Gold Standard
for the Global Goals

TEMPLATE

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.2**

RELATED SUPPORT

- **TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2**

This document contains the following Sections

KEY PROJECT INFORMATION

GS ID of Project	GS11307
Title of Project	Sapphire 49.5 MW Wind Farm Project
Time of First Submission Date	02/08/2021
Date of Design Certification	NA
Version number of the PDD	3.2
Completion date of version	17/03/2022
Project Developer	Sapphire Wind Power Co. Ltd.
Project Representative	UPM Umwelt-Projekt-Management GmbH
Project Participants and any communities involved	Sapphire Wind Power Co. Ltd. UPM Umwelt-Projekt-Management GmbH
Host Country (ies)	Islamic Republic of Pakistan
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Scale of the project activity	☐ Micro scale ☐ Small Scale ☒ Large Scale
Other Requirements applied	NA
Methodology (ies) applied and version number	ACM0002: Grid-connected electricity generation from renewable sources (Version 20.0).
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Project Cycle:	☐ Regular ☒ Retroactive

Table 1 – Estimated Sustainable Development Contributions

Sustainable Development Goals Targeted	SDG Impact	Annual Average	Units/ Products
SDG 13 Climate Action	Annual Emission Reductions	61,998	tCO_2e/yr
SDG 7 Affordable and Clean Energy	Net amount of electricity supplied to grid	137,500	MWh
SDG 8 Decent work and Economic Growth	Number of jobs created	20	jobs

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

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The Sapphire Wind Farm Project is located 100km east-northeast from the city of Karachi, Pakistan. The project owner is Sapphire Wind Power Co. Ltd. As mentioned below.

The purpose of the Sapphire Wind Farm Project (hereinafter the "proposed project" or 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 52.8 MW (33 wind turbines with 1.6MW each) and to deliver the electricity generated from the project to the *Water and Power Development Authority* (WAPDA) grid. 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 CO_2 emissions.

The purpose of the proposed project is to generate zero-emission wind power and deliver it to the WAPDA grid. For the proposed project,

(a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project. The WAPDA electricity grid is dominated by fossil fuel-fired power plants.

(b) The project scenario is the implementation of the proposed project, the installation and operation of wind turbines with a total capacity of 52.8 MW, which will supply an average annual generation of 137,500 MWh to the WAPDA grid and thereby reduce the baseline grid emissions by an annual 61,998 tCO_2e.
I The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The project start date (EPC contract signing) is 27/08/2011 and the project started commercial operation on 22/11/2015. The project has been registered under CDM on 14/11/2012 and the UNFCCC Reference no is 8163. The project has the installed capacity change from 49.5MW to 52.8MW and the post-registration change has been approved on 10/04/2017.

Table 2: Key events of the project

Date	**Key event**	**Supporting document**
27/08/2011	EPC (Engineering, Procurement, Construction) contract signing	Start date of the project
14/11/2012	CDM Registered at UNFCCC CDM EB	UNFCCC CDM EB Webpage[1]
28/08/2014	Construction started	Letter of Notice to proceed
29/09/2014	Implementation of the changes was decided	Turbine provider Letter of Capacity Enhancement to the project owner
24/04/2015	Issuance of Generation License by NEPRA (National Electric Power Regulatory Authority) for the capacity increase from 49.5MW (33*1.5MW) to 52.8MW (33*1.6MW)	Revised Generation License

[1] http://cdm.unfccc.int/Projects/DB/BVQI1352703902.61/view

22/11/2015	Commercial Operation Date	Certificate of Commissioning of Complex of Sapphire wind project
10/04/2017	Approval on Post-registration change (capacity change from 49.5MW to 52.8MW and change of start date of crediting period) by CDM EB	UNFCCC project link[2]
28/07/2021	GS registration consulting service agreement signed with UPM Umwelt-Projekt-Management GmbH	Consulting agreement
03/08/2021	Project first submission to GS	
17/08/2021	Invitation to the stakeholders for the conduction of local stakeholder consultation meeting	Invitation letter, pictures regarding public invitation
20/09/2021	Local stakeholder consultation (LSC) meeting was held	Pictures of LSC meeting

A.1.1. Eligibility of the project under Gold Standard

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The project activity meets the eligibility criteria as per section 3.1.1 of GS4GG Principles and Requirements, version 1.2:

- The project activity includes construction and operation of a wind power plant to generate renewable electricity to supply the national gird. It is eligible under GS4GG;
- The project is located in Jhimpir, Thatta District, Sindh Province, Pakistan.

[2] https://cdm.unfccc.int/PRCContainer/DB/prcp771647029/view

- According to the applied CDM methodology ACM0002, the spatial extent of the project boundary includes the Sapphire wind power plant and all power plants connected physically to the WAPDA electricity grid. The installed capacity of the project activity is 52.8 MW, it is large scale project.
- The project is registered as CDM on 14/11/2012 and now is seeking for GS registration to have GS labelling on CERs. Apart from GS and CDM, no other voluntary or compliance standard has been applied. In addition, GS CERs and GS VERs will not be issued for the same monitoring period of the project, to avoid double Counting. The project area does not overlap with any project with GS or other voluntary or compliance standard, therefore, no double counting of impacts exists.
- The Initial Environment Examination (IEE) report of the project has been conducted in line with in compliance with Pakistan Environmental Protection Act (PEPA), 1997 and submitted to EPA (Environmental Protection Agency) on 20/06/2009.

  The project is in compliance with Policy for Development of Renewable Energy for Power Generation, 2006, which is issued by Alternative Energy Development Board (AEDB), Government of Pakistan[3]. The feasibility study of the project was conducted in 09/2009 and approved by AEDB on 16/10/2009. The project got Generation license on 24/04/2015 and started commercial operation since 22/11/2015. Therefore, the project is in compliance with legal, social, environment and ecological regulations.
  According to the feasibility study report and IEE report of the project, it contributes to sustainable development of the local area and the host Country:
    - **Economic development:**
      Pakistan is passing through an acute energy crisis. The proposed project will generate an estimated amount of 137,500 MWh per year and will therefore contribute to a reduction in the number of black-outs and brown-

[3] http://www.aedb.org/Documents/Policy/REpolicy.pdf

outs experienced by other grid users, which can help to improve the economic performance of other businesses connected to the grid.

- **Social development:**
  The conducting of the proposed project will offer job opportunities for local people during the construction phase and the operational period, and thus achieve economic growth in the region.
- **Environmental development:**
  By resulting in a significant reduction of greenhouse gas emissions, the project contributes to a sustainable development of the local environment.
- **Technological development:**
  The project activity is the first of its kind in Pakistan. By adopting foreign manufacturer wind turbines, the project activity will promote important transfer of technical know-how to Pakistan, and can act as a pioneer in promoting the spread of this technology to other wind power projects.

- Contact details of the project participants, incl. Sapphire Wind Power Co. Ltd. And UPM Umwelt-Projekt-Management GmbH, have been included in the Appendix of this GS PDD. Sapphire Wind Power Company Ltd has registration number 0058992 and registered office in Karachi. UPM Umwelt-Projekt-Management GmbH was registered in Munich Germany and has registered with the Commercial Register B of the Local Court of Munich under HRB 95277. Both entities are in a good standing, the relevant business licenses documents have been provided to GS VVB for validation.
- Legal Ownership and Other Rights: The project owner Sapphire Wind Power Co. Ltd has full legal right to control and operate the project activity.
- No public funds or ODA (Official Development Assistance) is involved in this project activity.

The project also meets the "Renewable Energy Activity Requirements" (version 1.4):

- *3.1 Type of project:*
  - The project activity includes construction and operation of a wind power plant to generate renewable electricity to supply the national grid;

  - The project is located in Pakistan, Low Middle income Country[4]; The penetration level – the ratio of installed capacity of the wind power (1,049MW[5]) to the total grid installed capacity (35,114 MW[6]) is 2.98%, which is less than 5% as required by Paragraph 2.1.3 Section 2 of Renewable Energy Activity Requirements (version 1.4);
- *3.2 Location of project:* The project is located in Jhimpir, Thatta District, Sindh Province, Pakistan.
- *3.3 Project area, boundary and scale:* According to the applied CDM methodology ACM0002, the spatial extent of the project boundary includes the Sapphire wind power plant and all power plants connected physically to the WAPDA electricity grid. The installed capacity of the project activity is 52.8 MW, it is large scale project.
- *3.4 Suppress Demand:* Such scenario is not applicable to this project;
- *3.5 Stacking:* The project is only seeking for GS labelling on CERs.

The project meets the Eligibility Principles and Requirements as follows:
Principle 1: Contribution to Climate Security & Sustainable Development

- The project is wind power project type, which is eligible under GS4GG;
- The project contributes to SDG 13, SDG 7 and SDG8;
- The above has been included in the GS PDD.

Principle 2: Safeguarding Principles

- The safeguarding principles assessment has been done and reported in the GS PDD, see Appendix 1 of GS PDD for details;

Principle 3: Stakeholder Inclusivity

- The relevant stakeholders have been invited for local stakeholder meeting and the local stakeholder consulting meeting has been held as per the Gold

[4] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519

[5] Table 6.1 Pakistan Energy Yearbook 2019
[6] Table 5.1 Pakistan Energy Yearbook 2019

Standard Stakeholder Consultation & Engagement Requirements on 20/09/2021. The stakeholder consultation report has been prepared and submitted to GS VVB for validation.

Principle 4: Demonstration of real outcome

- The GS project design document (GS PDD) has been conducted and submitted to GS for preliminary review. And the project documents have been provided to GS VVB for GS validation. The project start date is 27/08/2011 and the stakeholder consultation meeting was held on 20/09/2021, therefore is retroactive project. Project monitoring and Reporting plan has been presented in the GS PDD.

Principle 5: Financial Additionality and ongoing financial need

- The project has been registered under CDM. For CDM-registered project, it's not required to carry out additional assessment for demonstration of additionality over and above what has been done for registration/determination with the CDM EB, as per section 7.2.1, GHG emissions reduction and sequestration product requirements (version 2.0).
- The ongoing financial need of the project will be carried out at the crediting period renewal under GS4GG, as per section 7.2.2, GHG emissions reduction and sequestration product requirements (version 2.0).

