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Monitoring report



June 2017, version 1

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Title of the project	49.5 MW Sachal Wind Power Project, Jhampir
Gold Standard project id	GS3511
Version number of the monitoring report	3.1
Completion date of the monitoring report	25/03/2020
Date of project design certification	11/08/2016
Start date of crediting period	11/04/2017
Duration of this monitoring period	11/04/2017 to 28/02/2019
Duration of previous monitoring period	NA
Project representative(s)	Sachal Energy Development (Pvt) Ltd
Host Country	Islamic Republic of Pakistan
Certification pathway (activity certification/impact certification)	Activity certification
SDG Contributions targeted (as per approved PDD)	SDG7 SDG8 SDG13
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GS CER
Selected methodology(ies)	ACM0002 Grid-connected electricity generation from renewable sources (version 16)
Estimated amount of annual average certified SDG impact (as per approved PDD)	SDG 7: The project supplies an average annual generation of 136,500 MWh to the power grid; SDG 8: The project provides around 20 jobs opportunities during the implementation of the project; SDG 13: The project is expected to reduce 84,804tCO ₂ e emissions annually.
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	SDG 7: The project supplies total generation of 243,085 MWh to the power grid in this monitoring period; SDG 8: The project provides 20 jobs opportunities in this monitoring period; SDG 13: The project achieved 151,029tCO ₂ e emissions reductions in this monitoring period.

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SECTION A. Description of project

A.1. Purpose and general description of project

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The purpose of the 49.5 MW Sachal Wind Power Project, Jhampir (hereinafter the "project activity" or the "project" or the "wind farm") is to utilize wind resources for electricity generation through the construction of a wind farm with a total capacity of 49.5 MW and to deliver the electricity generated from the project to National Transmission & Despatch Company Limited (NTDC) through its central power purchasing agency on behalf of Water and Power Development Authority (WAPDA) distribution companies. By replacing the electricity supplied by the WAPDA grid, which is heavily dominated by fossil fuel fired power plants, with electricity generated from wind power the proposed project activity will achieve obvious greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions.

The project owner is Sachal Energy Development (Pvt) Ltd. The project activity involves the installation and operation of 33 wind turbines with unit capacity of 1,500kW, which will supply an average annual generation of 136,500 MWh to the WAPDA grid. The total installed capacity is 49.5 MW.

The EPC (Engineering, Procurement, Construction) contract of the project was signed on 28/04/2012. The construction of the project started on 11/12/2015. The project was in full commercial operation on 11/04/2017. Since then, the operation of the project has been continued in accordance with the project design as well as the description in the registered PDD. The CDM registration date was 22/04/2016. The start date of crediting period has been changed to be 11/04/2017 (formerly 01/01/2017)¹. Therefore, the crediting period is 11/04/2017 – 10/04/2027 (Fixed).

The total emission reductions achieved in this monitoring period are 151,029 tCO₂e. No RECs have been issued during this monitoring period.

A.2. Location of project

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The project is located in Pakistan, Sindh Province, Thatta District, spanned by the following coordinates:

	Longitude	Latitude
1.	67° 52' 43.91" E	25° 09' 18.50" N
2.	67° 59' 20.83" E	25° 07' 24.26" N
3.	67° 59' 16.60" E	25° 07' 17.47" N
4.	67° 52' 34.62" E	25° 09' 13.17" N

A.3. Reference of applied methodology

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¹ <http://cdm.unfccc.int/Projects/DB/RWTUV1433919517.8/view>

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ACM0002 - Grid-connected electricity generation from renewable sources (Version 16.0, EB 81 Annex 9)

A.4. Crediting period of project

11/04/2017 – 10/04/2027 (10-yr Fixed)

SECTION B. Implementation of project

B.1. Description of implemented project

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During the project implementation, 33 Goldwind 1.5 MW wind turbine generators (WTG) have been installed. The project has a total installed capacity of 49.5 MW and generates an annual estimated amount of electricity of 136,500 MWh at a plant load factor of 31.48%. Please see the technical parameters of the wind turbines as follows:

Table 1: Main technical parameters of the wind turbines

Parameter	Value
Type	GW 77/1500
No. of units	33
No. of blades	3
Rated power [kW]	1,500
Rotor diameter [m]	77
Cut-in wind speed [m/s]	3
Cut-out wind speed [m/s]	22
Nominal wind speed [m/s]	11
Hub height [m]	85
Manufacturer	Goldwind Science and Technology Co. LTD, China
Lifetime [yrs]	20

The EPC (Engineering, Procurement, Construction) contract of the project was signed on 28/04/2012. The construction of the project started on 11/12/2015. The project was in full commercial operation on 11/04/2017. Since then, the operation of the project has been continued in accordance with the project design as well as the description in the registered PDD.

