMR). Hence, the net electricity reading will be directly sourced from the monthly generation statement/JMR which is in line with the actual monitoring process.

Deviation 2:

The project activity was registered under VCS with a total capacity of 100 MW_{AC} located at Anantapuram District, Andhra Pradesh in India. There are 2 SPVs involved in the project activity Guttaseema Wind Energy Company Private Ltd. having capacity 80 MW_{AC} and Vayuputra Energy Private Ltd. having 20 MW_{AC} capacity. Out of 100 MW_{AC}, only 40 MW_{AC} has commissioned the remaining capacity of project is not commissioned due to land acquisition problem. Therefore, in this monitoring period out of 100 MW, generation of only 40 MW has considered for calculation of emission reduction under VCS mechanism.

The deviations are in line with the guidelines provided in VCS Standard Version 4.4⁹ Section 3.20; however, it doesn't impact existing applicability conditions, methodology, baseline, and additionality.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

⁹ <https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf>

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid, OM, y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 14, December 2018 ¹⁰
Value applied	0.9610 (Indian Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07.0.0” as 3-year generation weighted average using data for the years 2015-16, 2016-17 & 2017-18. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 14.0, published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid, BM, y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 14, December 2018
Value applied	0.8644 (Indian Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07.0.0” as 3-year generation weighted average using data for the year 2017-18. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid, CM, y}
Data unit	tCO ₂ /MWh

¹⁰ <https://cea.nic.in/cdm-co2-baseline-database/?lang=en>

Description	Combined margin CO ₂ emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 14, December 2018
Value applied	0.9368 (Indian Grid)
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * WOM + EF_{grid,BM,y} * WBM$ Where: $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh) WOM = Weighting of operating margin emissions factor (%) = 75% WBM = Weighting of build margin emissions factor (%) = 25%
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

4.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ} ,
Data unit	MWh
Description	Electricity supplied to Grid
Source of data	Certificate for share of electricity generated by the wind farm
Description of measurement methods and procedures to be applied	Net electricity generated is calculated at the main meter connected to the Grid Substation. The procedures for metering are as per the provisions of the power purchase agreement. The WEGs of a single customer (individual PPS) at a particular site are connected to a feeder that ultimately leads to the main meter at the substation maintained by O&M team. Data monitoring takes place at the metering yard and Main meter at the substation. The electricity metered at the main meter is proportionally divided among the customers connected to the meter on the basis of the prorata readings taken at the individual WTGs. The emission reduction calculations are done on the basis of the Main meter reading (net electricity exported to the grid) after deducting imports from the grid as mentioned in the share certificate issued on monthly basis. The electricity measurements at main meter are continuous and recorded on monthly basis.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording

Value monitored	153,767.99 MWh
Monitoring equipment	Electricity Meters of 0.2s Class
QA/QC procedures to be applied	Calibration of all the meters is undertaken at required intervals and faulty meters are duly replaced immediately based on CEA guidelines which specifies calibration once in 5 years.¹¹ The data can be cross checked with sales receipts. The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines will be applied appropriately to confirm the conservativeness of metering. The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered the monitoring parameter. The billing is raised based on substation meters.
Purpose of the data	Calculation of Baseline emissions
Calculation method	Net electricity supplied will be calculated based on the difference between calculated values of “export”, “import” and “transmission loss” on the EB energy meter and at substation”. Transmission loss is calculated on pro-rata basis as per the readings of 220KV substation & “primary metering Point”. (Net Electricity = Export – Import – Transmission Loss) The net electricity will be calculated by State electricity board and provided in the monthly generation statement/JMR. Hence, the net electricity reading will be directly sourced from the monthly generation statement/JMR.
Comments	The data will be archived electronically for two years after the end of the last crediting period or the last issuance of VCU for this project activity, whichever occurs later

4.3 Monitoring Plan

The project proponents at the power station have a procedure to ensure proper monitoring of the VCS project activity. The project activity has installed monitoring and control equipment that measure, record, report, monitor and control various key parameters.

The methodology requires monitoring of the net electricity supplied from the project activity.

