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Standard**

RENEWABLE POWER PROJECT BY DEVARAHIPPARIGI WIND POWER PRIVATE LIMITED



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Document Prepared by EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity involves installation of a 100 MW wind power project in Karnataka state of India.

Over the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 195,052 tCO_{2e} per year, thereon displacing 205,860 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

The details of the project and their location of installation are mentioned in the table below:-

Name of Investor	Capacity in MW	COD	Connection with Grid	State	Usage
Devarahippargi Wind Power Private Limited	100 MW	25-March-2017	Indian Grid	Karnataka	Sale to State DISCOM

Total emission reductions achieved in this monitoring period:

During the Current Monitoring Period from 01-August-2018 to 01-October-2019 (First and last date included), the project activity has supplied 352,441 MWh of electricity, and thus contributing to the GHG reductions 333,937 tCO_{2e}.

1.2 Sectoral Scope and Project Type

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 18.1¹

The project is not a grouped project activity.

¹ <http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP>

1.3 Project Proponent

Organization name	Devarahipparigi Wind Power Private Limited
Contact person	Murali Krishnam Raju M
Title	Sr Manager - CDM & GIMS
Address	Sy. No. 552/1B, 552/1A, 551/2A, 551/2B, 552/3, Bijapur to Devarahipparigi Road, Shivanagi Village, Bijapur Taluk, Karnataka, India
Telephone	+91 40 40300100
Email	info@greenkogroup.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Prakash Sahu
Title	Project Manager
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91-9589899649
Email	prakash@enkingint.org

1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e. 25-March-2017. This is the date of commissioning of 100 MW Wind Project activity by Devarahipparigi Wind Power Private Limited.

1.6 Project Crediting Period

Crediting Period Start date : 25-March-2017

Crediting Period End date : 24-March-2027

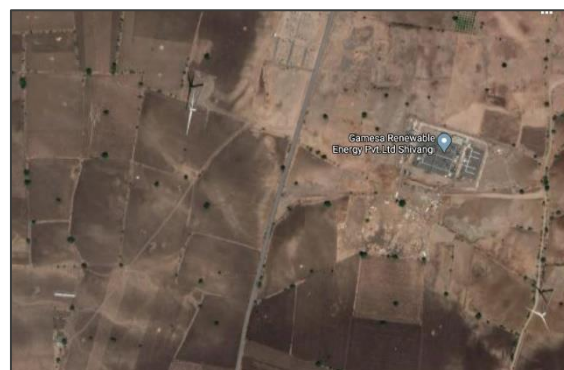
The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Location

The details of the project locations are mentioned in the table below

Name of Investor	Capacity (MW)	Village(s)	Tehsil / Mandal	District	State	Latitude (N)	Longitude (E)
Devarahippargi Wind Power Private Limited	100 MW	Shivanagi, Hadagali & Neginal	Vijayapur	Vijayapur	Karnataka	16° 48' 39.7296"	75° 58' 50.1780"

The project locations have been shown in the map below:



1.8 Title and Reference of Methodology

Title : Grid-connected electricity generation from renewable sources
Reference : The project activity meets the eligibility criteria of large scale project as it is more than 15 MW
Methodology : ACM0002: Grid-connected electricity generation from renewable sources - Version 18.1²
Type I : Energy industries (renewable / non-renewable sources)
Category : Approved Consolidated Methodology (ACM0002)

² <http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP>

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

- Tool to calculate the emission factor for an electricity system³ - Version 07.0 (EB 100, Annex 04)
- Methodological Tool- Tool for the demonstration and assessment of additionality⁴ - Version 07.0.0 (EB 70, Annex 08)

1.9 Participation under other GHG Programs

Not Applicable, as the project activity is not registered with any other program.

The undertaking from PP has been submitted for no any double accounting for current monitoring period and project activity is not participated any other GHG program other than VCS.

1.10 Other Forms of Credit

The project activity is not availing any REC benefits and the same can be confirmed from publically available link of REC generators.

Web-link: https://www.recregistryindia.nic.in/index.php/general/publics/registered_regens PP has also submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration.

1.11 Sustainable Development

Contribution to sustainable development:

Ministry of Environment, Forests and Climate Change, GoI, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

- **Social well-being:** The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.
- **Economic well-being:** 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.

The project activity will generate power using zero emissions wind energy 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.

³ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

⁴ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

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

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the WTGs, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that wind project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same⁵.