The normal implementation of the project has been maintained and no events or situations which may impact the applicability of the methodology has been observed during this monitoring period.

B.2. Post-registration changes

B.2.1. Temporary deviations from Certified Key Project Information, Project Design Document, Monitoring & Reporting Plan, applied methodology or applied standardized baseline

No temporary deviations from registered monitoring plan or applied methodology have been applied during this monitoring period.

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B.2.2. Corrections

No corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report.

B.2.3. Changes to start date of crediting period

The start date of crediting period has been changed to be 11/04/2017 (formerly 01/01/2017), see the link: <http://cdm.unfccc.int/Projects/DB/RWTUV1433919517.8/view>

B.2.4. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

N/A. The Project is implemented as the registered PDD and no permanent changes.

B.2.5. Changes to project design of approved project

N/A. The Project is implemented as the registered PDD and no changes.

SECTION C. Description of monitoring system applied by the project

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The monitoring system is designed in accordance with the requirements of methodology ACM0002, Grid-connected electricity generation from renewable sources (Version 16.0, EB 81 Annex 9).

1. Monitoring objects

The main monitoring objects are the net electricity supplied to the grid $EG_{\text{facility},y}$ (i.e. electricity delivered to the grid $EG_{\text{export},y}$ and the electricity imported from the grid $EG_{\text{import},y}$). It is relevant to SDG 7 (Affordable and Clean Energy) monitoring;

The emission reductions achieved during this monitoring period are calculated based on the monitored parameter $EG_{\text{facility},y}$. It is relevant to the SDG 13 (Climate Action) monitoring.

2. Management structure

A CDM department set up by the project owner has appointed personnel to carry out the monitoring plan. The personnel structure is as follows:

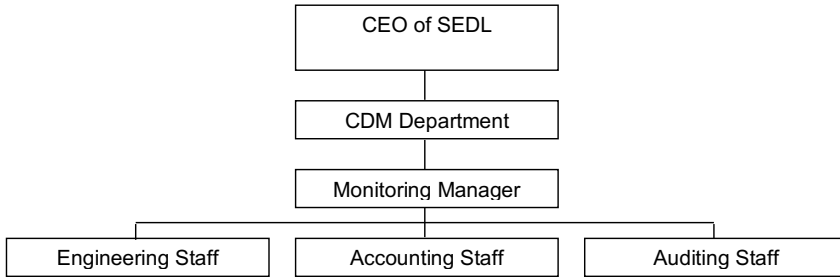


Figure 4: Monitoring organogram

A monitoring manager will be appointed to supervise the implementation of the monitoring plan, while further staff, including engineering staff, accounting staff and (internal) auditing staff, will be appointed to carry out the monitoring plan.

- The engineering staff is responsible for data collection (such as meter readings), daily maintenance of equipment (if required) and the emission reduction calculation.
- The accounting staff is responsible for the process of power transactions with the power grid company and power sale receipts keeping.
- The auditing staff is responsible for reviewing the data and receipt collected, ensuring the veracity and transparency of them.

3. Monitoring equipment and installation

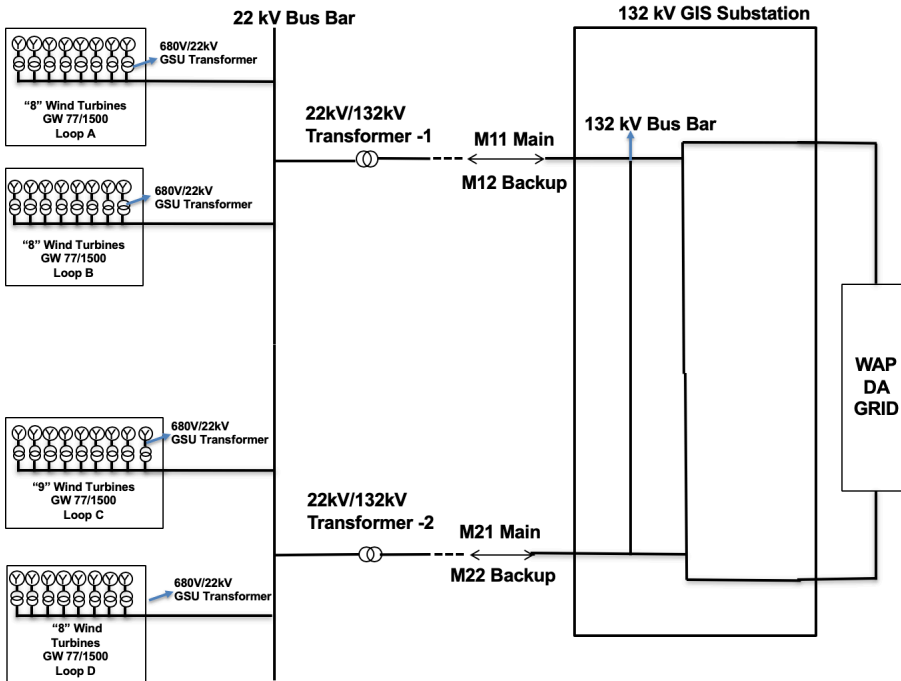
Four electricity meters are adopted in the monitoring system of the project. The meters have been installed at the interconnection point to the grid for monitoring the electricity delivered to the grid.