¹¹ https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf

The proponent shall maintain complete and accurate records and all other data required for the purpose of proper administration and operation of the wind power project. The data will be kept for at least 2 years after the end of the crediting period.

1. **Purpose** - The purpose of monitoring the project is to assess the annual emission reductions in tonnes of CO₂ that the project activity has achieved.
2. **Data to be reported** - EG_{PJ,y} in MWh and periodical calibrations of monitoring equipment's.
3. **Monitoring times and periods** - The data is monitored on a continuous basis and recorded on a monthly basis with the energy meters installed at the site.
4. **Data Accuracy** - Metering Arrangement of the Power Purchase Agreement (PPA) the metering arrangement including its installation, testing, maintenance and collection transportation and processing of data required for energy exchange shall be governed as per the notification/ directives issued/or to be issued by Central Electricity Regulatory Commission and as per relevant provisions contained in IEGC as amended from time to time. The Central Electricity Authority (CEA) notification regarding Installation and Operation of meters regulations, 2006, says that meters are required to be tested once in 5 years (refer clause 18 of the guideline). Thus, the meters recording the electricity exported is calibrated at least once 5 years.
5. **Mismatch in monitoring period and the billing period**

In case the dates of a particular monitoring period do not match with the dates of the billing period, the net electricity exported to the grid would be calculated from:

$$D = (A/B) \times C$$

Where,

A= Difference of number of days which are not matching of billing period and monitoring period.

B=Number of days of the billing period/month which was not matched with the monitoring period.

C= Net electricity supplied to the grid for that given billing period/month The calculated value after apportioning would be used for calculation of emission reductions during that period.

6. **Metering arrangement** - The project activity includes metering at the substation managed by Guttaseema, Vayuputra & other customers. The electricity exported & imported are

measured by Energy meter installed at substation. The reading is recorded and the difference from last month reading gives the number of units imported/exported.

The project activity metering is done at the GSS {input (33kV) and output (220kV)}.

There are total of 2 input meters for this project activity at the 33kV end of GSS (X1 for 80 MW and X2 for 20 MW). Projects from other developers join the same GSS through another meters (Meter X3) at the 33kV input end.

All the electricity received at the GSS through input 33kV meters is stepped up to 220kV and recorded at the output meter means bulk meter (Meter Y). While stepping up the power from 33kV to 220kV, there is some transformation/transmission loss. For record purpose it is termed as "Transmission loss".

The Export, Import & Transmission Losses are as below:

Export = Export (Net meter) – (Export (Net meter) *Transmission Loss %)

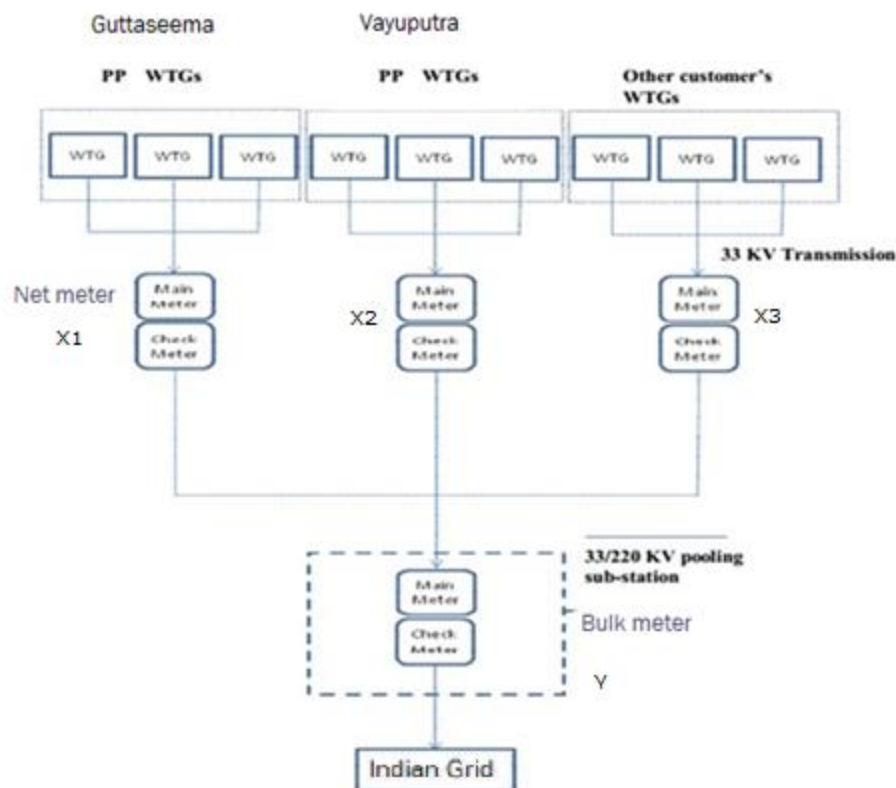
Import = Import (Meter X)