Thus there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

2.2 Local Stakeholder Consultation

The project has already been registered under VCS mechanism, hence it is not applicable.

2.1 AFOLU-Specific Safeguards

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

3 IMPLEMENTATION STATUS

⁵ <http://mnre.gov.in/file-manager/UserFiles/report-on-developmental-impacts-of-RE.pdf>

3.1 Implementation Status of the Project Activity

The project activity involves the installation of Wind project. The total installed capacity of the project is 100 MW Wind project located in Karnataka state in India. The project is promoted by Devarahipparigi Wind Power Private Limited.

The Project activity is a new facility (Greenfield) and the electricity generated by the project will be exported to the Indian electricity grid. The project 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 the VCS benefits for the project. The plant was commissioned on 25-March-2017 and it running smoothly with specific schedule maintenance works. In the Pre-project scenario the entire 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.

The technical specification for 100 MW Wind project shall be provided at the time of validation.

WTG Make and Model No.	Gamesa G114 ⁶
Generator Type & Rating	Doubly-Fed Induction generator, 2000 kW
WTG configuration	50 X 2000 kW
Rotor Diameter	114 m
Hub Height	93
Tower Type & Shape	Conical Tubular Steel
Cut-in-wind speed	2.5 m/s
Rated wind speed	10.0 m/s
Cut-out wind speed	25.0 m/s
Survival wind speed	60.0 m/s

3.2 Deviations

2.1.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

2.1.2 Project Description Deviations

No deviation has taken place in project description during the monitoring period.

3.3 Grouped Projects

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

⁶ <https://en.wind-turbine-models.com/turbines/428-gamesa-g114-2.0mw>

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid, OM, y}
Data unit	tCO ₂ e/MWh
Description	Operating margin CO ₂ e emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 13, June 2018 ⁷
Value applied	0.9726
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” as 3-year generation weighted average using data for the years 2014-15, 2015-16 & 2016-17. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 13, published by the Central Electricity Authority, Ministry of Power, 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 e/MWh
Description	Build margin CO ₂ emission factor for the project electricity system in year y
Source of data	Central Electricity Authority (CEA) of India Database Version 07
Value applied	0.8723
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” as per the latest data available for the most recent year 2016-17. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

⁷ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

Data / Parameter	$EF_{grid, CM, y}$
Data unit	tCO ₂ e/MWh
Description	Combined margin CO ₂ e emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 13, June 2018 ⁸
Value applied	0.9475
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid, CM, y} = EF_{grid, OM, y} * W_{OM} + EF_{grid, BM, y} * W_{BM}$ Where: $EF_{grid, BM, y}$ = Build margin CO₂ emission factor in year y (tCO₂e/MWh) $EF_{grid, OM, y}$ = Operating margin CO₂ emission factor in year y (tCO₂e/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM} = 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	$EG_{PJ, y}$
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)
Source of data	Monthly joint meter reading reports
Description of measurement methods and procedures to be applied	The difference of final value of export and import is used for monthly values of net electricity supplied to the grid by the project activity and same value will be considered for ER calculations.
Frequency of monitoring/recording	Continuous measurement & monthly recording
Value monitored	352,441.16
Monitoring equipment	The electricity exported / supplied by the plant to pooling substation and further to substation. This meter also measures electricity imported by the plant from the grid.