Two bidirectional electricity meters with the accuracy of 0.2s (M11 and M21) are installed as the main meters at the output side of the 132 kV substation to monitor the electricity exported to the grid ($EG_{export,y}$) and imported from the grid ($EG_{import,y}$) by the project activity. Another two bidirectional electricity meters of the same accuracy of 0.2s (M12 as backup meter for M11; M22 as backup meter for M21) are also installed as the backup meters of the main meters of M11 and M21 at the 132 kV substation.

The emission reductions are calculated based on records of the main meters, and can be cross-checked with electricity sales & purchase receipts.

The monitoring system is illustrated as follows:

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Net electricity generation supplied by the project to the grid during the year y ($EG_{\text{facility},y}$) equals to the difference between electricity exported to the grid ($EG_{\text{export},y}$) and electricity imported from the grid ($EG_{\text{import},y}$) by the project in year y .

Testing and calibration of all the energy meters M11, M12, M21 and M22 have been carried out by the grid as per the specification the energy purchase agreement (EPA). SEDL is not authorized to do anything with energy meters.

4. Data recording, collection and reporting

The monitoring staffs are responsible for the measurement of electricity by reading the meters on-site according to the Energy Purchase Agreement (EPA). Every month, the monitored data has been archived electronically, at the same time the paper document has been archived. The project owner keeps the receipts of power sales/purchase. The monitoring plan has been carried out mainly by the CDM department and conducted by the appointed personnel. All key documents have been kept collectively.

The monitored data will be kept during the whole crediting period and 2 years after the end of the crediting period or until the last issuance of CERs, whichever occurs later.

5. Emergency procedures for monitoring system

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Electricity measured by the main meter alone should suffice for the purpose of billing and emissions reduction verification as long as the error in the main meter is within the permissible limits. However, should either the project owner or the grid company find the function of the main meter abnormal or broken-down, the other party and the authorized meter inspection institution need to be informed immediately to address the issues and make the meter function normally again as soon as possible. In addition, should any previous monthly readings of the main meter be inaccurate by more than the allowable error, or be functioned improperly, the electricity generated by the project shall be determined by:

- a) First, by reading the backup main meter, unless a test by either party reveals it is inaccurate;
- b) If the backup also meter fails to function normally, the project owner and the grid company shall jointly estimate the correct reading in a conservative manner.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Relevant SDG Indicator	SDG 13 – Climate Action
Data/parameter:	$EF_{grid,OM,y}$
Unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor for grid connected power generation in year y
Source of data	"Tool to calculate the emission factor for an electricity system", Pakistan Energy Yearbook 2011 -2013
Value(s) applied)	0.7393
Choice of data or measurement methods and procedures	Calculated ex ante as per "Tool to calculate the emission factor for an electricity system, ver. 04.0" as 3-year generation-weighted average of latest three years, 2011,2012, 2013, data obtained from Pakistan Energy Yearbook published by Ministry of Petroleum & Natural Resources, Hydrocarbon Development Institute of Pakistan.
Purpose of data	Baseline emission calculation
Additional comments	

Relevant SDG Indicator	SDG 13 – Climate Action
Data/Parameter	$EF_{grid,BM,y}$
Unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for grid connected power generation in year y
Source of data	"Tool to calculate the emission factor for an electricity system", Pakistan Energy Yearbook 2011 -2013
Value(s) applied	0.2673

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Choice of data or measurement methods and procedures	Calculated ex ante as per "Tool to calculate the emission factor for an electricity system, ver. 04.0" based on the most recent year 2013 data available from Pakistan Energy Yearbook published by Ministry of Petroleum & Natural Resources, Hydrocarbon Development Institute of Pakistan.
Purpose of data/parameter	Baseline emission calculation
Additional comments	

Relevant SDG Indicator	SDG 13 – Climate Action
Data/Parameter	$EF_{grid,CM,y}$
Unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y
Source of data	Calculated weighted average combined margin using equation – $EF_{grid,CM,y} = EF_{grid,OM,y} \cdot W_{OM} + EF_{grid,BM,y} \cdot W_{BM}$ <p>The default values for W_{OM} and W_{BM} are taken as applicable to wind power generation project activities as $W_{OM} = 0.75$ and $W_{BM} = 0.25$.</p>
Value(s) applied	0.6213
Choice of data or measurement methods and procedures	Calculated ex ante as per "Tool to calculate the emission factor for an electricity system, ver. 04.0"
Purpose of data/parameter	Baseline emission calculation
Additional comments	

