

**B.7 Application of a monitoring methodology and description of the monitoring plan:**

As per the provisions of paragraph 14 of Draft simplified modalities and procedures for small scale CDM project activities [FCCC/CP/2002/7/Add.3, English, Page 21] the “*Project participants may use the simplified baseline and monitoring methodologies specified in appendix B for their project category*” if they meet the applicability criteria of small scale CDM project activity.

Since the project activity is a small-scale CDM project of Type I.D. category, the monitoring methodology and plan has been developed in line with the guidance provided in paragraph 9 of category I.D. of Appendix B.

As per the methodology following provision of Para 13, monitoring shall consist of metering of electricity generation.

**Monitoring plan:**

The sole objective of having a monitoring system is to have a constant watch on the emission reductions.

Metering of net electricity supplied to grid performed at 66 kV Sub – Station, its aggregation and recording activity is done by GUVNL & its subsidiary companies / GEDA supported by OEM, its calculation activity is done by GEDA and its reporting is done by <sup>1</sup>GEDA / SLDC.

Metering equipment have Electronic Tri Vector Meters (TVM) / <sup>2</sup>Availability Based Tariff Meter (ABT meter). The metering equipment (TVM / ABT) maintained by GUVNL & its subsidiary companies. The monthly meter readings at the project sites and the receiving station recorded from TVM/ABT Meter.

At the conclusion of each meter reading, an appointed representative of GUVNL & its subsidiary companies / GEDA submit it to SLDC – Gujarat and GEDA/SLDC issues certificate for share of electricity generated by wind farm on periodic monthly basis.

Each meter shall be jointly tested & calibrated and sealed on behalf of GUVNL & its subsidiary companies / GEDA by its authorised representatives.

<sup>1</sup> Reporting authority has changed from GEDA to SLDC. Thus, SLDC is now the reporting authority from April 2010 onwards. Prior to that GEDA was the reporting authority.

<sup>2</sup> Availability Based Tariff Meter (ABT meter) came into use from April 2010 onwards. Prior to that Tri Vector Meters (TVM) was in use.

**Measurement/ Recording Procedure:**

- a) The project activity have 2 steps metering at 33 kV S/S & 66 kV S/S.
- b) Step -1: OEM facilitates recording of the electricity generated at 33 kV S/S by TVM/ABT meter.
- c) Step -2: The WTGs of a single customer (Alembic Ltd in this case) at a particular site are connected to 33kV S/S , which in-turn connected with 33/66 kV S/S , have TVM/ABT meter. The metering equipment (TVM / ABT) maintained by GUVNL & its subsidiary companies. Data monitoring takes place at the 33 kV meter of 33 kV S/S & 66 kV S/S meter of 33/66 kV S/S.
- d) The electricity metered at the 66 kV meter is proportionally divided among the customers. The emission reduction calculations are done on the basis of the 66kV meter reading (Net electricity substituted in the grid during the periodic year y) as mentioned in the share certificate issued by GEDA / SLDC on monthly basis.. WTGs of various project promoters at the site, are connected with TVM/ ABT energy meter at the pooling sub-station installed by GUVNL & its subsidiary companies at 33/66 kV S/S .Meter reading at 66 kV meter is recorded by GUVNL & its subsidiary companies / GEDA, submit it to SLDC – Gujarat and GEDA/SLDC issues certificate for share of electricity generated by wind farm on periodic monthly basis.

Project Participant has no role in the entire procedure of Measurement / Recording

The allocation of electricity is executed as per the following procedure:

1. Enter the value of electricity received from W/M at 33 KV S/S (kWh).
2. Enter the value of electricity supplied to W/M at 33 KV S/S (kWh).
3. Take the difference of electricity received and supplied to W/F at 33 KV S/S (kWh) [  $EG_{\text{meter A}}$  ]
4. Take the difference of electricity as per the above steps 1 to 3 for each of the 33 kV S/S meters (i) connected to the 66 kV S/S metering point of Alembic Limited. [  $EG_{\text{meter},i}$  ] and take the total of these differences [  $EG_{\text{meter A}} + \sum EG_{\text{meter},i}$  ]
5. Divide individual difference by total calculated as per step 4 and multiply by 100 to find %.  
[  $EG_{\text{meter A}} / (EG_{\text{meter A}} + \sum EG_{\text{meter},i}) \times 100$  ]
6. Enter the value of electricity received from W/M at 66 KV S/S (kWh).
7. Enter the value of electricity supplied to W/M at 66 KV S/S (kWh).
8. Take the difference of electricity received and supply to W/F at 66 KV S/S (kWh) [  $EG_{\text{meter},T}$  ]
9. Multiply the value calculated as per step 8 by % allocation calculated as per step 5 to calculate the net electricity export allocated to Alembic Limited.

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**B.7.1 Data and parameters monitored:**

<b>Data / Parameter:</b>	EG <sub>meter A<sub>s</sub></sub>
<b>Data unit:</b>	kWh
<b>Description:</b>	Net Electricity Supplied by WTG of Alembic Limited (33 kV S/S to 66 kV S/S point).
<b>Source of data to be used:</b>	Electricity Bifurcation reading issued by OEM on periodic monthly basis for “CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARMS”
<b>Value of data</b>	
<b>Description of measurement methods and procedures to be applied:</b>	<p><u>Monitoring Equipment:</u> TVM / ABT meter will be used for monitoring</p> <p><u>Data Type:</u> Measured &amp; Calculated.</p> <p><u>Monitoring Frequency:</u> Continuous</p> <p><u>Recording:</u> Periodic Monthly</p> <p><u>Archiving Policy:</u> Paper &amp; Electronic</p> <p><u>Responsibility:</u> Manager (OEM) would be responsible to undertake regular calibration of the meter by GUVNL and its subsidiary.</p> <p><u>Calibration Frequency:</u> Once a Year <sup>3</sup> OR Once in a Three Years<sup>4</sup></p>
<b>QA/QC procedures to be applied:</b>	In case, 33 kV Meter fails or malfunction, it will be sent for repair / replacement by OEM. (a) In this case readings of Controller, installed on each WTG (All WTG connected with 33 kV & finally to 66 kV Meter) will be considered for calculation of electricity exported by project activity to grid. Calculation will be performed on the highest percentage loss considering the reading of “Generation at Controller” & 33 kV Meter reading from the historical verified values from previous verification (From start of crediting period to most recent JMR available at the start of verification). Furthermore the highest transmission losses between 33 kV and 66 kV S/S point will be considered from 33 kV and 66 kV meter value (From start of crediting period to most recent JMR available at the start of verification). (b) For the electricity import, following method is applicable.

<sup>3</sup> FOR TVM METER :<sup>4</sup> FOR ABT METER IF IT INSTALLED IN FUTURE

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	<p>The 66 kV meter provides the electricity imported by the WTGs connected to the sub-station meter. Highest historical % allocation (From start of crediting period to most recent JMR available at the start of verification) will be considered while calculating electricity imported by the project activity from grid. (c) The net electricity exported to the grid will be difference of (a) and (b). It is also possible that GUVNL &amp; its subsidiary companies may come up with their approach. Conservative value which will lead to conservative emission reduction will be selected by the PP in that case. (For more clarity refer Fig A under Section B.7.1)</p>
Any comment:	<p>Data archived: Data will be archived for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later</p> <p>Calibration of Controller at WTG: MITA Controller WP 3000 is a micro-processor based intelligent controller which has been specially designed to control the wind turbines ,where control functions , data collection &amp; storage , real time grid monitoring, storage &amp; such other functions are integrated. In order to measure Electrical Energy &amp; Grid Parameters, the controller uses an interface card WP 3090. The controller has three current inputs from CT and three voltage inputs from PT. The analog values of current/voltage are converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous values of parameters such as voltage, current, frequency, power factor, kVA, kVAr and kW.</p> <p>These instantaneous values are then time integrated to display kVAh, kVArh,kWh &amp; stored .</p> <p>WP 3000 being main controller for controlling entire turbine operation &amp; is calculating energy generation with the basic signal of CT &amp; PT connected to through I/O hence , not possible to calibrate.</p>
<b>Data / Parameter:</b>	$EG_{\text{meter},i}$ ( $i = 1,2,\dots,n$ )
Data unit:	kWh
Description:	Net electricity supplied WTG of PP other than Alembic Limited ( 33 kV S/S to 66 kV S/S point ). WTG i.