As per GS4GG GHG Emissions Reduction & Sequestration Product Requirements (Version 2.0), the eligibility criteria are met as follows:

Eligibility criteria	The project
1.1.1 This document represents the Product Requirements for the issuance of: a. Gold Standard Verified Emission Reductions (GSVERs) b. Gold Standard labels for Certified Emission Reductions (GSCERs) c. Gold Standard Planned Emissions Reductions (PERs) for Land Use & Forests	The project is seeking for GS labels for CERs (GS CERs).
2.1.1. Unless otherwise stated elsewhere in the Principles & Requirements, Projects involving a mix of eligible and ineligible components can only claim credits for the Emission Reductions and/or	The project is wind power project and no ineligible components are involved.

sequestration associated with the eligible component of the project.	
3.2.1. CDM Projects shall be located in a Non-Annex I country, as defined by the UNFCCC.	The project is registered as CDM on 14/11/2012 and is located in Pakistan (non-Annex I Country)
4.1.1 Only Carbon Dioxide (CO_2), Methane (CH_4) and/or Nitrous Oxide (N_2O) are eligible for GSVERs or GSCERs, provided Projects comply with all GS4GG Requirements and eligibility criteria.	CO_2 are eligible for GS CERs
5.1.1 The Following Project types are eligible for issuance of GSVERs or GSCERs: a. **Renewable Energy Supply:** Project activities that generate and deliver energy services (e.g. mechanical work/electricity/heat) from non-fossil and renewable energy sources. Note that specific requirements apply with regards to the issuance of Gold Standard Labelled Renewable Energy GSCERs and GSVERs, as listed in section 2 of the Renewable Energy Activity Requirements. **b. End-Use Energy Efficiency Improvement:** Project activities that reduce energy requirements as compared to baseline scenario without affecting the level and quality of services or products, where the end user of the products and services are clearly identified and when the physical intervention is required at the user end. For example, efficient cooking, heating, lighting, etc. **c. Waste Handling & Disposal:** The waste handling and disposal category refers to all waste handling Projects that deliver an energy service (e.g. LFG with some of the recovered methane used for electricity generation) or a usable product with sustainable development benefits (e.g. composting). **d. Land Use and Forests:** including Afforestation/Reforestation and Agriculture Projects (CDM A/R projects are not eligible for issuance of GSCERs, however project may issue GSVERs after transitioning to GS4GG)	The project generates and delivers electricity from wind sources. Option a applies.
6.1.1 Projects are ineligible for carbon crediting under GS4GG if the OFFICIAL DEVELOPMENT ASSISTANCE (ODA) is provided to the project under the condition	No ODA is involved in this project activity

that the credits generated by the Project will be transferred, either directly or indirectly, to the donor country providing ODA support.	
7.2.1 Gold Standard CDM and JI Projects are not required to carry out additional assessment for demonstration of additionality over and above what has been done for registration/determination with the CDM EB/JISC unless the Project falls into a category that is deemed non-Additional in an applicable GS4GG Activity Requirement. In such cases the relevant Activity Requirement shall take precedence.	The project has registered as CDM on 14/11/2012 and currently go for GS upgradation. The additionality demonstration has been done with CDM EB.
7.2.2 Gold Standard CDM and JI Projects shall demonstrate Ongoing Financial Need at Certification Renewal following latest version of Principles & Requirements available at the time of renewal of their crediting period, unless otherwise stated in the relevant Activity Requirements.	The project will demonstrate Ongoing Financial Need at Certification Renewal following latest version of Principles & Requirements available at the time of renewal of their crediting period. The project has GS crediting period (02/08/2019-01/08/2024) and will renew on or before 01/08/2024. That means, the project will demonstrate Ongoing Financial Need on or before 01/08/2024.
8.1.1 All Projects shall a. conform to the relevant Activity Requirements and Gold Standard Approved Methodologies, including eligible CDM Methodologies[3].	The project conforms to CDM methodology ACM0002 (version 20.0)

b. also meet the additional GS4GG methodology eligibility requirements, where applicable. Refer to eligible CDM Methodologies.	
8.3.1 CDM and JI Projects seeking issuance of GSCERs shall use an approved CDM methodology and applicable tools available at the time of registration with CDM. The project shall also meet additional GS4GG methodology eligibility requirements, where applicable. Refer to eligible CDM methodology.	CDM methodology ACM0002 (version 20.0) is applied
9.2.1 Gold Standard CDM or JI Projects may be 'large scale' or 'small scale' Projects. All Project exceeding the small scale thresholds are defined as large scale. The applicability of methodologies is defined in accordance with CDM project standard for project activities.	The project has installed capacity 52.8MW, it is large-scale project.

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

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The project owner Sapphire Wind Power Co. Ltd has the legal ownership of credits generated by the project and legal right to alter use of resources required to service the project.

A.2 Location of project

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The project is located in Pakistan, Sindh Province, northeast of Jhimpir City, within a narrow corridor, spanned by the following coordinates:

	Longitude	Latitude
1.	67º51'48.33" E	25º07'18.40" N
2.	67º51'48.03" E	25º07'10.59" N
3.	67º54'40.46" E	25º06'20.95" N

4.	67º56’01.05” E	25º05’35.46” N
5.	67º57’53.13” E	25º05’03.55” N
6.	67º58’08.95” E	25º05’28.90” N

The Geo-coordinate of each WTG is listed as follows:

WTG	Longitude (E)	Latitude (N)	WTG	Longitude (E)	Latitude (N)
1	25° 6' 47.937"	67° 53' 29.378"	17	25° 6' 9.012"	67° 55' 44.715"
2	25° 6' 45.497"	67° 53' 37.837"	18	25° 6' 6.57"	67° 55' 53.172"
3	25° 6' 43.057"	67° 53' 46.296"	19	25° 6' 4.128"	67° 56' 1.63"
4	25° 6' 40.649"	67° 53' 54.754"	20	25° 6' 1.718"	67° 56' 10.086"
5	25° 6' 38.209"	67° 54' 3.216"	21	25° 5' 59.275"	67° 56' 18.544"
6	25° 6' 35.768"	67° 54' 11.675"	22	25° 5' 57.054"	67° 56' 26.185"
7	25° 6' 33.328"	67° 54' 20.133"	23	25° 5' 54.39"	67° 56' 35.458"
8	25° 6' 30.92"	67° 54' 28.591"	24	25° 5' 51.979"	67° 56' 43.914"
9	25° 6' 28.479"	67° 54' 37.049"	25	25° 5' 49.536"	67° 56' 52.375"
10	25° 6' 26.038"	67° 54' 45.508"	26	25° 5' 47.093"	67° 57' 0.831"
11	25° 6' 23.597"	67° 54' 53.966"	27	25° 5' 44.65"	67° 57' 9.288"
12	25° 6' 21.188"	67° 55' 2.423"	28	25° 5' 42.239"	67° 57' 17.744"
13	25° 6' 18.746"	67° 55' 10.881"	29	25° 5' 39.795"	67° 57' 26.201"
14	25° 7' 44.07"	67° 55' 18.569"	30	25° 5' 37.351"	67° 57' 34.657"
15	25° 6' 13.863"	67° 55' 27.8"	31	25° 5' 34.908"	67° 57' 43.113"
16	25° 6' 11.454"	67° 55' 36.257"	32	25° 5' 32.496"	67° 57' 51.569"
			33	25° 5' 30.052"	67° 58' 0.025"

The maps below illustrate the project location.