⁸ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

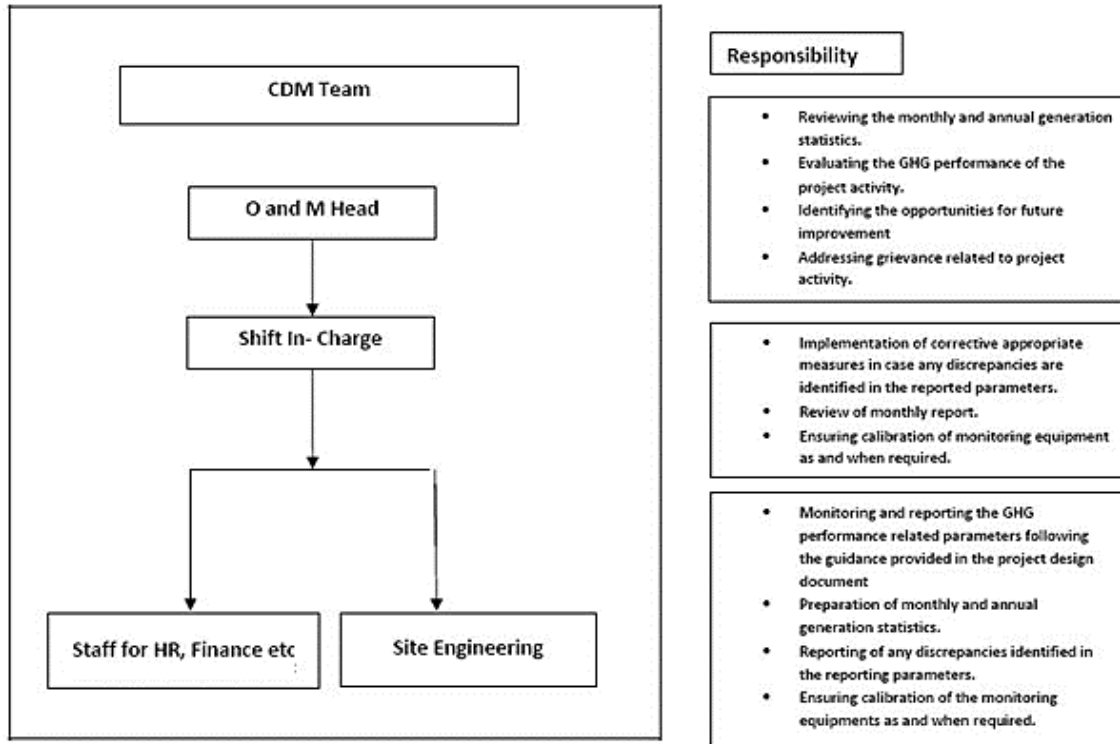
	There are numerous meters used in this project activity and the details including Meter serial number, Make, accuracy class and the calibration dates are mentioned APPENDIX 1: Calibration Records.
QA/QC procedures to be applied	The meters is approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years.⁹ 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	Thus, Net electricity supplied to the grid by the project plant in a given month = Export, kWh – Import, kWh
Comments	Data will be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of VERs for this project activity, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected wind power project being implemented. The monitoring plan, which will be implemented by the project participant describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:

⁹ http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf



Data Measurement

The export and import energy will be measured continuously using above mentioned Main and Check meters located at the substations. Readings of meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices will be raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

Readings from meters will be collected in the presence of the plant in-charge. Export and Import data would be recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. 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.

Emergency preparedness

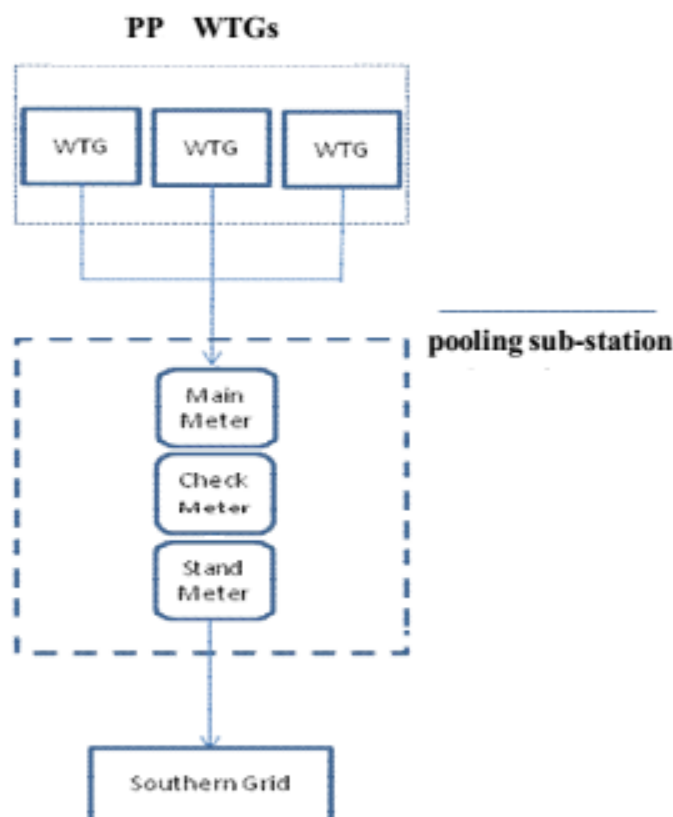
The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff will be trained. The plant helpers will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

Metering Arrangement

Line diagram with metering arrangement for the wind project activity is shown below.