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Source of data to be used:	Electricity Bifurcation reading issued by OEM on periodic monthly basis for “CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARMS”
Value of data	
Description of measurement methods and procedures to be applied:	<p><u>Monitoring Equipment:</u> TVM/ABT meter will be used for monitoring.</p> <p><u>Data Type:</u> Measured &amp; Calculated</p> <p><u>Monitoring Frequency:</u> Continuous</p> <p><u>Recording:</u> Periodic Monthly</p> <p><u>Archiving Policy:</u> Paper &amp; Electronic</p> <p><u>Responsibility:</u> Manager (OEM) would be responsible to undertake regular calibration of the meter by GUVNL and its subsidiary.</p> <p>Alembic cannot control on calibration of meters of PP other than their own Meter.</p> <p><u>Calibration Frequency:</u> Once a year<sup>5</sup> OR Once in a Three Years<sup>6</sup></p>
QA/QC procedures to be applied:	In case, 33 kV Meter fails or malfunction, it will be sent for repair / replacement by OEM.
Any comment:	Data archived: Data will be archived for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later

<b>Data / Parameter:</b>	EG <sub>meter T</sub>
Data unit:	MWh
Description:	Net electricity supplied at 66 kV Meter.
Source of data to be used:	CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARMS ISSUED BY GEDA/SLDC/ GUVNL & its subsidiary companies, which ever applicable.
Value of data	
Description of measurement methods and procedures to be applied:	<p><u>Monitoring Equipment:</u> TVM/ABT will be used for monitoring.</p> <p><u>Data Type:</u> Measured &amp; Calculated</p> <p><u>Monitoring Frequency:</u> Continuous</p> <p><u>Recording:</u> Monthly from CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARMS</p> <p><u>Archiving Policy:</u> Paper &amp; Electronic</p> <p><u>Responsibility:</u> Manager (OEM) would be</p>

<sup>5</sup> FOR TVM METER :<sup>6</sup> FOR ABT METER IF IT INSTALLED IN FUTURE

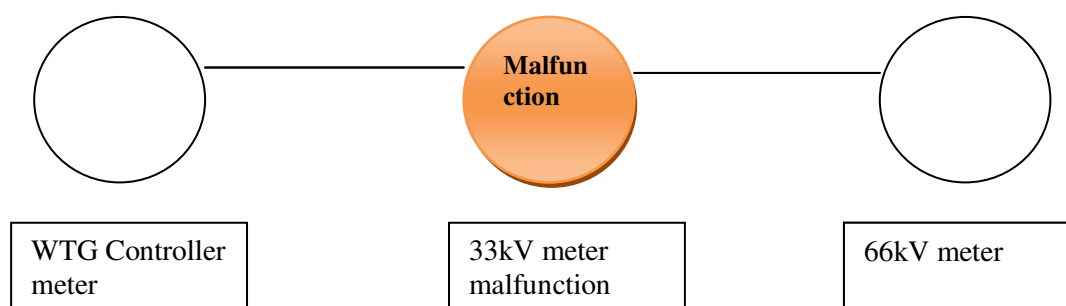
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	responsible to undertake regular calibration of the meter by GUVNL and its subsidiary. <u>Calibration Frequency:</u> Once a Year <sup>7</sup> OR Once in a Three Years <sup>8</sup>
QA/QC procedures to be applied:	(a) In case, 66 kV Meter fails or malfunction, it will be sent for repair / replacement by GUVNL & its subsidiary. In this case readings of 33 kV meter installed at 33kV S/S of each PP (All WTG connected with 33 kV & finally to 66 kV Meter ) will be considered for calculation. Calculation will be performed on the highest percentage loss considering the reading of transmission loss from 33 kV meter to 66 kV Meter reading from the historical verified values from previous verification (From start of crediting period to most recent JMR available at the start of verification). (b) The 33 kV meter will provide the electricity imported by the WTG's connected to the sub-station meter. Imported electricity will be calculated for 66 kV level with the application of highest historic transmission loss to arrive at electricity imported by WTG from grid at 66 kV level. (c) The net electricity exported to grid will be difference of (a) and (b). It is also possible that GUVNL & its subsidiary companies may come up with their approach. Conservative value which will lead to conservative emission reduction will be selected by the PP in that case. (For more clarity refer Fig A under Section B.7.1)
Any comment:	Data archived: Data will be archived for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later