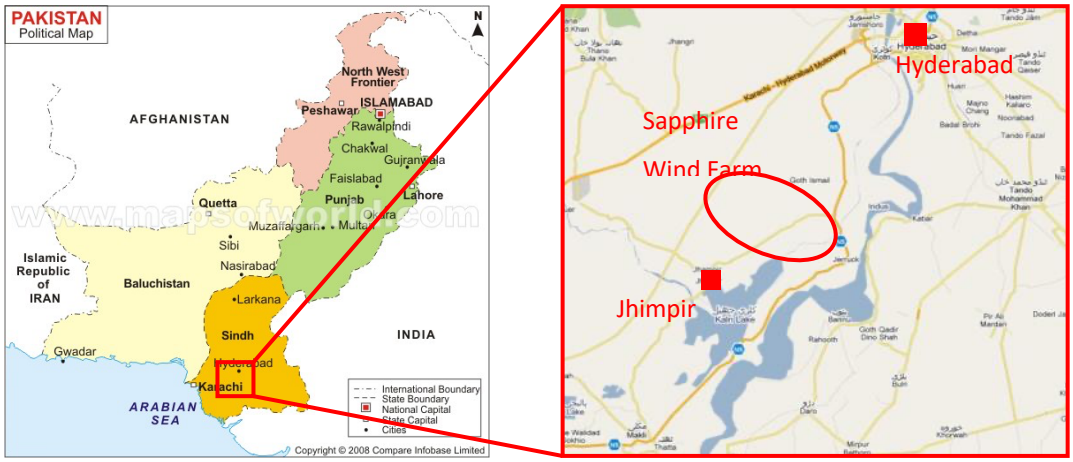

Figure 1: Map of the project location

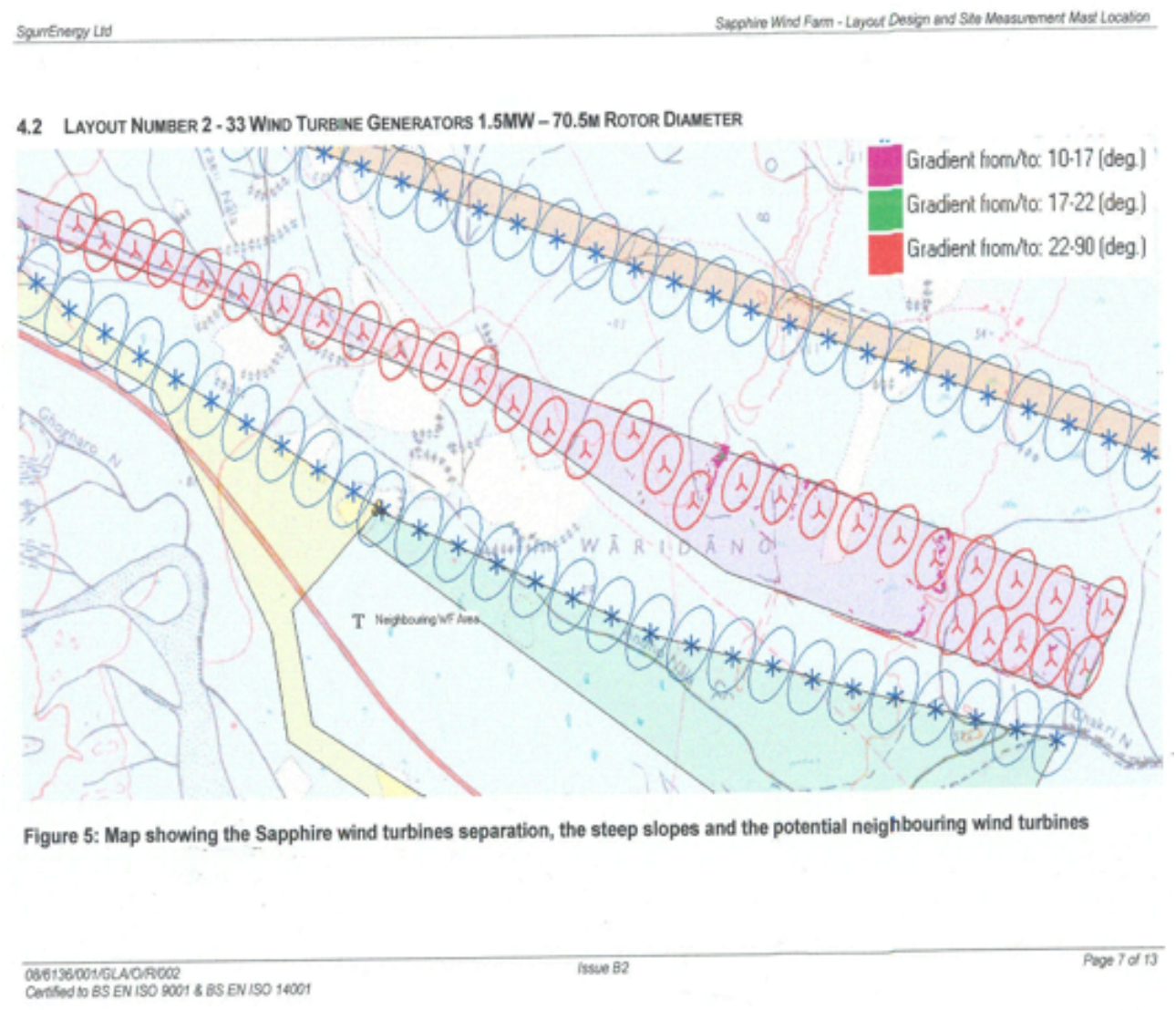

Figure 2: Map of the project location

A.3 Technologies and/or measures

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The project owner of the project uses the wind turbine GE 1.6xle by the American company GE.

The GE 1.6xle has a capacity of 1.6 MW at a rated voltage of 690 V and is also available with 50 or 60 Hz. Its rotor diameter measures 82.5m. The project owner installs 33 units of GE 1.6xle WTGs.

The GE 1.6xle 50 Hz WTG uses a power converter system that consists of a converter on the rotor side, a DC intermediate circuit, and a power inverter on the grid side. Altogether this complete system functions as a pulse-width-modulated converter in 4-quadrant operation. The converter consists of an insulated gate bipolar transistor (IGBT) power module and the associated electrical equipment. Variable output frequency of the converter allows a rotational speed-module operation of the generator within the range of 1000 rpm to 2000 rpm.

The WTGs are 3-bladed, upwind, horizontal-axis WTGs and are equipped with a SCADA (Supervisory Control and Data Acquisition) system for monitoring.

The total capacity of the WTGs to be installed shall be 52.8 MW and an annual estimated amount of electricity of 137,500 MWh at 132kV at a capacity factor of 29.7% shall be generated.
All equipment to be installed is new and has an estimated lifetime of 20 years.
The technical parameters of WTGs are shown in the following Table:

Table 3: Technical parameters of WTGs

Parameter	Value
Rated power	1.6MW
Diameter of Rotor	82.5m
Number of blades	3
Swept area	5,346m^2
Rotor speed range	9 to 18 rpm
Rotational direction	Clockwise looking downwind
Maximum tip speed	77.2m/s
Orientation	Upwind
Speed regulation	Pitch control
Manufacturer	GE
Lifetime	20 years

A.4 Scale of the project

>>Large Scale. The project has installed power capacity 52.8MW, which is >15MW, therefore, the project is large-scale.

A.5 Funding sources of project

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No public funding or ODA is involved for this project.

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

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ACM0002: Grid-connected electricity generation from renewable sources (Version 20.0).

Link:

https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

Related tools:

• Version 07.0 of the Tool07: "Tool to calculate the emission factor for an electricity system";

Link:

https://cdm.unfccc.int/methodologies/Pamethodologies/tools/am-tool-07-v7.0.pdf

B.2. Applicability of methodology (ies)

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Applicability Criteria	The project activity
This methodology applies to project activities that include retrofitting, rehabilitation (or refurbishment), replacement or capacity addition of an existing power plant or construction and operation of a Greenfield power plant.	Yes. The project includes construction and operation of a Greenfield power plant.
The methodology is applicable to grid-connected renewable power generation project activities that *(a) Install a Greenfield power plant;* *(b) Involve a capacity addition to (an) existing plant(s);* *(c) Involve a retrofit of (an) existing operating plants/units;* *(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or* *(e) Involve a replacement of (an) existing plant(s)/unit(s).*	Yes. The project is a grid-connected wind power project that installs a Greenfield power plant.
The methodology is applicable under the following conditions: (a) *The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power*	Yes, the project includes a wind power plant.

plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; *(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.*	
In case of hydro power plants, one of the following conditions shall apply: (…)	Not applicable, the project is not hydro power project.
In the case of integrated hydro power projects, project proponent shall: (…)	Not applicable, the project is not hydro power project.
The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	Not applicable. No switching of fossil fuels or biomass is involved in the project activity
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	Not applicable. No retrofits, rehabilitations, replacements, or capacity additions is included.

In addition, the applicability conditions included in the tool (Tool to calculate the emission factor for an electricity system Version 07.0) apply:

Applicability Criteria	The project activity
The tool determines the CO2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the "operating margin" (OM) and the "build margin" (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.	Yes, applicable. The tool is used to calculated the grid emission factor (CM) of the electricity grid which the project is connected to. The CM is 75% of calculated OM and 25% of calculated BM for the project.
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	Applicable. The project supplies electricity to grid that substitutes the grid electricity. The geographic and system boundaries for this electricity grid can be clearly identified and information on the characteristics of the grid is available from the Pakistan Energy Yearbook[7] published annually by the Government of Pakistan. The tool is used to calculate the OM, BM and CM for baseline emissions calculation.

[7] Pakistan Energy Yearbook 2019, that's the latest version at the time of GS validation of the project

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Applicable. Grid power plants only are included for the grid emission factor calculation for the project.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project is located in Pakistan, not an Annex I Country.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	Not applicable, no biofuel is included in the grid emission factor calculation

Therefore, ACM0002 and the tool "Tool to calculate the emission factor for an electricity system Version 07.0" are applicable to the proposed project activity.

B.3. Project boundary

>>

According to ACM0002, v.20.0, the project boundary is defined as[8]:

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.
The greenhouse gases and emission sources included in or excluded from the project boundary are shown in below Table.

> *The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.*

Following this definition, the project boundary is drawn as follows:

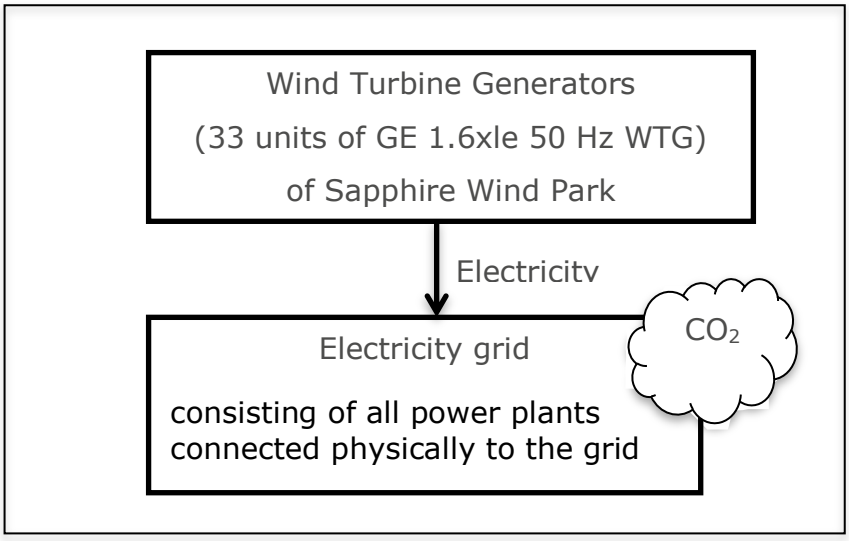

Figure 3: project boundary

[8] Cited from ACM0002, v.20.0

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project scenario	The project	CO_2	No	According to ACM0002, the project emission of wind energy project activity is zero
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

>>

According to methodology ACM0002, version 20.0, the baseline scenario for a new grid connected renewable power plant can easily be identified:

> *If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:*
>
> *Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".*

The proposed project comprises the installation of a new wind power plant, connected to the WAPDA grid. Therefore, the baseline scenario is the generation of electricity by grid-connected power plants. The baseline emissions can be calculated using the *"Tool to calculate the emission factor for an electricity system"*. See B.6 for details.
The baseline emissions would be the emissions resulting from the generation of 137,500 MWh in the grid.

B.5. Demonstration of additionality

NA. The project has been registered under CDM on 14/11/2012 and additionality has been demonstrated. See registered CDM PDD of the project for details.

B.5.1 Prior Consideration

>>

NA. The project has been registered under CDM on 14/11/2012. Prior consideration has been done via GSP (Global Stakeholder Publication) of the project at CDM UNFCCC website (on 28/07/2011) before project start date (27/08/2011).

B.5.2 Ongoing Financial Need

>>

NA. The project is not at the renewal of crediting period.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Sustainable Development Goals Targeted	Most relevant SDG Target	SDG Impact Indicator (Proposed or SDG Indicator)
13 Climate Action (mandatory)	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Emission reductions achieved by the project
SDG 7 – Affordable and Clean Energy	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	Net electricity supplied to the grid
SDG 8 – Decent work and Economic Growth	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises,	Number of jobs created

	including through access to financial services

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact

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SDG 13: Climate Action

The calculation of the estimated emission reduction that is described in the methodology consists of the following four steps:

1. Project emissions
2. Baseline emissions
3. Leakage
4. Emission reductions

Project emissions

Methodology ACM0002 gives the following formula for the calculation of the project emission:

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

With:

PE_y	Project emissions in year *y* (tCO_2e)
$PE_{FF,y}$	Project emissions from fossil fuel consumption in year *y* (tCO_2)
$PE_{GP,y}$	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e)
$PE_{HP,y}$	Project emissions from reservoirs of hydro power plants in year *y* (tCO_2e)

However, in this equation, the factor PE_y is only valid for geothermal and solar thermal projects, $PE_{GP,y}$ is applicable for geothermal projects and $PE_{HP,y}$ refers to CH_4 and CO_2 emissions from hydropower plants. Furthermore, this project is a wind power plant and as such does not plan the combustion of fossil fuels. Therefore, also $PE_{FF,y}$ is considered 0. This leads to:

$$PE_y = 0. \quad (1.1)$$

Baseline emissions

The baseline emissions can be calculated according to the methodology that uses the following approach[9]:

> *Baseline emissions include only CO_2 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.*

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \quad (2)$$

Where:

BE_y	Baseline emission in year *y* (tCO_2/MWh)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project in year *y* (MWh)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the *"Tool to calculate the emission factor for an electricity system"* (tCO_2/MWh)

The calculation of the first factor, $EG_{PJ,y}$ is simple for so-called greenfield projects, which are defined as power plants at a site where no renewable power plant was operated prior to the implementation of the project activity. Following this definition, the project qualifies as a greenfield project and the following method can be applied:

[9] Cited from ACM0002, v.20.0

$$EG_{PJ,y} = EG_{facility,y} \quad (2.1)$$

Where:

$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project in year *y* (MWh)
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh)

For the second factor of equation (2), the *Tool to calculate the emission factor for an electricity system* has to be used. Following the tool, this factor is calculated as a combined margin (CM), consisting of the simple average of the operating margin emission factor (OM) by utilizing an ex-ante 3-year data period and the build margin (BM) emission factor:

That leads to:

$$BE_y = EG_{facility,y} \cdot EF_{grid,CM,y} \quad (2.2)$$

Leakage

In the methodology, leakage is described as follows[10]:

> *No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.*

Therefore, following the methodology, leakage is neglected.