D.2. Data and parameters monitored

Relevant SDG Indicator	SDG 7 – Affordable and Clean Energy
Data/parameter:	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Measured/calculated/default	Calculated
Source of data	Electricity meters readings

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Value(s) of monitored parameter

243,085

11/04/2017-30/04/2017	7,602.63
01/05/2017-31/05/2017	13,815.95
01/06/2017-30/06/2017	12,108.07
01/07/2017-31/07/2017	15,611.84
01/08/2017-31/08/2017	16,625.61
01/09/2017-30/09/2017	9,186.89
01/10/2017-31/10/2017	5,207.49
01/11/2017-30/11/2017	5,745.27
01/12/2017-31/12/2017	13,669.57
Subtotal for vintage 2017	99,573.32
01/01/2018-31/01/2018	5,325.66
01/02/2018-28/02/2018	5,475.01
01/03/2018-31/03/2018	8,011.66
01/04/2018-30/04/2018	10,117.24
01/05/2018-31/05/2018	13,722.01
01/06/2018-30/06/2018	18,928.45
01/07/2018-31/07/2018	20,050.45
01/08/2018-31/08/2018	17,713.26
01/09/2018-30/09/2018	12,987.98
01/10/2018-31/10/2018	3,602.33
01/11/2018-30/11/2018	5,356.76
01/12/2018-31/12/2018	7,035.74
Subtotal for vintage 2018	128,326.54
01/01/2019-31/01/2019	6,289.44
01/02/2019-28/02/2019	8,896.40
Subtotal for vintage 2019	15,185.85
Total	243,085.71

Where,

- The values of $EG_{\text{export},y}$ is as follows:

Meters	M11 (back up M12)	M21 (back up M22)	Total Wind Turbines
11/04/2017-30/04/2017	2,863.80	4,742.74	7,606.54
01/05/2017-31/05/2017	7,092.67	6,725.93	13,818.60
01/06/2017-30/06/2017	6,323.38	5,787.40	12,110.78
01/07/2017-31/07/2017	8,375.89	7,245.23	15,621.12
01/08/2017-31/08/2017	8,739.08	7,891.00	16,630.08
01/09/2017-30/09/2017	4,824.89	4,368.90	9,193.79
01/10/2017-31/10/2017	2,666.86	2,563.08	5,229.94

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01/11/2017-30/11/2017	3,152.07	2,614.49	5,766.56
01/12/2017-31/12/2017	7,526.60	6,153.58	13,680.18
Subtotal for vintage 2017	51,565.24	48,092.35	99,657.59
01/01/2018-31/01/2018	3,041.97	2,312.94	5,354.91
01/02/2018-28/02/2018	3,095.00	2,402.01	5,497.01
01/03/2018-31/03/2018	4,529.47	3,499.40	8,028.87
01/04/2018-30/04/2018	5,430.21	4,695.13	10,125.34
01/05/2018-31/05/2018	7,495.40	6,235.21	13,730.61
01/06/2018-30/06/2018	9,838.45	9,097.91	18,936.36
01/07/2018-31/07/2018	10,450.73	9,602.49	20,053.21
01/08/2018-31/08/2018	9,326.82	8,390.24	17,717.06
01/09/2018-30/09/2018	6,897.86	6,092.55	12,990.41
01/10/2018-31/10/2018	2,064.07	1,573.02	3,637.10
01/11/2018-30/11/2018	3,002.63	2,396.41	5,399.04
01/12/2018-31/12/2018	3,905.26	3,161.45	7,066.71
Subtotal for vintage 2018	69,077.87	59,458.75	128,536.62
01/01/2019-31/01/2019	3,662.50	2,653.60	6,316.10
01/02/2019-28/02/2019	4,995.55	3,925.94	8,921.49
Subtotal for vintage 2019	8,658.05	6,579.54	15,237.59
Total	129,301.15	114,130.64	243,431.79

- The values of EG_{import,y} is as follows:

Meters	M11 (back up M12)	M21 (back up M22)	Total Wind Turbines
11/04/2017-30/04/2017	2.33	1.58	3.91
01/05/2017-31/05/2017	1.67	0.98	2.65
01/06/2017-30/06/2017	1.71	1.00	2.71
01/07/2017-31/07/2017	5.30	3.98	9.28
01/08/2017-31/08/2017	2.76	1.71	4.47
01/09/2017-30/09/2017	4.55	2.35	6.90