<b>Data / Parameter:</b>	EG <sub>y</sub>
Data unit:	MWh
Description:	Net electricity substituted in the grid during the periodic year y
Source of data to be used:	CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARMS ISSUED BY GEDA/SLDC/ GUVNL & its subsidiary companies, which ever applicable
Value of data	
Description of	Monitoring: Calculated

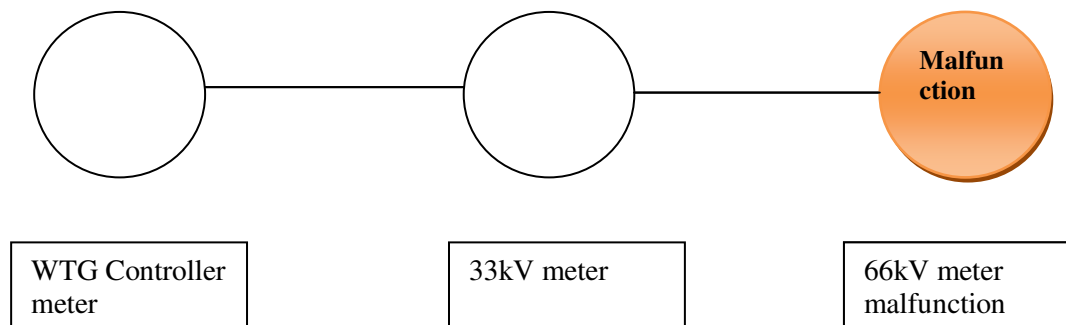
<sup>7</sup> FOR TVM METER<sup>8</sup> FOR ABT METER

measurement methods and procedures to be applied:	<u>Data Type:</u> Calculated <u>Frequency:</u> Periodic Monthly Recording: Periodic Monthly from CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARMS ISSUED BY GEDA/SLDC/ GUVNL & its subsidiary companies, which ever applicable <u>Archiving Policy:</u> Paper & Electronic
QA/QC procedures to be applied:	The net electricity supplied to the grid can be cross verified with the monthly bill issued by GUVNL & its subsidiary companies to Alembic Limited.
Any comment:	Data archived: Data will be archived for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later. In case of malfunction of both 33kV & 66 kV meter PP will not claim emission reduction for period of malfunction.

**Figure A:****i) Failure of 33kV meter of Alembic Ltd and normal operation of 66kV meter.**

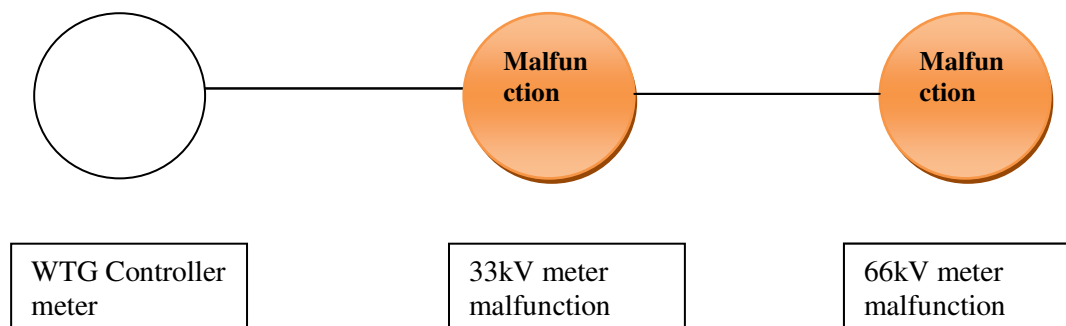
In case of 33 kV meter failure:

1. The export at 33 kV meter will be calculated based on export on controller reading and highest percent transmission loss between controller and 33 kV meter based on conservative value from start of crediting period till most recent JMR available at the start of verification
2. The export at 66 kV meter will be calculated based on export value at 33 kV calculated from previous step and highest transmission loss % between 33 kV meter and 66 kV meter based on conservative value from start of crediting period till most recent JMR available at the start of verification
3. The import for project activity at 66 kV will be calculated based on the highest percentage allocation based on conservative value from start of crediting period till most recent JMR available at the start of verification.
4. The net export at 66 kV meter would be difference of (2) – (3).

**ii) Failure of 66kV meter and normal operation of 33kV meter of Alembic Ltd.**

In case of 66 kV meter failure:

1. The export at 66 kV meter will be calculated based on export at 33 kV and highest transmission loss % between 33 kV and 66 kV substation based on conservative value from start of crediting period till most recent JMR available at the start of verification
2. The import at 66 kV meter will be calculated (electricity import reading at 33 kV/(1 – highest historic transmission loss between 33 kV and 66 kV substation).
3. The net export at 66 kV meter would be difference of (1) – (2).

**iii) Failure of 66kV meter and failure of 33kV meter of Alembic Ltd**

- In this case PP will not claim emission reduction for period of malfunction.

<b>B.7.2 Description of the monitoring plan:</b>
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**Roles and responsibilities:**

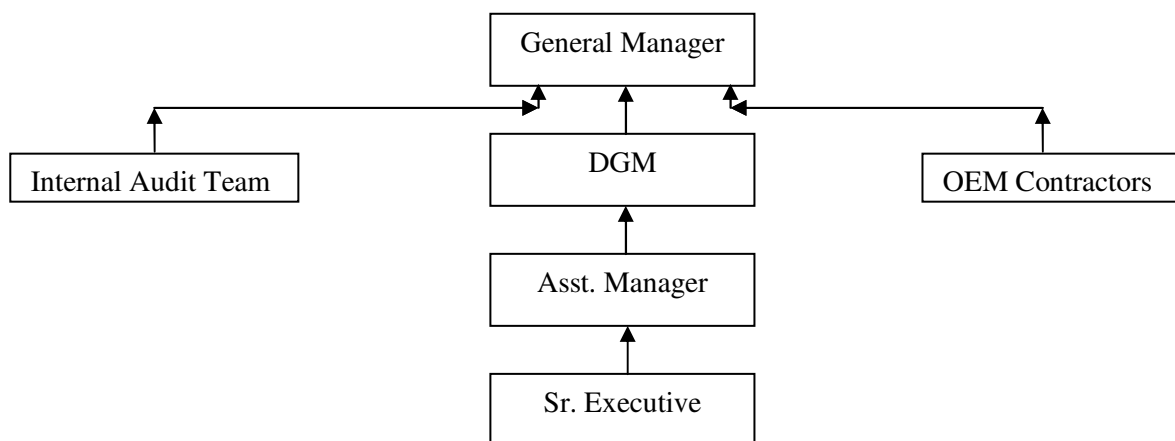
**General Manager:** In the project management structure General Manager is responsible for the project management. He is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organizing third party contractors, revenue collection etc.



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General Manager will check the monthly electricity generated and annual emission reduction calculations. He is responsible for any leakage of emissions in the project boundary.

Operation and maintenance of wind generators will be done by OEM and they will be responsible to inform General Manager.



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**Deputy General Manager:** DGM is assisting to General Manager for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He will crosscheck the log book regularly and report to General Manager for any abnormality.

**Sr. Executive/Ass Manager:** Sr. Executive/asst. manger is responsible for recording the electricity meter reading.

**Record Handling:** OEM contractors are collecting daily report obtained from hourly monitoring with all the related parameters. All the records are given to General Manager every month. The GM has final responsibility for record keeping.