The wind plants have their own dedicated metering arrangement at the substation end. The metering arrangement is under control of state electricity board and may change in future.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 18.1) para 42:

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

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

Where:

BE_y = Baseline emissions in year y (tCO₂e/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” (tCO₂e/MWh)

Grid Emission Factor

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

Parameter	Value
OM	0.9726
BM	0.8723
CM	0.9475

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 is

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y = Emission Reduction in tCO₂e/year

BE_y = Baseline emission in tCO₂e/year

PE_y = Project emissions in tCO₂e/year

LE_y = Leakage Emissions in tCO₂e/year

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

$BE_y = 333,937 \text{ tCO}_2\text{e}$
 $PE_y = 0 \text{ tCO}_2\text{e}$
 $LE_y = 0 \text{ tCO}_2\text{e}$

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-August-2018 to 31-December-2018	115,791	0	0	115,791
01-January-2019 to 01-October-2019	218,146	0	0	218,146
Total	333,937	0	0	333,937

The achieved GHG emission is 46.35 % is higher than the estimated value. This is due to the higher wind flow pattern at the site. However the increased PLF (34.39%) during the monitoring period is crosschecked with the breaching values of IRR (15.10%) and found that the increased IRR is in the breaching limit (14.82%).

APPENDIX 1: CALIBRATION RECORDS

The billing meter used for the project activity:

For Line-01		
Meter Details	Main Meter	Check Meter
Meter Serial No	16196503	16196514
Meter Make	L & T	L & T
Accuracy Class	0.2s	0.2s
Date of Calibration	25-March-2017	25-March-2017
Date of subsequent Calibration	20-Decemeber-2018	20-Decemeber-2018
Date of subsequent Calibration	17-June-2019	17-June-2019
Due date of Calibration	16-June-2024	16-June-2024

For Line-02		
Meter Details	Main Meter	Check Meter
Meter Serial No	16196510	16196508
Meter Make	L & T	L & T
Accuracy Class	0.2s	0.2s
Date of Calibration	25-March-2017	25-March-2017
Date of subsequent Calibration	20-Decemeber-2018	20-Decemeber-2018
Date of subsequent Calibration	17-June-2019	17-June-2019
Due date of Calibration	16-June-2024	16-June-2024

APPENDIX 2: MAJOR BREAKDOWN DETAILS

Date	Breakdown Hours	Remarks
19-May-18	21	Load restriction for Plant balancing due to Power Trafo-1 failure
20-May-18	22	Load restriction for Plant balancing due to Power Trafo-1 failure
21-May-18	20	Load restriction for Plant balancing due to Power Trafo-1 failure
22-May-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
23-May-18	24	Load restriction for Plant balancing due to Power Trafo-1 failure
24-May-18	22	Load restriction for Plant balancing due to Power Trafo-1 failure
25-May-18	24	Load restriction for Plant balancing due to Power Trafo-1 failure
26-May-18	20	Load restriction for Plant balancing due to Power Trafo-1 failure
27-May-18	21	Load restriction for Plant balancing due to Power Trafo-1 failure
28-May-18	20	Load restriction for Plant balancing due to Power Trafo-1 failure
29-May-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
30-May-18	20	Load restriction for Plant balancing due to Power Trafo-1 failure
31-May-18	24	Load restriction for Plant balancing due to Power Trafo-1 failure
01-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
02-Jun-18	22	Load restriction for Plant balancing due to Power Trafo-1 failure
03-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
04-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
05-Jun-18	22	Load restriction for Plant balancing due to Power Trafo-1 failure
06-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
07-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
08-Jun-18	21	Load restriction for Plant balancing due to Power Trafo-1 failure
09-Jun-18	24	Load restriction for Plant balancing due to Power Trafo-1 failure
10-Jun-18	24	Load restriction for Plant balancing due to Power Trafo-1 failure

11-Jun-18	22	Load restriction for Plant balancing due to Power Trafo-1 failure
12-Jun-18	24	Load restriction for Plant balancing due to Power Trafo-1 failure
13-Jun-18	21	Load restriction for Plant balancing due to Power Trafo-1 failure
14-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
15-Jun-18	23	Load restriction for Plant balancing due to Power Trafo-1 failure
16-Jun-18	20	Load restriction for Plant balancing due to Power Trafo-1 failure