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01/10/2017-31/10/2017	14.42	8.03	22.45
01/11/2017-30/11/2017	12.28	9.01	21.29
01/12/2017-31/12/2017	6.04	4.57	10.61
Subtotal for vintage 2017	51.06	33.21	84.27
01/01/2018-31/01/2018	16.49	12.76	29.25
01/02/2018-28/02/2018	12.31	9.69	22.00
01/03/2018-31/03/2018	9.34	7.87	17.21
01/04/2018-30/04/2018	4.85	3.24	8.10
01/05/2018-31/05/2018	5.05	3.55	8.60
01/06/2018-30/06/2018	4.70	3.22	7.91
01/07/2018-31/07/2018	1.80	0.96	2.77
01/08/2018-31/08/2018	2.41	1.39	3.79
01/09/2018-30/09/2018	1.36	1.07	2.43
01/10/2018-31/10/2018	19.99	14.78	34.77
01/11/2018-30/11/2018	23.77	18.52	42.28
01/12/2018-31/12/2018	17.24	13.73	30.97
Subtotal for vintage 2018	119.31	90.77	210.08
01/01/2019-31/01/2019	14.05	12.60	26.65
01/02/2019-28/02/2019	13.38	11.71	25.09
Subtotal for vintage 2019	27.43	24.32	51.74
Total	197.79	148.29	346.09

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Monitoring equipment	<p>Equipment: Meter M11 (Main meter) Type: ISKRA MT-860 Accuracy class: 0.2S Serial number: 66219229 Dates of last calibrations: 05/03/2017 Calibration frequency: No more than 2 years Calibration Validity: 2 years</p> <p>Equipment: Meter M12 (Back up meter for M11) Type: ISKRA MT-860 Accuracy class: 0.2S Serial number: 66605337 Dates of last calibrations: 05/03/2017 Calibration frequency: No more than 2 years Calibration Validity: 2 years</p> <p>Equipment: Meter M21 (Main meter) Type: ISKRA MT-860 Accuracy class: 0.2S Serial number: 66219230 Dates of last calibrations: 05/03/2017 Calibration frequency: No more than 2 years Calibration Validity: 2 years</p> <p>Equipment: Meter M22 (Backup meter for M21) Type: ISKRA MT-860 Accuracy class: 0.2S Serial number: 66605336 Dates of last calibrations: 05/03/2017 Calibration frequency: No more than 2 years Calibration Validity: 2 years</p>
Measuring/reading/recording frequency:	Measured continuously, recorded monthly
Calculation method (if applicable):	<p>The following parameters will be measured:</p> <p>(i) The quantity of electricity supplied by the project plant/unit to the grid ($EG_{export,y}$); and</p> <p>(ii) The quantity of electricity delivered to the project plant/unit from the grid ($EG_{import,y}$)</p> <p>$EG_{facility,y}$ is calculated as the difference between $EG_{export,y}$ and $EG_{import,y}$</p>
QA/QC procedures:	<p>Monitoring equipments are tested and maintained in accordance with the relevant technical codes.</p> <p>The net on-grid electricity generation can be cross-checked by electricity sales & purchase receipts.</p>
Purpose of data:	Emission reduction calculation and SDG claim.
Additional comments:	

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Relevant SDG Indicator	SDG 8 – Decent work and Economic Growth																
Data/parameter:	- Certificates of worker staffs; - Whether workers are satisfied with the payment; - training documents																
Unit	/																
Description	- Certificates of workers; - Whether workers are satisfied with the payment; - training documents - Number of jobs created																
Measured/calculated/default	Calculated																
Source of data	Monitoring survey with workers																
Value(s) of monitored parameter	Workers are satisfied with the payment; All the workers are qualified and have got the work certificates; Worker staffs have been trained during the project implementation; <table border="1" data-bbox="406 936 938 1232"> <thead> <tr> <th>Training date</th> <th>Training subject</th> </tr> </thead> <tbody> <tr> <td>15/04/2017</td> <td>Electrical equipments operation and maintenance</td> </tr> <tr> <td>18/05/2017</td> <td>Operation of wind turbine engines</td> </tr> <tr> <td>22/05/2017</td> <td>Running Fault Diagnosis</td> </tr> <tr> <td>15/03/2018</td> <td>Electrical equipments operation and maintenance</td> </tr> <tr> <td>11/04/2018</td> <td>Running Fault Diagnosis</td> </tr> <tr> <td>16/04/2018</td> <td>Operation of wind turbine engines</td> </tr> <tr> <td>13/02/2019</td> <td>Electrical equipments operation and maintenance</td> </tr> </tbody> </table> 20 jobs are created during project implementation, incl. Project director, plant manager, operation&maintenance manager, electrical manager, operation engineers, maintenance engineer, etc	Training date	Training subject	15/04/2017	Electrical equipments operation and maintenance	18/05/2017	Operation of wind turbine engines	22/05/2017	Running Fault Diagnosis	15/03/2018	Electrical equipments operation and maintenance	11/04/2018	Running Fault Diagnosis	16/04/2018	Operation of wind turbine engines	13/02/2019	Electrical equipments operation and maintenance
Training date	Training subject																
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11/04/2018	Running Fault Diagnosis																
16/04/2018	Operation of wind turbine engines																
13/02/2019	Electrical equipments operation and maintenance																
Monitoring equipment	/																
Measuring/reading/recording frequency:	Monitored Annually																
Calculation method (if applicable):	Questionnaires were delivered to staffs and asked whether they got income from working for the project and whether they are satisfied with the payment. Staffs gave feedback by filling out questionnaire anonymous. Labour certifications of worker staffs and training documents have been checked as well.																
QA/QC procedures:	Interview with operation worker staffs will be carried out by a third party during onsite verification.																
Purpose of data:	SDG claim.																
Additional comments:																	