Transmission Loss % =

$$\frac{\{X1 + X2 + X3 - Y\}}{(X1 + X2 + X3)} \times 100$$

The source of above data is JMR.

Single Line Diagram:



7. **Emission Reduction Calculation Approach** - The emission reductions are calculated as a product of the net electricity generated from the project activity and the combined margin emission factor. The calculation approach is explained in detail under section 3 of this document.
8. **Approach to be followed in following cases:** In case monitoring period is between the billing cycle, pro rata calculation for the number of days in the monitoring period shall be estimated for emissions reduction calculation.
9. **Emergency preparedness:** The project activity does not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

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 and in the event that the Main meter and check meter both are not in service as a result of maintenance, repairs or testing, the Standby meter will be used for readings. During the

monitoring period the main meter and check meter were operating in the acceptable limits of accuracy and there were no issued identified during the monitoring period.

10. QA/QC procedures: Calibration of all the meters is undertaken at required intervals and faulty meters are duly replaced immediately based on CEA guidelines which specifies calibration once in 5 years. The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines is applied appropriately to confirm the conservativeness of metering.

The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered in the monitoring parameter. The billing is raised based on substation meters.

All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of VCU for this project activity, whichever occurs later. The data is archived both electronically and manually, and kept in safe storage by PP.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 19).

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

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

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 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)

Grid Emission Factor:

The GEF is fixed ex-ante in the PD as given below:

Parameter	Value (tCO ₂ /MWh)
OM	0.9610
BM	0.8644
CM	0.9368

Therefore,

$$BE_y = 153,767.99 \times 0.9368$$

$$= 144,048 \text{ tCO}_2\text{e (Vintage wise round down value)}$$

5.2 Project Emissions

Not Applicable, since emissions from the project activity is zero as per ACM0002 methodology. Hence, $PE_y = 0$.

5.3 Leakage

Not Applicable, since leakage emissions from the project activity is zero as per ACM0002 methodology. Hence, $LE_y = 0$.

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO₂/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂/year

LE_y = Leakage Emissions in tCO₂/year

For the project activity during the current monitoring period, as per section 5.1

BE_y =144,048 tCO₂e

PE_y = 0 tCO₂e

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)
01-January -2021 to 31-December-2021	67,230	0	0	67,230
01-January -2022 to 31-December-2022	76,818	0	0	76,818
Total	144,048	0	0	144,048

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
154,278 tCO ₂ e	144,048 tCO ₂ e	-6.63 %	It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 154,278 tCO ₂ e, whereas actual emission reductions achieved are 144,048 tCO ₂ e, which is approximately 6.63 % lower than the estimated emission reductions. The lower generation achieved during current verification period due to certain natural conditions therefore it is acceptable.

APPENDIX 1: METER CALIBRATION DETAILS

Guttaseema Wind Energy Company Private Ltd. Location: 33 KV							
Main Meter	Check Meter	Stand by Meter	Last Calibration Date	New Calibration Date	Due Date of calibration	Accuracy Class	Make and Model
18035458	18035460	18035461	26- April-2019	17-November-2021	16-November-2026	0.2S	L&T (ER300P)

Vayuputra Energy Private Ltd. Location: 33 KV							
Main Meter	Check Meter	Stand by Meter	Last Calibration Date	New Calibration Date	Due Date of calibration	Accuracy Class	Make
17250994	18035463	18035464	26- April-2019	17-November -2021	16-November-2026	0.2S	L&T (ER300P)