#### Internal Audits and performance review

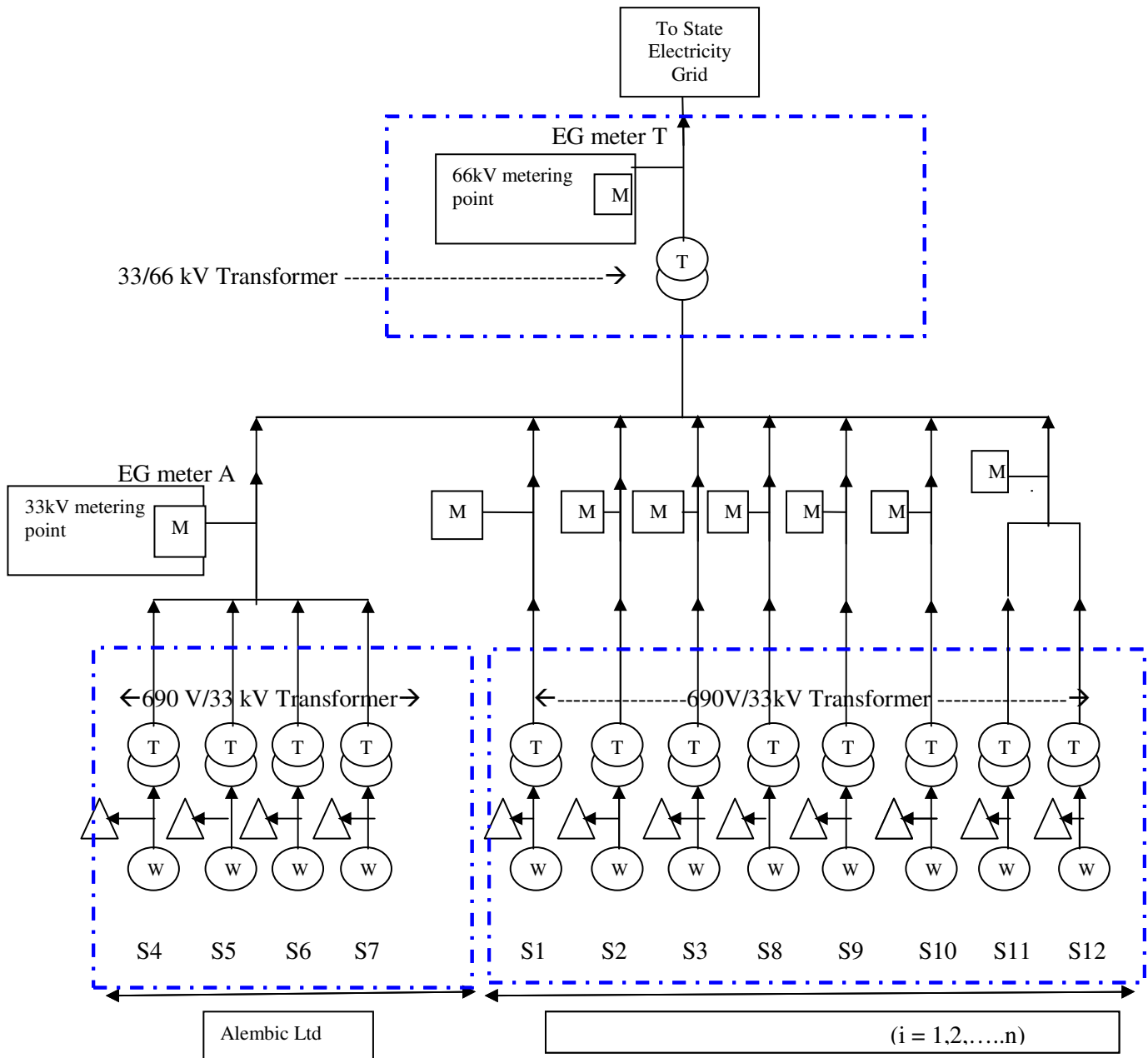
These records are regularly audited and checked by the senior officials from Alembic Limited during their visits to the site. The Alembic Ltd Representative visit once in a year and audit the records. The Alembic Ltd Representative will crosscheck the emissions reductions claimed in PDD with respect to actual emissions reduction. All corrective actions will be recorded in the log book.