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Relevant SDG Indicator	SDG 13 – Climate Action
Data/parameter:	Emission reductions achieved by the project
Unit	tCO ₂ e
Description	Emission reductions achieved by the project
Measured/calculated/default	Calculated
Source of data	ER sheet
Value(s) of monitored parameter	151,029 for the monitoring period (11/04/2017 – 28/02/2019) Vintage 2017: 61,865 Vintage 2018: 79,729 Vintage 2019: 9,435
Monitoring equipment	/
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	The calculation is based on the CDM methodologies ACM0002 and the calculation process is verified by third party DOE.
QA/QC procedures:	The emission reduction calculation is based on the CDM methodology and certified by DOE and approved by CDM EB
Purpose of data:	ER calculation and SDG claim.
Additional comments:	

Relevant SDG Indicator	Safeguarding Principle 3 - Community Health, Safety and Working Conditions
Data/parameter:	Air Quality
Unit	N.A.
Description	In order to reduce dust emissions during the construction phase, the following dust suppression measures stipulated and implemented: <ul style="list-style-type: none"> - Frequent watering of exposed area or worksite of excavation to maintain surface wet, if necessary and practical; - Imposition of speed controls for vehicles and unpaved site roads; - Well-maintained diesel-powered mechanical equipment to avoid black smoke emissions; - Shut-down of diesel-powered mechanical equipment or trucks inside the worksites when they are not in operation.
Measured/calculated/default	/
Source of data	Monitoring survey with workers. Monitoring survey questionnaire was provided to all worker staffs. Each worker staff filled out the questionnaire and was allowed to be anonymous.
Value(s) of monitored parameter	All worker staffs confirmed the plant has taken various measures to improve the air quality and reduce the impacts on the dust emissions during the project implementation.

Deleted: SDG 3 – Good health and well being

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Monitoring equipment	/
Measuring/reading/recording frequency:	Once per monitoring period
Calculation method (if applicable):	NA
QA/QC procedures:	Workers are allowed to provide feedback anonymous.
Purpose of data:	To monitor the air quality indicator.
Additional comments:	

Relevant SDG Indicator	Safeguarding Principle 3 – Environment, ecology and land use
Data/parameter:	Soil condition
Unit	N.A.
Description	General soil erosion and sediment control measures would include: <ul style="list-style-type: none"> - Keep open areas of excavation to a minimum; - Maintain sediment control structures along drainage lines to prevent the transport of sediment from the site; - Stockpiles of materials should be located away from drainage lines and formed with sediment control structures placed immediately down slope; - Control drainage in areas of construction areas using a water truck; - Minimization of traffic in construction zones and use of a dedicated parking area, i.e. site compound; - Revegetate disturbed areas i.e. around turbine foundations as soon as practical.
Measured/calculated/default	/
Source of data	Monitoring survey with workers. <u>Monitoring survey questionnaire was provided to all worker staffs. Each worker staff filled out the questionnaire and was allowed to be anonymous.</u>
Value(s) of monitored parameter	<u>All worker staffs confirmed the plant has taken various measures to reduce the impacts on the soil during the project implementation.</u>
Monitoring equipment	/
Measuring/reading/recording frequency:	Once per monitoring period
Calculation method (if applicable):	NA
QA/QC procedures:	Workers are allowed to provide feedback anonymous.
Purpose of data:	To monitor the soil condition indicator.
Additional comments:	

Deleted: NA

Relevant SDG Indicator	Safeguarding Principle 6 - Economic Impacts
Data/parameter:	Balance of payments and investment
Unit	
Description	-

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Measured/calculated/default	/
Source of data	Financial/Loan Agreement
Value(s) of monitored parameter	The project involves Chinese loan of approx. USD 107 Million
Monitoring equipment	/
Measuring/reading/recording frequency:	Once per monitoring period
Calculation method (if applicable):	NA
QA/QC procedures:	Financial/Loan Agreement will be reviewed.
Purpose of data:	
Additional comments:	