[10] Cited from ACM0002, v.20.0

Emission reductions

The emission reduction can be calculated as difference of the baseline emission, the project emission and the leakage:

$$ER_y = BE_y - PE_y \quad (3)$$

With the input values calculated before:

ER_y	Project emissions in year *y* (tCO_2e)
BE_y	Baseline emissions in year *y* (tCO_2e)
PE_y	Project emissions in year *y* (tCO_2e)

SDG 7: Affordable and Clean Energy

Baseline: Prior to the start of implementation of the project activity, there is no power generation unit at the site of the project and no clean energy is available in the baseline.

Project: The project generates and supplies 137,500MWh electricity to the grid. This is ex ante, the actual data will be monitored ex post by electricity meter.

SDG 8: Decent work and Economic Growth

Baseline: In the absence of the project, no jobs are created.

Project: The project implementation creates 20 permanent skilled jobs, incl. Project director, plant manager, operation & maintenance manager, electrical manager, operation engineers, maintenance engineer, etc.

B.6.2 Data and parameters fixed ex ante

Not applicable. As all parameters available at validation are also parameters, which need to be monitored, they are included in section B.7.1 instead of section B.6.2.

B.6.3 Ex ante estimation of SDG Impact

>>

SDG 13: Climate Action.

Project emissions

Project Emissions have been determined as 0 in Section B.6.1.

$$PE_y = 0 \tag{1.1}$$

Baseline emissions

As mentioned in Section B.6.1, the baseline emissions are calculated as

$$BE_y = EG_{facility,y} \cdot EF_{grid,CM,y} \tag{2.2}$$

Where:

BE_y	Baseline emission in year *y* (tCO_2/MWh)
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the *"Tool to calculate the emission factor for an electricity system"* (tCO_2/MWh)

The grid emission factor for 2020 has been calculated according to *"Tool to calculate the emission factor for an electricity system".*

$$EF_{grid,CM,2010} = 0.4509 \frac{tCO_2e}{MWh} \tag{4}$$

See the details of calculation of grid emission factor as follows:
Following the tool, this factor is calculated as a combined margin (CM), consisting of the simple average of the operating margin emission factor (OM) by utilizing an ex-ante 3-year data period and the build margin (BM) emission factor:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM}$$

With the input values:

$EF_{grid,CM,y}$	Combined margin grid emission factor in year *y* (tCO_2/MWh)

$EF_{grid,OM,y}$	Operation margin grid emission factor in year *y* (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin grid emission factor in year *y* (tCO_2/MWh)
w_{OM}	Weighting of operation margin factor (%)
w_{BM}	Weighting of build margin factor (%)

For the calculation of these input values, the *Tool to calculate the emission factor for an electricity system* describes six steps:

STEP 1. Identify the relevant electricity systems.
STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3. Select a method to determine the operating margin (OM).
STEP 4. Calculate the operating margin emission factor according to the selected method.
STEP 5. Calculate the build margin (BM) emission factor.
STEP 6. Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electricity systems

The Pakistani DNA has not published any delineation of the project electricity system and a connected electricity system. Moreover, the criteria provided in the "Tool to calculate the emission factor for an electricity system" under Step 1 do not result in a clear grid boundary as

1) there is no official data for market prices for electricity over periods of time in Pakistan
2) there is no official data available with regard to the operation of the transmission line between different electricity systems.

In such cases, the "Tool to calculate the emission factor for an electricity system" suggests "to use a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial/regional/national)" to distinguish a connected electricity system. As a provincial grid definition may be too narrow, the national grid definition should be used by default, as per the tool.

Pakistan comprised two electricity grids, the Karachi Electricity Supply Company (KESC) grid, which supplies Karachi city and adjoining areas of Sindh and Balochistan, and the national electricity grid, managed by the *Water and Power Development Authority (WAPDA).* The national grid covers the whole of Pakistan, except the city of Karachi, which is supplied by the KESC grid.

The Pakistan Energy Yearbook, which is annually published by the Government of Pakistan, Ministry of Petroleum and Natural Resources, provides the official data for energy generation in Pakistan for KESC and WAPDA. Further does it mention the IPPs (Independent Power Producers), which deliver their generated power either to WAPDA or KESC.[11]

The proposed project will be connected to the national electricity grid (WAPDA). According to the *Tool to calculate the emission factor for an electricity system,* the project electricity system can be identified as the national grid by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

Although the two grids are interconnected for occasional supply from the national grid to the smaller KESC grid, electricity imports and exports are not foreseen during standard operation. According to the definitions in the above-mentioned tool, the KESC grid can be identified as connected electricity system.
Since none of the two grids is physically connected to foreign grids, electricity imports to the national grid can therefore be excluded.

[11] On the website of the Private Power & Infrastructure Board, Government of Pakistan, Ministry of Water & Power (http://www.ppib.gov.pk/N_commissioned_ipps.htm) it is mentioned which IPPs deliver their generated power to which electricity system (WAPDA or KESC). Currently only two IPPs (Gul Ahmed, Karachi, and Tapal Energy, Karachi) deliver to KESC, while the other IPPs deliver to WAPDA. In 1998, as part of the government's privatization policy, the National Transmission & Despatch Company (NTDC) "was organized to take over all the properties, rights and assets obligations and liabilities of 220 KV and 500KV Grid Stations and Transmission Lines/Network Transmission Lines/Network owned by Pakistan Water and Power Development Authority (WAPDA) (See http://www.ntdc.com.pk). IPPs commissioned under the 2002 power policy are therefore mentioned as delivering their generated power to NTDC.

Electricity exports are not subtracted from the electricity generation data, as advised in the *Tool to calculate the emission factor for an electricity system.*

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

According to Option I of step 2, off-grid power plants are not included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

Four alternatives for the calculation of OM are given in the tool:

a) Simple OM; or
b) Simple adjusted OM; or
c) Dispatch data analysis OM; or
d) Average OM.

The simple OM method (option a) can only be used if low-cost/must-run resources[12] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

As calculated with the data available from the Pakistan Energy Yearbooks published by the Government of Pakistan, the share of low-cost/must-run resources has constituted less than 50% of total grid generation in average of the five most recent years:

2015	39.83%
2016	39.43%

[12] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

2017	35.21%
2018	31.65%
2019	31.81%
Average of the five most recent year (2015 – 2019)	35.59%

As this requirement is met according to the Energy Yearbooks of 2015 - 2019, the simple OM method (option a) is applicable.

Two ways of calculating the operating margin can be applied according to *Tool to calculate the emission factor for an electricity system*, v.7.0:

> Ex ante *option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.*
>
> Ex post *option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.*

For the proposed project, the *ex post* option is chosen. This means, that each monitoring report would have to include the latest calculation of the operation margin emission factor. Since the latest data is usually not available earlier than eighteen months after the end of year *y*, the factor for the year proceeding the previous year (*y-1*) will be used for the calculations.

However, since the data is obviously not available at the moment, the estimated emission reductions shown in Section B.6.4 are calculated using the *ex ante* option based on the latest data, which is available at the start of validation.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

Two ways of calculation are described in the tool[13]:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Whereas Option B can only be applied if:

a) *The necessary data for Option A is not available; and*
b) *Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and*
c) *Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).*

The exact operation and emission factor data is not available for all connected power plants, only nuclear and hydro power have been considered as low-cost/must-run resources in Step 3 and Option I has been chosen in Step 2. Option B can therefore be

[13] Cited from *Tool to calculate the emission factor for an electricity system*, v.7.0

chosen to calculate the OM emission factor using the total net electricity generation, emission and utilization data for each fuel type. The necessary data can be found in the present Pakistan Energy Yearbooks.

The calculation of the OM emission factor is based on the net electricity supplied to the grid by all power plants serving the system, not including the above mentioned low-cost/must-run power plants. To carry out the calculation, the tool provides the following formula:

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \cdot NCV_{i,y} \cdot EF_{CO_2,i,y}\right)}{EG_y}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO_2,i,y}$	CO_2 emission factor of fossil fuel type i in year *y* (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/most-run power plants/units, in year *y* (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year y
y	The relevant year as per the data vintage chosen in Step 3.

As a result of this calculation[14], the simple operation margin for the year 2020 is:

$$EF_{grid,OMsimple,2020} = 0.4729 \frac{tCO_2e}{MWh}$$

[14] All relevant input values and calculations will be provided to the DOE(s) during validation and verification.

Step 5: Calculate the build margin (BM) emission factor

For the terms of data vintage, the tool offers two options[15]:

> ***Option 1:*** *For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*
>
> ***Option 2:*** *For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.*
>
> *The option chosen should be documented in the CDM-PDD.*

For the proposed project, option 2 is chosen and the build margin will be updated every year of the first crediting period. Therefore, the latest figures will be calculated in each monitoring report.

[15] Cited from *Tool to calculate the emission factor for an electricity system*, v.2.2.1.

However, since the data is obviously not available at the moment, the estimated emission reductions shown in Section B.6.4 are calculated using option 1.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure from the *Tool to calculate the emission factor for an electricity system*[16], consistent with the data vintage selected above:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

(c) From $SET_{5\text{-}units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. In this case ignore steps (d), (e) and (f).

Otherwise:

[16] Cited from *Tool to calculate the emission factor for an electricity system*, v.2.2.1

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activities, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample-CDM}$) the annual electricity generation ($AEG_{SET-sample-CDM}$, in MWh);
If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET-sample-CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample-CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

(e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample-CDM->10yrs}$).