For any deviation from the actual emission reduction values and reported values corrective action will be suggested by senior official to calculate the conservative emission reduction. All corrective actions will be recorded in the logbook.

**Monitoring and Calibration**

As emission reductions from the project are determined by the number of units supplied to the grid, it is mandatory to have a monitoring system in place and ensure that the project activity produces and exports the rated power at the stipulated norms. The sole objective of having monitoring system is to have a constant watch on the emission reductions.

Necessary records of calibration are undertaken by GEDA/SLDC/ GUVNL & its subsidiary companies. Project Participant has no role in the entire procedure.

**Figure II - (Line Diagram):**

The number of non-CDM project activity WTG connected to 66 kV meter are 8. The list of these WTG along with name and capacity are provided in table below:

Sr No	Other WTG Details	Installed Capacity (MW)
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1	<i>Alembic Ltd, Vadodara- (S4,S5,S6,S7)</i>	5
2	<i>Samay Electronics Pvt Ltd, Morbi</i>	1.25
3	<i>Umedica Laboratories Ltd, Mumbai</i>	0.7
4	<i>Real Strips Ltd, Ahmedabad</i>	1.25
5	<i>Raajratna metal Ind, Ahmedabad</i>	1.25
6	<i>Intas Pharmaceuticals Ltd, Ahmedabad</i>	1.25
7	<i>Jaybharat Dying &amp; printing Pvt. Ltd, Suart</i>	1.25
8	<i>Ratnamani Metal &amp; Tubes Ltd.,Ahmedabad</i>	1.25
	<i>Total</i>	13.2

PP would like to mention that the number of non-CDM project activity WTG connected to 66 kV meter is not in control of project participant. This authority only lies with GUVNL and its subsidiary companies and the combination could be change. The name of the WTG owners can also change in event of sale of WTG by existing customers. Such changes will directly be reported in monitoring report during periodic monitoring.

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### **Definitions & Interpretations**

#### **1. ABT meter - Availability Based Tariff Meter**

Energy recorded in (ABT) meter is in every 15 minutes basis. Data storage capacity varies from manufacturer to manufacturer.

#### **2. TVM - Tri Vector Meter**

Energy recorded in (TVM) meter is in half hourly basis. Data storage capacity of TVM meter is 35 days.

#### **3. GUVNL - Gujarat Urja Vikas Nigam Limited**

The GUVNL is engaged in the business of bulk purchase and sale of electricity, Supervision, Co-ordination and facilitation of the activities of its six Subsidiary Companies.

GUVNL & its subsidiary companies are as follows:

- i) Gujarat State Electricity Corporation Ltd
- ii) Gujarat Energy Transmission Corporation Ltd.
- iii) Madhya Gujarat Vij Company Ltd
- iv) Uttar Gujarat Vij Company Ltd
- v) Paschim Gujarat Vij Company Ltd.
- vi) Dakshin Gujarat Vij Company Ltd.

#### **4. GEDA - Gujarat Energy Development Agency**

**5. SLDC Gujarat - State Load Dispatch Centre, Gujarat:** SLDC issues certificate for share of electricity generated by wind farm on periodic monthly basis.

#### **6. S/S - Sub Station**

**7. OEM - Original Equipment Manufacturer –** M/s Suzlon Energy Ltd, & M/s Suzlon Infra Structures Service Ltd

#### **8. Energy Meter monitoring responsibility:**

- i) 33kV metering point: OEM
- ii) 66 kV metering point: GUVNL & its subsidiary companies/ GEDA.

#### **9. 33/66kV switch yard (S/S)**

This is the single switch yard where 33kV common supply (generated from all WTGs) is step-up to 66kV voltage level & connected with state grid.

**10. Electricity Supplied -** It means the kWh/MWh supplied to the system, which is difference of export and import.

**11. Periodic Monthly -** Cut off date for initial and final value of energy meter reading, decided by GUVNL & its subsidiary companies/GEDA/SLDC.