APPENDIX 2: BREAKDOWN DETAILS

Month	Error name	Total in HH:MM: SS
January-21	Grid Failure	12:53:00
	Schedule maintenance	3:45:00
February-21	Grid Failure	3:46:00
	Schedule maintenance	2:59:00
March-21	Grid Failure	15:13:00
	Schedule maintenance	6:06:00
April-21	Grid Failure	33:39:00
	Schedule maintenance	5:09:00
May-21	Grid Failure	19:32:00
	Schedule maintenance	3:09:00
June-21	Grid Failure	70:27:00
	Schedule maintenance	0:49:00
July-21	Grid Failure	11:56:00
	Schedule maintenance	4:11:00
August-21	Grid Failure	2:41:00
	Schedule maintenance	1:31:00
September-21	Grid Failure	29:45:00
	Schedule maintenance	22:21:00
October-21	Grid Failure	14:43:00
	Schedule maintenance	6:27:00
November -21	Grid Failure	5:06:00
	Schedule maintenance	0:11:00
December -21	Grid Failure	7:24:00
	Schedule maintenance	2:02:00
January-22	Grid Failure	1:47:00
	Schedule maintenance	1:07:00
February-22	Grid Failure	17:38:00
	Schedule maintenance	9:29:00
March-22	Grid Failure	29:13:00
	Schedule maintenance	3:28:00
April-22	Grid Failure	68:30:00
	Schedule maintenance	8:13:00
May-22	Grid Failure	18:02:00
	Schedule maintenance	6:44:00
June-22	Grid Failure	14:49:00
	Schedule maintenance	10:27:00
July-22	Grid Failure	3:11:00
	Schedule maintenance	1:15:00
August-22	Grid Failure	11:31:00

	Schedule maintenance	4:55:00
September-22	Grid Failure	40:23:00
	Schedule maintenance	2:42:00
October-22	Grid Failure	12:32:00
	Schedule maintenance	20:31:00
November-22	Grid Failure	108:33:00
	Schedule maintenance	2:40:00
December-22	Grid Failure	13:03:00
	Schedule maintenance	7:41:00
Total		704:09:00

APPENDIX 3: SDG CONTRIBUTION

Months	Total Net (MWh)	Emission Reductions(tCO ₂)
	SGD 7	SGD 13
01-January-2021 to 02-January-2021	264.37	247.66
03-January-2021 to 03-February-2021	3,318.82	3,109.07
03-February-2021 to 03-March-2021	3,098.62	2,902.79
03-March-2021 to 03-April-2021	4,859.44	4,552.32
03-April-2021 to 03-May-2021	3,072.26	2,878.10
03-May-2021 to 03-June-2021	5,634.56	5,278.45
03-June-2021 to 03-July-2021	11,239.09	10,528.78
03-July-2021 to 03-August-2021	9,753.40	9,136.99
03-August-2021 to 03-September-2021	10,443.64	9,783.60
03-September-2021 to 03-October-2021	10,105.13	9,466.48
03-October-2021 to 03-November-2021	2,698.43	2,527.89
03-November-2021 to 03-December-2021	3,176.84	2,976.07
03-December-2021 to 03-January-2022	4,101.91	3,842.67
03-January-2022 to 03-February-2022	3,635.92	3,406.13
03-February-2022 to 03-March-2022	4,186.02	3,921.46
03-March-2022 to 01-April-2022	4,375.41	4,098.89
01-April-2022 to 03-May-2022	5,095.27	4,773.25
03-May-2022 to 03-June-2022	11,735.12	10,993.46
03-June-2022 to 03-July-2022	11,549.13	10,819.22
03-July-2022 to 03-August-2022	13,555.80	12,699.07
03-August-2022 to 03-September-2022	10,448.36	9,788.02
03-September-2022 to 03-October-2022	8,852.00	8,292.56
03-October-2022 to 03-November-2022	2,377.45	2,227.19
03-November-2022 to 03-December-2022	2,509.86	2,351.23
03-Decemebr-2022 to 31-December-2022	3,681.15	3,448.50
Total	153,767.99	144,048 (Vintage wise round down value)