Step (a)

The five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and for which official data about their annual electricity generation is available, are:

$SET_{5\text{-units}}$:

No.	Power Unit	Commission Date	Electricity generation 2019 (MWh)[17]
1	T-4th	Year 2019	1,556,240.00
2	Golen Gol	Year 2019	72,150.00
3	CHASNUPP-IV	Year 2018	2,298,000.00
4	Baloki	Year 2018	5,284,190.00
5	Port Qasim	Year 2018	7,553,640.00

$AEG_{SET\text{-}5\text{-}units}$ = 16,764,220 MWh

Step (b)

According to Pakistan Energy Yearbook 2019, the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}) has been calculated as:

AEG_{total} = 111,588,748 MWh

The set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} and for which official data about their annual electricity generation is available, are:

$SET_{\geq 20\%}$:

No.	Power Unit	Commission Date	Electricity generation 2019 (MWh)[18]

[17] Pakistan Energy Yearbook 2019

[18] Pakistan Energy Yearbook 2019

1	T-4th	Year 2019	1,556,240.00
2	Golen Gol	Year 2019	72,150.00
3	CHASNUPP-IV	Year 2018	2,298,000.00
4	Baloki	Year 2018	5,284,190.00
5	Port Qasim	Year 2018	7,553,640.00
6	Reshman	Year 2018	15,110.00
7	CHASNUPP-III	Year 2017	2,694,000.00
8	Haveli Bahdur Shah PP	Year 2017	6,589,440.00

$AEG_{SET-\geq 20\%,}$ = 26,062,770 MWh

Step (c)

$SET_{\geq 20\%}$ comprises the larger annual electricity generation and is therefore SET_{sample}. SET_{sample}. And none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} is used to calculate the build margin.

According to the *Tool to calculate the emission factor for an electricity system,* the build margin emissions factor is the generation-weighted average emission factor of all power units *m* during the most recent year *y*, for which electricity generation data is available. It can be calculated using the following formula:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh).
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh).
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh).
m	Power units included in the build margin.
y	Most recent historical year for which electricity generation data is available.

As a result of this calculation[19], the build margin for 2020 is:

$$EF_{grid,BM,2020} = 0.3851 \frac{tCO_2e}{MWh}$$

Step 6: Calculate the combined margin emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

The weighted average CM method (option A) should be used as the preferred option.

Weighted average CM has been selected, as evident from the grid emission factor calculation sheet provided to GS VVB.

As described above, the combined margin emission factor for an electricity system is calculated using the following formula:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM}$$

The weighting factors w_{OM} and w_{BM} are defined by the *Tool to calculate the emission factor for an electricity system*[20]*:*

> *Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;*

[19] All relevant input values will be provided to the DOE(s) during validation and verification.

[20] Cited from *Tool to calculate the emission factor for an electricity system*, v.2.2.1

All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period , and w_{OM} = 0.25 and
w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Therefore, the combined emission factor for the national grid in Pakistan is:

$$EF_{grid,CM,2020} = 0.4729 \frac{tCO_2e}{MWh} \cdot 0.75 + 0.3851 \frac{tCO_2e}{MWh} \cdot 0.25 = 0.4509 \frac{tCO_2e}{MWh}$$

The quantity of net electricity supplied to the grid is estimated (see Section B.7.1):

$$EG_{facility,y} = 137{,}500\ MWh \tag{5}$$

With these two values, the baseline emissions for the first year can be calculated:

$$BE_y = 137{,}500\ MWh \cdot 0.4509 \frac{tCO_2e}{MWh} \tag{2.3}$$

$$= 61{,}998\ tCO_2e$$

Leakage

Leakage is neglected, as mentioned in Section B.6.1.

Emission Reductions

The proposed project plans to reduce carbon dioxide emissions by replacing grid electricity generated in fossil fuel fired power plants with renewable electricity. According to Section B.6.1, the emission reduction can be calculated with following formula:

$$ER_y = BE_y - PE_y \tag{3}$$

With the input values calculated before:

ER_y Emission Reductions in year *y* (tCO_2e/yr)

BE_y Baseline emissions in year *y* (tCO_2e/yr)

PE_y Project emissions in year *y* (tCO_2e/yr)

According to equations (1.1) and (2.3), that leads to:

$$ER_y = 61{,}998\ tCO_2e - 0\ tCO_2e \quad (3.1)$$

$$ER_y = 61{,}998 tCO_2e \quad (3.2)$$

SDG 7: Affordable and Clean Energy

Baseline: Prior to the start of implementation of the project activity, there is no power generation unit at the site of the project and no clean energy is available in the baseline.

Project: The project generates and supplies 137,500MWh electricity to the grid. This is ex ante, the actual data will be monitored ex post by electricity meter.

Net impact: The project supplies 137,500MWh clean electricity to grid.

SDG 8: Decent work and Economic Growth

Baseline: In the absence of the project, no jobs are created.

Project: The project implementation creates 20 permanent skilled jobs, incl. Project director, plant manager, operation & maintenance manager, electrical manager, operation engineers, maintenance engineer, etc.

Net impacts: 20 jobs are created due to this project.

B.6.4 Summary of ex ante estimates of each SDG Impact

SDG 7: Affordable and Clean Energy

Year	Baseline estimate (MWh)	Project estimate (MWh)	Net benefit (MWh)
02/08/2019 – 31/12/2019	0	57,291	57,291

01/01/2020 – 31/12/2020	0	137,500	137,500
01/01/2021 – 31/12/2021	0	137,500	137,500
01/01/2022 – 31/12/2022	0	137,500	137,500
01/01/2023 – 31/12/2023	0	137,500	137,500
01/01/2024 – 01/08/2024	0	80,209	137,500
Total	**0**	**687,500**	**687,500**
Total number of crediting years	5		
Annual average over the crediting period	0	137,500	137,500

SDG 8: Decent work and Economic Growth

Baseline: no jobs is generated in the baseline.

The project generates 20 jobs during the crediting period.

SDG 13: Climate Action

Year	Baseline estimate (tCO2e)	Project estimate (tCO2e)	Net benefit (tCO2e)
02/08/2019 – 31/12/2019	25,832	0	25,832
01/01/2020 – 31/12/2020	61,998	0	61,998
01/01/2021 – 31/12/2021	61,998	0	61,998
01/01/2022 – 31/12/2022	61,998	0	61,998
01/01/2023 – 31/12/2023	61,998	0	61,998
01/01/2024 – 01/08/2024	36,166	0	36,166
Total	**309,990**	**0**	**309,990**
Total number of crediting years	5		
Annual average over the crediting period	61,998	0	61,998

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

SDG 7 and SDG 13

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
Source of data	Continuous measurement, directly measured by the main meter or the backup meter installed at the output side of the 132 kV substation The following parameters are measured: (i) The quantity of electricity supplied by the project plant/unit to the grid ($EG_{export,y}$); and (ii) The quantity of electricity delivered to the project plant/unit from the grid ($EG_{import,y}$) Difference between $EG_{export,y}$ and $EG_{import,y}$ is taken as $EG_{facility,y}$ The electricity meters are as follows: Equipment: Meter M11 (Main meter) Type: ISKRA MT-860 Accuracy class: 0.2S Serial number: 41601054 Dates of last calibrations: 23/09/2015, 20/09/2017, 12/09/2019, 15/01/2020 Calibration frequency: 2 years Calibration Validity: 23/09/2015 – 22/09/2017, 20/09/2017-19/09/2019, 12/09/2019-11/09/2021, 15/01/2020 – 14/01/2022 Equipment: Meter M12 (Back up meter for M11) Type: ISKRA MT-860 Accuracy class: 0.2S Serial number: 41601051 Dates of last calibrations: 23/09/2015, 20/09/2017, 12/09/2019, 15/01/2020 Calibration frequency: 2 years

	Calibration Validity:	23/09/2015 – 22/09/2017, 20/09/2017-19/09/2019, 12/09/2019-11/09/2021, 15/01/2020 – 14/01/2022
	Equipment:	Meter M21 (Main meter)
	Type:	ISKRA MT-860
	Accuracy class:	0.2S
	Serial number:	41601050
	Dates of last calibrations:	23/09/2015, 20/09/2017, 12/09/2019, 15/01/2020
	Calibration frequency:	2 years
	Calibration Validity:	23/09/2015 – 22/09/2017, 20/09/2017-19/09/2019, 12/09/2019-11/09/2021, 15/01/2020 – 14/01/2022
	Equipment:	Meter M22 (Back up meter for M21)
	Type:	ISKRA MT-860
	Accuracy class:	0.2S
	Serial number:	41601049
	Dates of last calibrations:	23/09/2015, 20/09/2017, 12/09/2019, 15/01/2020
	Calibration frequency:	2 years
	Calibration Validity:	23/09/2015 – 22/09/2017, 20/09/2017-19/09/2019, 12/09/2019-11/09/2021, 15/01/2020 – 14/01/2022
Value(s) applied	137,500	
Measurement methods and procedures	Continuous measurement and at least monthly recording.	
Monitoring frequency	Continuous measurement and at least monthly recording.	
QA/QC procedures	The quantity of net electricity supplied to the grid is monitored by metering equipment that is also used for billing purposes.	

	Testing and calibration of the Metering System shall be carried out by the grid company.
Purpose of data	Baseline Emission Calculation
Additional comment	

SDG 13

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	Pakistan Energy Yearbook 2019
Value(s) applied	0.4509
Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system". For the detailed way of calculation, see section B.6.3
Monitoring frequency	Annually
QA/QC procedures	Appropriateness of the data is reviewed and changes are applied annually by the PO. It will be recalculated annually.
Purpose of data	Baseline Emission Calculation
Additional comment	

SDG 13

Data / Parameter	$FC_{i,y}$
Unit	Mass unit
Description	Amount of fossil fuel type I consumed in the project electricity system in year y
Source of data	Pakistan Energy Yearbook 2019
Value(s) applied	Refer to ER sheet
Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC procedures	-

Purpose of data	Baseline Emission Calculation
Additional comment	-

SDG 13

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass unit
Description	Net calorific value (energy content) of fossil fuel type I in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Refer to ER sheet
Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Baseline Emission Calculation
Additional comment	-

SDG 13

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type I used in power unit m in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Refer to ER sheet
Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	

Additional comment	-

SDG 13

Data / Parameter	EG_y
Unit	MWh
Description	Net electricity generated by the project electricity system in year y
Source of data	Pakistan Energy Yearbook 2019
Value(s) applied	Refer to ER sheet
Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system". For the detailed way of calculation, see section B.6.3.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Baseline Emission Calculation
Additional comment	-

SDG 13

Data / Parameter	$\eta_{m,y}$
Unit	-
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	The default values provided in the table in Annex 1 of the Tool to calculate the emission factor of an electricity system.
Value(s) applied	Refer to ER sheet
Measurement methods and procedures	-
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Baseline Emission Calculation
Additional comment	-