Relevant SDG Indicator	Safeguarding Principle 3 - Community Health, Safety and Working Conditions
Data/parameter:	SG principle #8 (The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments)
Unit	NA.
Description	Measures are taken to eliminate safety hazards related to the construction, incl. maintain good housekeeping, dispose of left over materials, eliminate over-head work of welders and burners; use good lighting to illuminate work areas, pathways, corridors, hall ways, working platforms, have a supply of flashlights; keep work areas cleared, dry, sanded, use personal protective equipment, etc.
Measured/calculated/default	/
Source of data	Monitoring survey with workers. <u>Monitoring survey questionnaire was provided to all worker staffs. Each worker staff filled out the questionnaire and was allowed to be anonymous.</u>
Value(s) of monitored parameter	<u>All worker staffs confirmed the plant has taken various measures to eliminate safety hazards during the project implementation.</u>
Monitoring equipment	/
Measuring/reading/recording frequency:	Once per monitoring period
Calculation method (if applicable):	NA
QA/QC procedures:	Workers are allowed to provide feedback anonymous.
Purpose of data:	
Additional comments:	

Deleted: NA

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Relevant SDG Indicator	<u>Safeguarding Principle 3 - Community Health, Safety and Working Conditions</u>
Data/parameter:	SG principle #9 (The project takes a precautionary approach in regard to environmental challenges and is not complicit in practices contrary to the precautionary principle)
Unit	N.A.
Description	The project owner takes measures, incl. e.g. major dusty activities, incl. material handling, onsite stockpiling and vehicles movement, etc, would cause dust emissions. The project owner takes measures, e.g. frequent watering of exposed area or worksite of excavation to maintain surface wet, imposition of speed controls for vehicles and unpaved site roads. e.g. works will only be carried out during the day to minimize the construction noise.
Measured/calculated/default	/
Source of data	Monitoring survey with workers. <u>Monitoring survey questionnaire was provided to all worker staffs. Each worker staff filled out the questionnaire and was allowed to be anonymous.</u>
Value(s) of monitored parameter	<u>All worker staffs confirmed the plant has taken various measures to reduce the noise and reduce the impacts on the dust emissions during the project implementation.</u>
Monitoring equipment	/
Measuring/reading/recording frequency:	Once per monitoring period
Calculation method (if applicable):	NA
QA/QC procedures:	Workers are allowed to provide feedback anonymous.
Purpose of data:	
Additional comments:	

Deleted: SDG 3 – Good health and well being

Deleted: NA

D.3. Implementation of sampling plan

NA

SECTION E. Calculation of SDG outcomes

E.1. Calculation of baseline value or estimation of baseline situation of each SDG outcome

Baseline emissions calculation (SDG13 and SDG7)

Baseline emissions (BE_y) are calculated as follows:

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

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

Where:

- BE_y Baseline emission in year y (tCO₂e)
 $EG_{facility,y}$ Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)
 $EF_{grid,CM,y}$ Combined margin CO₂ emission factor of the WAPDA grid in year y (tCO₂/MWh)
 $EF_{grid,y}$ Grid Emission factor of WAPDA grid in year y (tCO₂/MWh), equals to $EF_{grid,CM,y}$

$$EF_{grid,CM,y} = 0.6213 \text{ tCO}_2/\text{MWh}$$

The $EG_{facility,y}$ during this monitoring period is as follows:

Monitoring period	$EG_{facility,y}$ (MWh)
11/04/2017-30/04/2017	7,602.63
01/05/2017-31/05/2017	13,815.95
01/06/2017-30/06/2017	12,108.07
01/07/2017-31/07/2017	15,611.84
01/08/2017-31/08/2017	16,625.61
01/09/2017-30/09/2017	9,186.89
01/10/2017-31/10/2017	5,207.49
01/11/2017-30/11/2017	5,745.27
01/12/2017-31/12/2017	13,669.57
Subtotal for vintage 2017	99,573.32
01/01/2018-31/01/2018	5,325.66
01/02/2018-28/02/2018	5,475.01
01/03/2018-31/03/2018	8,011.66
01/04/2018-30/04/2018	10,117.24
01/05/2018-31/05/2018	13,722.01
01/06/2018-30/06/2018	18,928.45
01/07/2018-31/07/2018	20,050.45
01/08/2018-31/08/2018	17,713.26
01/09/2018-30/09/2018	12,987.98
01/10/2018-31/10/2018	3,602.33
01/11/2018-30/11/2018	5,356.76
01/12/2018-31/12/2018	7,035.74
Subtotal for vintage 2018	128,326.54
01/01/2019-31/01/2019	6,289.44
01/02/2019-28/02/2019	8,896.40
Subtotal for vintage 2019	15,185.85
Total	243,085.71