**12. Periodic Year -** Duration of each monitoring period.

**13. Net -** It is the difference between export and import.

**14. Export -** Electricity supplied to the system

**15. Import -** Electricity taken from the system

**16. kWh -** Kilo Watt Hour

**17. MWh -** Mega Watt Hour

**18. V -** Volt

**19. kV -** Kilo Volt

**20. CT -** Current Transformer

**21. PT -** Potential Transformer

**Annex 4****MONITORING INFORMATION**

<b>Sr.no.</b>	<b>Data description</b>	<b>Recording instruments details</b>	<b>Location of instrument</b>	<b>Calibration Frequency</b>	<b>Accuracy Class</b>
<b>1.</b>	Net Electricity Supplied by WTG of Alembic Limited (33 kV S/S to 66 kV S/S point).- (EG <sub>meter A,</sub> )	Monitoring equipment have Electronic Tri Vector Meters (TVM ). Manager ( OEM) would be responsible to undertake regular calibration of meter by GUVNL and its subsidiary companies. The monthly meter readings are recorded from TVM meter and in future ABT (Availability Based Tariff Meter) may be installed to record the readings .	<b>At 33 kV line for Alembic Limited WTG 4,5,6 &amp; 7</b>	Calibration Details Once a Year <sup>9</sup> OR Once in a Three Years <sup>10</sup>	<b>0.5s (TVM meters) &amp; 0.2s (ABT meters)</b>
<b>2.</b>	Net electricity supplied WTG of PP other than Alembic Limited ( 33 kV	Monitoring equipment have Electronic Tri Vector Meters (TVM) . Manager (	<b>At 33 kV line for PP other than Alembic Limited</b>	Calibration Details <sup>11</sup> : Once a Year <sup>12</sup> OR Once in	<b>0.5s (TVM meters) &amp; 0.2s (ABT meters)</b>

<sup>9</sup> FOR TVM METER :<sup>10</sup> FOR ABT METER IF IT INSTALLED IN FUTURE<sup>11</sup> Alembic Limited cannot control on calibration of meters of PP other than their own Meter.

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	S/S to 66 kV S/S point ). WTG i. $EG_{meter,i}$ ( $i = 1, 2, \dots, n$ )	OEM) would be responsible to undertake regular calibration of meter by GUVNL and its subsidiary companies. The monthly meter readings are recorded from TVM meter and in future ABT (Availability Based Tariff Meter) may be installed to record the readings		a Three Years <sup>13</sup>	
<b>3.</b>	Net electricity supplied at 66 kV Meter. ( $EG_{meter,T}$ )	Monitoring equipment have Electronic Tri Vector Meters (TVM) / <sup>14</sup> Availability Based Tariff Meter (ABT meter). The metering equipment (TVM / ABT) maintained by GUVNL & its subsidiary companies. The monthly meter readings at 66 kV S/S recorded from TVM/ABT Meter to derive of net electricity supplied to grid at 66 kV Sub – Station . Its aggregation and recording activity is done by	<b>Control Room of 66 kV Sub Station</b>	Calibration Details:  Once a Year (For TVM meters) OR Once in a Three Years (For ABT meters)	<b>0.5s (TVM meters) &amp; 0.2s (ABT meters)</b>

<sup>12</sup> FOR TVM METER :<sup>13</sup> FOR ABT METER IF IT INSTALLED IN FUTURE<sup>14</sup> Availability Based Tariff Meter (ABT meter) came into use from April 2010 onwards. Prior to that Tri Vector Meters (TVM) was in use.

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		GUVNL & its subsidiary companies / GEDA with support of OEM & issuance of CERTIFICATE FOR SHARE OF ELECTRICITY GENERATED BY WIND FARM performed by <sup>15</sup> GEDA / SLDC .			
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<sup>15</sup> Reporting authority has changed from GEDA to SLDC .Thus, SLDC is now the reporting authority from April 2010 onwards. Prior to that GEDA was the reporting authority.