SDG 8 – Decent work and Economic Growth

Data / Parameter	Number of jobs created

Unit	/
Description	Number of jobs created during the implementation of the project
Source of data	Monitoring survey with workers Certificate of workers
Value(s) applied	NA
Measurement methods and procedures	The project will create employment opportunities. Questionaries will be delivered to staffs and asked whether they got income from working for the project and whether they are satisfied with the payment. Staffs can give feedback by filling out questionnaire anonymous. Certificates of worker staffs will be checked as well.
Monitoring frequency	Monitored Annually
QA/QC procedures	The parameter will be monitored via monitoring survey with workers. And interview with operation worker staffs will be carried out by a third party during verification for crosschecking. In addition, continuous input / grievance mechanism has been available for all stakeholders and all stakeholders, incl. workers staffs, can provide their comments at anytime via comment book, GS contact (help@goldstandard.org), telephone and email access. Stakeholders are allowed to make anonymous comments should they wish.
Purpose of data	SDGs impact claim
Additional comment	

Safeguarding Principle 3. Community Health, Safety and Working Conditions

Data / Parameter	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	/

Description	Measures are taken to eliminate safety hazards related to the project implementation, 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.
Source of data	Monitoring survey with workers
Value(s) applied	NA
Measurement methods and procedures	Project logbook or interview with workers
Monitoring frequency	Once per monitoring period
QA/QC procedures	The parameter will be monitored via monitoring survey with workers. And interview with operation worker staffs will be carried out by a third party during verification for crosschecking. In addition, continuous input / grievance mechanism has been available for all stakeholders and all stakeholders, incl. workers staffs, can provide their comments at anytime via comment book, GS contact (help@goldstandard.org), telephone and email access. Stakeholders are allowed to make anonymous comments should they wish.
Purpose of data	SDGs impact claim
Additional comment	

Safeguarding Principle 9.1 Landscape Modification and Soil

Data / Parameter	Soil condition
Unit	/
Description	General soil erosion and sediment control measures would include: - 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.
Source of data	Monitoring survey with workers
Value(s) applied	NA
Measurement methods and procedures	Project logbook or interview with workers
Monitoring frequency	Once per monitoring period
QA/QC procedures	The parameter will be monitored via monitoring survey with workers. And interview with operation worker staffs will be carried out by a third party during verification for crosschecking. In addition, continuous input / grievance mechanism has been available for all stakeholders and all stakeholders, incl. workers staffs, can provide their comments at anytime via comment book, GS contact (help@goldstandard.org), telephone and email access. Stakeholders are allowed to make anonymous comments should they wish. In addition, statement on the environment impacts of the project implementation will be checked and interview with the local environment authority will be conducted by the GS VVB during the verification.
Purpose of data	SDGs impact claim
Additional comment	

Safeguarding Principle 9.4 Release of pollutants

Data / Parameter	Dust emissions
Unit	/
Description	In order to reduce dust emissions during the project implementation, the following dust suppression measures stipulated and implemented:

	- 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.
Source of data	Monitoring survey with workers
Value(s) applied	NA
Measurement methods and procedures	Project logbook or interview with workers
Monitoring frequency	Once per monitoring period
QA/QC procedures	The parameter will be monitored via monitoring survey with workers. And interview with operation worker staffs will be carried out by a third party during verification for crosschecking. In addition, continuous input / grievance mechanism has been available for all stakeholders and all stakeholders, incl. workers staffs, can provide their comments at anytime via comment book, GS contact (help@goldstandard.org), telephone and email access. Stakeholders are allowed to make anonymous comments should they wish. In addition, statement on the environment impacts of the project implementation will be checked and interview with the local environment authority will be conducted by the GS VVB during the verification.
Purpose of data	SDGs impact claim
Additional comment	

B.7.2 Sampling plan

>>

Not Applicable.

B.7.3 Other elements of monitoring plan

>>

The purpose of the monitoring plan is to ensure the completeness, consistency and accuracy of the monitoring system as well as the calculation of the emission reductions. The personnel appointed by the project owner will be in charge of the monitoring plan.

1. Monitoring objects
For SDG7 and SDG 13, the main monitoring objects are the electricity delivered to the grid and the grid emission factor. To calculate the grid emission factor, the following parameters are monitored:

- Amount of fossil fuel type i consumed in the project electricity system in year y ($FC_{i,y}$);
- Net calorific value (energy content) of fossil fuel type i in year y ($NCV_{i,y}$);
- CO2 emission factor of fossil fuel type i used in power unit m in year y ($EF_{CO2,i,y}$);
- Net electricity generated by the project electricity system in year y (EG_y);
- Average net energy conversion efficiency of power unit m in year y ($\eta_{m,y}$)

For SDG8, the number of jobs created during project implementation is monitored.

2. Monitoring organization
A CDM department set up by the project owner will appoint personnel to carry out the monitoring plan. The personnel structure is as follows:

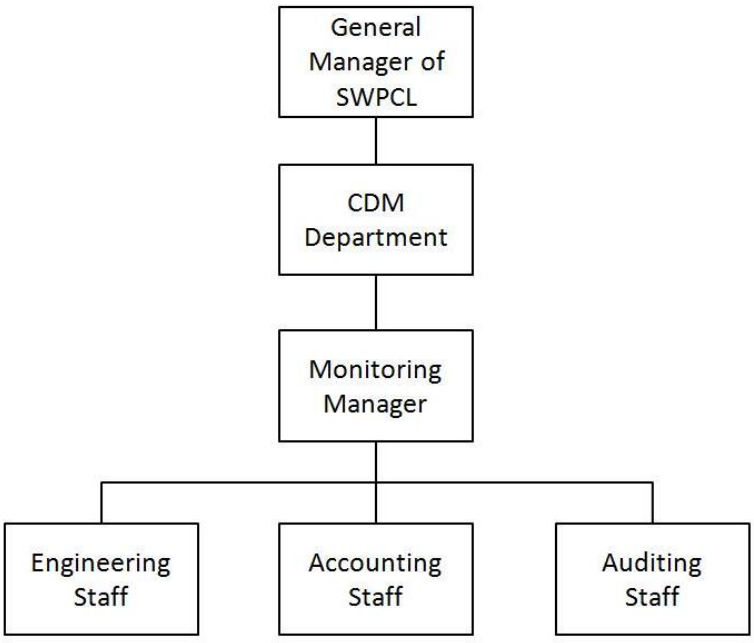

Figure 4: Monitoring organigram

- General manager is responsible to the implementation of monitoring as per the registered monitoring plan.

- A monitoring manager has been appointed to supervise the implementation of the monitoring plan, while further staff, including engineering staff, accounting staff and (internal) auditing staff, have been 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 High Voltage Side (132kV) of the Power Transformer of the Complex to monitor the electricity exported to the grid ($EG_{export,y}$) and imported from the grid ($EG_{import,y}$) by the project activity. The net electricity supplied to grid ($EG_{facility,y}$) is the difference between the electricity exported to the grid ($EG_{export,y}$) and imported from the grid ($EG_{import,y}$), i.e. $EG_{export,y}$ - $EG_{import,y}$. 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 High Voltage Side (132kV) of the Power Transformer of the Complex.

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:

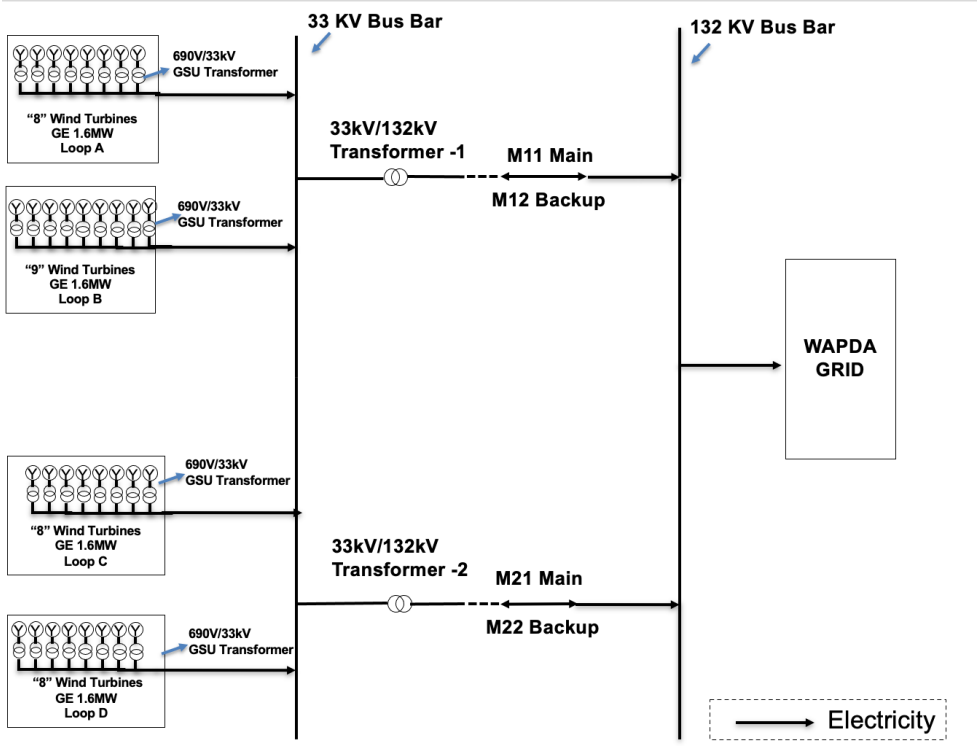

Figure 5: Monitoring diagram of the project

Net electricity generation supplied by the project to the grid during the year y ($EG_{facility,y}$) equals to the difference between electricity exported to the grid ($EG_{export,y}$) and electricity imported from the grid ($EG_{import,y}$) 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), which is signed between the grid company and SWPCL[21]. The meters have been sealed after calibration. Neither the project owner nor the power grid company could unseal or change the meters without the presence of the other party.

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 accounting staff issues the receipts of power sales/purchase to the grid company every month and then keeps the receipts of power sales/purchase.

[21] This EPA is agreed between SWPCL and the grid company based on the manufacturer's recommendations and national standards

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 grid emission factor is calculated annually based on "Tool to calculate the emission factor for an electricity system" Version 7.0 and latest data from Pakistan Energy Yearbooks.

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

Electricity measured by the main meters 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 meters, unless a test by either party reveals it is inaccurate;
b) If the backup meters fail to function normally, the project owner and the grid company shall jointly estimate the correct reading in a conservative manner;
c) If the project owner and the grid company fail to mutually estimate of the correct reading, the readings will be taken as zero, it is conservative.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project

>>

27/08/2011 (EPC contract signing)

C.1.2 Expected operational lifetime of project

>>20 years, 0 months

C.2. Crediting period of project

C.2.1 Start date of crediting period

>>

02/08/2019[22]

C.2.2 Total length of crediting period

>>

5 years, 0 months[23].

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in Appendix 1, ongoing monitoring is summarized below.