During the monitoring period,
 $BE_y = EG_{facility,y} \times EF_{grid,CM,y}$

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$$= 243,085.71 \text{ MWh} \times 0.6213 \text{ tCO}_2/\text{MWh} = 151,029 \text{ tCO}_2\text{e}$$

For vintage 2017:

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

$$= 99,573.32 \text{ MWh} \times 0.6213 \text{ tCO}_2/\text{MWh} = 61,865 \text{ tCO}_2\text{e}$$

For vintage 2018:

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

$$= 128,326.54 \text{ MWh} \times 0.6213 \text{ tCO}_2/\text{MWh} = 79,729 \text{ tCO}_2\text{e}$$

For vintage 2019:

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

$$= 15,185.85 \text{ MWh} \times 0.6213 \text{ tCO}_2/\text{MWh} = 9,435 \text{ tCO}_2\text{e}$$

Based on above, baseline emissions for SDG13 are 151,029tCO₂e, and baseline electricity supply for SDG7 are 243,085MWh.

Baseline situation estimation (SDG8)

In the absence of the project, there will be no jobs created, therefore, the outcome of SDG8 in the baseline scenario is 0.

E.2. Calculation of project value or estimation of project situation of each SDG outcome

Project emissions calculation (SDG7 and SDG13)

As per methodology ACM0002 (Version 16.0.0), for a wind power project, $PE_y = 0$, i.e. project emissions are 0 for the outcome of SDG13.

243,085MWh electricity are generated by the project in the project scenario, the SDG7 outcome is 243,085MWh in the monitoring period.

Project situation estimation (SDG8)

The project created 20 jobs during the implementation of the project. The outcome of SDG8 is 20 jobs generation in the project scenario.

E.3. Calculation of net benefits as difference of baseline and project values or direct calculation for each SDG outcome

SDG7: 243,085.71MWh net electricity are supplied to the power grid in the monitoring period.

SDG13: Emission reductions achieved are the difference between BE_y and PE_y , that is 151,029 tCO₂e in this monitoring period.

SDG8: 20 jobs are created in this monitoring period.

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E.4. Summary of ex-post values of each SDG outcome for the current monitoring period

Item	Baseline estimate	Project estimate	Net benefit
SDG 13	151,029 tCO ₂ e	0	151,029 tCO ₂ e
SDG 7	0	243,085MWh	243,085MWh
SDG 8	0	20 jobs	20 jobs

E.5. Comparison of actual value of outcomes with estimates in approved PDD

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 13	160,082 tCO ₂ e (= 84,804tCO ₂ e/yr*689d/365d)	151,029 tCO ₂ e
SDG 7	257,667 MWh (= 136,500MWh*689d/365d)	243,085MWh
SDG 8	20 jobs	20 jobs

E.6. Remarks on difference from estimated value in approved PDD

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The actual emissions reductions and electricity generation during the monitoring period are 5.65% less than the estimated value in the PDD, the main reason is that, non project events such as Load curtailments & Power Breakdowns ultimately result in reduced net electricity supply. And during this monitoring period, 20 jobs are created during the project implementation.

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SECTION F. Stakeholder inputs and legal disputes

F.1. List all inputs/grievances which have been received for the project during the monitoring period together with their respective answers/actions

Stakeholders can provide comments via comment book, phone and email access. Comment book is in the reception room at project site. The phone (+92 51 2294184) and email of Mr. Anis Rehman of SEDL (anis@sedl.pk.com) is provided to contact.

1) Comment book. It is in the reception room at project site. All stakeholders have access to provide feedback on this project on this book. The contact information of Mr. Muhammad Amir is listed on the first page of the book. On each page that follows there is one table, incl. Date, Comment, Response from SEDL and Response Date, etc. Stakeholders are allowed to make anonymous comments should they wish.

2) Telephone access. Stakeholders can also provide comments via phone. The telephone number of Mr. Muhammad Amir of SEDL (+92 512153350) is provided to contact. Calls received are logged and recorded in the same way as the comment book mentioned above, with the date, comment and project response recorded for each call. Stakeholders are not required to give their personal information.

3) Email access. Email address of Mr. Muhammad Amir of SEDL (pd@sedl.pk.com) is provided as well for stakeholders to provide comments in the internet. Emails comments received are logged and recorded in the same way in the comment book, with the date, comment and project response recorded for each message. As with all the methods, stakeholders are not required to give their personal details when they wish to make a comment.

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No comments or grievances are received during this monitoring period.

F.2. List all inputs/grievances from previous monitoring period where follow up action is to be verified in this monitoring period

NA. This is the 1st monitoring period of the project.

F.3. Provide details of any legal contest or dispute that has arisen with the project during the monitoring period

NA.