Principles	Mitigation Measures added to the Monitoring Plan
Principle 3. Community Health, Safety and Working Conditions	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.
Principle 9.1 Landscape Modification and Soil	The ground would be disturbed to some extent during the construction period, while the project owner will adopt measures to better the ecological environment of the site after the construction completion of the project. According to Section 8.6 Soil contamination of IEE (Initial Environmental Examination) report, the

[22] 2 years prior to time of first submission to GS (for preliminary review).
[23] The CDM crediting period is 22/11/2015-21/11/2025. The GS crediting period is 02/08/2019 – 01/08/2024 (5-year project cycle) and will be renewed on or before 01/08/2024. The next GS crediting period for renewal is 02/08/2024-21/11/2025.

	amount of soil waste generated during construction phase is small. The solid waste is collected and reused and other materials which are not reusable are disposed off for recycling purpose. General erosion and sediment control measures would include: - 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.
Principle 9.4 **Release of pollutants**	In order to reduce dust emissions during the construction phase, the following dust suppression measures stipulated and implemented: ○ 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.

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 – Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	Yes. According to the Gold Standard Gender Policy, Foundational gender-sensitive minimum standards, this project locates

	in Pakistan, gender inequalities and gender-related risks are identified as follows: 1) Discriminations against women; In Pakistan, discrimination against woman[24] starts since her birth. In most families, a boy is considered more important compared to a girl. While girls face restrictions at all stages of their lives, they are, mostly, not allowed to take independent decisions in their lives. Women are asked to cover up; many women are not allowed to leave their houses without permission. Women exist among countless restrictions whereas men are born with a license to do as they please. Many households did not own household appliances that are time saving for women (e.g., refrigerators, electric or gas stoves, or washing machines), and women had limited access to markets, especially in rural areas. 2) Gender-based violence: Many women also face domestic violence[25]; one survey found 15% of female respondents and 12% of male respondents indicated that men have hit women in their households. Other types of gender-based violence, such as bonded labor, acid throwing, sexual violence, honor killings, and human trafficking, also occur in all classes, religions, and ethnicities, and in both urban and rural areas. Further, there are very few

[24] https://dailytimes.com.pk/49828/gender-inequality-in-pakistan/
[25] Pakistan Country Gender Assessment report, by ADB.

	shelters for women who are victims of domestic violence, and women often have difficulty obtaining justice against perpetrators of gender-based violence given the fact that women comprise less than 1% of the police force. Most police stations and courts lack women-friendly facilities as well, like bathrooms or prayer areas. The project design has taken the issues above into account in the project design and implementation. The project does not increase gender inequality. a. During local stakeholders consultation of the project, participating people, incl. women and men have been invited to the consultations for comments or questions. Regarding the female members of the community, they will not approached directly due to cultural limitations and the local community doesn't allow interaction of their women folk with the urban females as well. Also local customs and cultural restrictions don't allow women to attend any public gatherings. So in order to communicate the project details, local male community will be asked to give the project details in their respective homes and share the concerns of women if any regarding the project. b. In addition, the project will also set up "Continuous input / grievance mechanism". Stakeholders, incl. women and men, are allowed to give comments (or make anonymous comments should they wish) via comment book, telephone and email methods.

	c. Women and children, usually spend much of their time at home. The wind power (renewable energy) project is helpful to solve electricity shortage problem in Pakistan and provides women access to clean and affordable sustainable energy (i.e. electricity) for use, which is good to women's daily lives. A checklist of gender–sensitive processes, procedures and implementation risks is established, against which auditors can check for the level of gender-sensitivity compliance: a) Stakeholder consultation participation (check whether "local male community was asked to give the project details in their respective homes and share the concerns of women if any regarding the project"); b) Feedback to stakeholders' comments during "Continuous input / grievance mechanism", if any; c) Access to electricity.
Question 2 – Explain how the project aligns with existing country policies, strategies and best practices	Yes. Pakistan is making progress on discrimination against women/girls. One important institutional actor is the National Commission on the Status of Women (NCSW), which is tasked to examine the relevance and efficacy of all government policies, programs, and measures related to safeguarding and protecting the interests of women and achieving gender equality; and monitor Pakistan's achievements against human and women's rights obligations under international agreements or conventions to which Pakistan is a signatory. Provincial councils on the status of women have also formed, or are forming, in Khyber Pakhtunkhwa and Punjab, with

	missions similar to that of the NCSW but tailored to provincial concerns. In 1996, Pakistan has signed the "CEDAW – Convention on the Elimination of All Forms of Discrimination against Women [26]". The project, with electricity generation by using wind resources and supply to grid, tries to improve the quality of women's lives: a) Access to renewable and clean electricity; b) Encourage women stakeholders to provide comments (indirectly via their husbands, etc) during the stakeholder consultation process; All in all, the project does not increase gender inequality in line with "CEDAW – Convention on the Elimination of All Forms of Discrimination against Women".
Question 3 – Is an Expert required for the Gender Safeguarding Principles & Requirements?	Yes. The representative of National Commission for Human Development (NCHD), whose mission is to improve access to basic education and healthcare in the Pakistan's poorest communities, have been invited for the Gender Safeguarding Principles & Requirements. It's indicated that local customs and cultural restrictions don't allow women to attend any public gatherings but women stakeholders are encouraged to provide comments indirectly via their husbands, etc. In addition, the project company Sapphire provides school and hospital to

[26] http://tbinternet.ohchr.org/_layouts/TreatyBodyExternal/Treaty.aspx?CountryID=36&Lang=EN

	local communities so that the local residents, incl. their children can have access to education and medical support. No negative comments were raised on gender equality for the project.
Question 4 – Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	Yes. The representative of National Commission for Human Development (NCHD), whose mission is to improve access to basic education and healthcare in the Pakistan's poorest communities, have been invited and consulted to provide comment on Gender issues for the project. It's indicated that local customs and cultural restrictions don't allow women to attend any public gatherings but women stakeholders are encouraged to provide comments indirectly via their husbands, etc. In addition, the project company Sapphire provides school and hospital to local communities so that the local residents, incl. their children can have access to education and medical support. No negative comments were raised on gender equality for the project.

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes. Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round.

E.1 Summary of stakeholder mitigation measures

>>

The relevant stakeholders from all categories have been invited for the stakeholder consultation meeting via public invitation, email, telephone etc.

The invitation has been sent on 17/08/2021 and the Local stakeholder consultation meeting has been carried out for comments on 20/09/2021. All the attendees support this project. Relevant project documents, incl. non-technical summary, draft GS PDD,

CDM PDD, CDM validation report, etc have been shared with stakeholders to seeking for comments for two months (02/08/2021-02/10/2021).

No negative comments were received during the stakeholder feedback round and no changes in the project design was made.

During the stakeholder meeting, the representatives of Alternative Energy Development Board (AEDB), Central Power Purchasing Agency (CPPA) and National Commission for Human Development (NCHD) were invited to give comments on the aspects of human rights, gender equality and women's rights, community health, safety and working conditions, cultural heritage, indigenous people, displacement and reset, corruption, economic impacts, climate and energy, water, and environment, ecology and land use, etc.

Mr. Sheraz Khan of AEDB mentioned that:
Thanks for invitation. I have checked the project document for Sapphire 52.8MW wind power project. AEDB is responsible to review and approval of feasibility study report of the project. I have several opinions:

- The project has land taking over agreement with AEDB. The location of the project does not object with historical, cultural, artistic, traditional or religious values or intangible forms of culture;
- The project does not require or cause the physical or economic relocation of people, regardless of temporary or permanent, full or partial;
- The project will not affect any rights of indigenous people.
- The project does not cause additional erosion and/or water body or disrupt the natural pattern of erosion.
- The project is highly encouraged.

Mr. Ahmed Sajjad of CPPA also expressed his comments during the meeting. He said, thanks for inviting me to the stakeholder meeting. I have carefully read the project documents. This kind of project can produce electricity by wind resources, reduce the greenhouse gas emissions.

The project creates job opportunities for local people that would help in alleviation of poverty in area. Also, it will set way forward for clean energy in Pakistan where thermal generation is very dominant. Project uses GE wind turbines. By adopting foreign manufacturer wind turbines, the project activity promotes important transfer of technical know-how to Pakistan, and can act as a pioneer in promoting the spread of this technology to other wind power projects. I fully support the implementation of project.

Mr. Hassan Baig of National Commission for Human Development (NCHD) indicated that, The project, with electricity generation by using wind resources and supply to grid, tries to improve the quality of women's lives by providing access to renewable and clean electricity; and local customs and cultural restrictions don't allow women to attend any public gatherings, therefore, as mentioned during this stakeholder meeting, women stakeholders are encouraged to provide comments (indirectly via their husbands, etc). In addition, the project company Sapphire provides school and hospital to local communities so that the local residents, incl. their children can have access to education and medical support. So, in my opinion, the project contributes to gender equality in Pakistan and I warmly support this project.

E.2 Final continuous input / grievance mechanism

Method	Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.
Continuous Input / Grievance Expression Process Book (mandatory)	It's available outside the wall of the reception room on project site. All stakeholders have access to provide feedback on this project on this book. The contact information of Mr. Jawad Siddiqui is listed on the first page of the book. On each page that follows there is one table, incl. Date, Comment, Response from Sapphire and Response Date, etc. Stakeholders are allowed to make anonymous comments should they wish. One specific person is assigned to check the comments in the book daily, record responses, and ensure the safety of the book as well.
GS Contact (mandatory)	help@goldstandard.org
Telephone access (optional)	Stakeholders can also provide comments via phone. The telephone number of Mr. Jawad Siddiqui of Sapphire is provided to contact. Calls received will be logged and recorded in the same way as the comment book mentioned in a), with the date, comment, action requested and project response recorded for each call. Stakeholders are not required to give their personal information. Cell: +92 300 4222232 Contact person: Mr. Jawad Siddiqui, General Manager

	Projects & Operations
Internet/email access (optional)	Email address of contact person of Sapphire will be provided as well for stakeholders to provide comments in the internet. Emails comments received will be logged and recorded in the same way in the comment book, with the date, comment, action requested 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. Email: jawad.siddiqui@sapphiretextiles.com.pk Contact person: Mr. Jawad Siddiqui, General Manager Projects & Operations

APPENDIX 1 – SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into SECTION D above. Please refer to the instructions in the Guide to Completing this Form.

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in	1. No 2. No	The project is implemented voluntarily by the project owner and got approval from the government. The Project is not complicit in Human Rights abuses. Pakistan[27] ratified "International Convention on the Elimination of all Form of Racial Discrimination" on 21/09/1966; "International Covenant on Civil and Political Rights" on 23/06/2010; and "Convention on	1. N.A. 2. N.A.

[27] https://treaties.un.org/Pages/Treaties.aspx?id=4&subid=A&clang=_en

the Universal Declaration of Human Rights 2. The Project shall not discriminate with regards to participation and inclusion		the Elimination of all Forms of Discrimination against Women" on 12/03/1996. Therefore, the project will not discriminate with regards to participation and inclusion.	
Principle 2. Gender Equality			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women 2. Projects shall apply the principles of nondiscrimination,	1. No 2. No 3. No 4. No	In 1996, Pakistan has signed the "CEDAW – Convention on the Elimination of All Forms of Discrimination against Women [28]". The project does not increase gender inequality. a. During local stakeholders consultation of the project, participating people, incl. women and men have been invited to the consultations for comments or questions. Regarding the female members of the community, they are not approached directly due	1. N.A. 2. N.A. 3. N.A. 4. N.A.

[28] http://tbinternet.ohchr.org/_layouts/TreatyBodyExternal/Treaty.aspx?CountryID=36&Lang=EN

equal treatment, and equal pay for equal work 3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)		to cultural limitations and the local community doesn't allow interaction of their women folk with the urban females as well. Also local customs and cultural restrictions don't allow women to attend any public gatherings. So in order to communicate the project details, local male community have been asked to give the project details in their respective homes and share the concerns of women if any regarding the project. b. In addition, the project has set up "Continuous input / grievance mechanism". Stakeholders, incl. women and men, are allowed to give comments (or make anonymous comments should they wish) via comment book, telephone and email methods. c. Women and children, usually spend much of their time at home. The wind power (renewable energy) project is helpful to solve electricity shortage problem in Pakistan and provides women access to clean and affordable sustainable energy (i.e. electricity) for use, which is good to women's daily lives.	

		Based on above, the project, with electricity generation by using wind resources and supply to grid, tries to improve the quality of women's lives: c) Access to renewable and clean electricity; d) Encourage women stakeholders to provide comments (indirectly via their husbands, etc) during the stakeholder consultation process; The representative of National Commission for Human Development (NCHD), whose mission is to improve access to basic education and healthcare in the Pakistan's poorest communities, have been invited for comments on gender equality for this project. It's indicated that local customs and cultural restrictions don't allow women to attend any public gatherings but women stakeholders are encouraged to provide comments indirectly via their husbands, etc. No negative comments were raised on gender equality for the project.	

		All in all, the project does not increase gender inequality in line with "CEDAW – Convention on the Elimination of All Forms of Discrimination against Women".	
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community	1. Yes	The project makes several measures to ensure that the works are not exposed to unsafe or unhealthy work environments.	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. During operation phase, the wind farm operation and maintenance activities pose a low level of safety hazards

			to the nearby population, as per IEE report. The labour environment of the workers is safe and healthy.
Principle 4.1 Sites of Cultural and Historical Heritage			
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture? >>	No	According to IEE report, the land for the project Wind farm is the principal property of Government of Pakistan and there is absence of any activity on the land since the time (which is more than 60 years) it was taken into possession by Government of Pakistan and leased the land to the project owner for wind farm construction and operation. According to IEE report, the land was never used for any waste disposal, deep mining, oil and gas extraction, industrial activity, groundwater schemes etc. There is no formal and established human settlement on the project location and the adjacent areas According to IEE report (section 6.1), *There is absence of following since the last few decades on the major part of the land which will be utilized for the construction of the treatment plant*	**N.A.**

		• *Any agriculture activity on the land.* • *Any habitat permanent existence.* • *Any commercial activity on the land to support the livelihood of local residents of nearby villages* • *Any human settlement on the land* • *Any green field or wet land or sanctuary*	
Principle 4.2 Forced Eviction and Displacement			
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)? >>	No	According to IEE report, the land was never used for any waste disposal, deep mining, oil and gas extraction, industrial activity, groundwater schemes etc. There is no formal and established human settlement on the project location and the adjacent areas	
Principle 4.3 Land Tenure and Other Rights			
a. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership? b. For Projects involving land use tenure, are there any uncertainties with regards to land	a. No. b. N.A as the answer to a is No.	According to IEE report, the land for the project Wind farm is the principal property of Government of Pakistan and there is absence of any activity on the land since the time (which is more than 60 years) it was taken into possession by Government of Pakistan and leased the land to the project owner for wind farm construction and operation.	

tenure, access rights, usage rights or land ownership? >>			
Principle 4.4 – Indigenous people			
Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples? >>	**No**	According to IEE report (section 6.1), *There is absence of following since the last few decades on the major part of the land which will be utilized for the construction of the plant* • *Any agriculture activity on the land.* • *Any habitat permanent existence.* • *Any commercial activity on the land to support the livelihood of local residents of nearby villages* • *Any human settlement on the land* • *Any green field or wet land or sanctuary* In addition, there is no settlements within the vicinity of the project activity. According to IEE report, a wind turbine creates sound pressure of 50-60 dB (A) (a decibel measurement) at 40 meters. For comparison, a busy office measures 60 dB (A), and nighttime ambient noise in the countryside (leaf rustles, etc.) measures between 20-40 dB (A). On the other hand, wind plants are always located where the	

		wind speed is higher than average, and the "background" noise of the wind tends to "mask" any sounds that might be produced by operating wind turbines, especially because the turbines only run when the wind is blowing. An operating wind farm at a distance of 750 to 1,000 feet is no noisier than a kitchen refrigerator or a moderately quiet room. Therefore, the noise impact is quite low and can be ignored. Shadow flicker is the term used to describe the stroboscopic effect of the shadows cast by rotating blades of wind turbines when the sun is behind them. The shadow would create a disturbance to people inside buildings exposed to such light passing through a narrow window or create problem to such people which are working in the field. However, the site is located in the slightly hilly terrain. No such buildings and fields are present near to the site. Distance from the site to the near by village is more than 5-8 kms. Therefore, the shadow flicker impact is very low and can be ignored.	
Principle 5. Corruption			
1. The Project shall not involve, be	No	The cost of construction and implementation of project will be covered by the project	

complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects		owner. Furthermore, the cost of the project is involved in the Tariff Petition of the project that was taken as appropriate and approved by government. Pakistan has passed Prevention of Corruption Act[29]. The project does not involve and is not complicit in corruption	
Principle 6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the	1. No 2. No 3. No. 4. No. 5. No	1. The design and construction of the wind power plant are conducted by a qualified engineering company who is willing to work for the project. The EPC contract has been signed with engineering company by project owner. During operation phase, the workers are involved based on volunteer principle and the freedoms and rights are not limited. The workers have labor certificates and are qualified to do the assigned work. No child labor is involved.	1. N.A. 2. N.A. 3. N.A. 4. N.A. 5. N.A.

[29] http://joshandmakinternational.com/resources/laws-of-pakistan/anti-corruption-accountability-laws/the-prevention-of-corruption-act-west-pakistan-extension-ordinance-1958/

ILO fundamental conventions 2. Workers shall be able to establish and join labour organisations 3. Working agreements with all individual workers shall be documented and implemented and include: a) Working hours (must not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND		Pakistan is a party to ILO (International Labor Organization) Convention 87 Freedom of Association and Protection of the Right to Organise Convention[30]. Pakistan is a party to ILO C29 Forced Labour Convention[31]. 2. Workers have the rights to establish and join the labour organizations as per the Labor Legislation of Pakistan[32]. 3. Labor contracts have been signed with all the individual workers, incl. conditions of labor, employer's liability, workers' compensation and health insurance, industrial and labor disputes, termination of the contract, etc[33]. 4. No Child labor is involved in the project. The workers are trained and qualified to the implementation of the project.	

[30] http://www.ilo.org/dyn/normlex/en/f?p=1000:11200:1061780266196662::::P11200_INSTRUMENT_SORT:4
[31] http://www.ilo.org/dyn/normlex/en/f?p=1000:11200:1061780266196662::::P11200_INSTRUMENT_SORT:4
[32] https://www.ilo.org/ifpdial/information-resources/national-labour-law-profiles/WCMS_158916/lang--en/index.htm
[33] National Labour Law Profile: Islamic Republic of Pakistan, https://www.ilo.org/ifpdial/information-resources/national-labour-law-profiles/WCMS_158916/lang--en/index.htm

c) Remuneration (must include provision for payment of overtime), AND d) Modalities on health insurance, AND e) Modalities on termination of the contract with provision for voluntary resignation by employee, AND f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave.		Pakistan has ratified ILO Conventions on child labour (ILO Convention 182: Worst Forms of Child Labour Convention, ILO Convention 138: Minimum Age Convention)34. 5. various trainings are provided to all Engineers and Managerial staffs of the project, incl. Basic understanding of wind power; Training on Yawing and Lubrication system of wind turbines; Wind Turbine Generators (WTG) SCADA system; WTG safety training, WTG Climbing Training, Health and Safety Training, etc. Based on above, the staffs are qualified and receive training for the working.	

[34] http://www.ilo.org/dyn/normlex/en/f?p=1000:11200:1061780266196662::::P11200_INSTRUMENT_SORT:4

4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion) 5. The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures			
Principle 6.2 Negative Economic Consequences			
1. Does the project cause negative economic	**No**	The project generates electricity by using wind resources and supply to grid.	

consequences during and after project implementation? >>		The project will reduce dependency on expensive fossil fuels and create more affordable clean energy for Pakistan. Electrical energy generated by the project will be supplied to the national grid under Energy Purchase Agreement (EPA) with the grid. As per the Generation License issued by National Electric Power Regulatory Authority (NEPRA), the project has been granted for electricity generation business until year 2035.	
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario? >>	No	The purpose of the project is to utilize wind resources for electricity generation through the construction of a wind farm with a total capacity of 52.8 MW and to deliver the electricity generated from the project to electricity grid. By replacing the electricity supplied by the 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 CO_2 emissions.	N.A
Principle 7.2 Energy Supply			

Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project will reduce dependency on fossil fuel based electricity and create more affordable clean energy by using wind resources for Pakistan.	N.A
>>			
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	No surface and ground water will be used during construction and operation of the project. The wind farm does not use water for electricity generation, only consumption for drinking water and sanitary water.	N.A
>>			
Principle 8.2 Erosion and/or Water Body Instability			
a. Could the Project directly or indirectly	1. No.		N.A.

cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? b. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	2. N.A as the answer to 1 is No.	1. The wind farm does not use water for electricity generation, only consumption for drinking water and sanitary water. Therefore, the project does not cause erosion and/or water body instability or disrupt the natural pattern of erosion.	
>>			
Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	Yes	The project involves electricity generation by using wind resources and supplies to grid. It does not involve land/soil use for crops production or other products. The ground would be disturbed to some extent during the construction period, while the project owner will adopt measures to better the ecological environment of the site after the construction completion of the project.	The ground would be disturbed to some extent during the construction period, while the project owner will adopt measures to better the ecological environment of the site after the construction completion of the project. According to Section 8.6 Soil contamination of IEE report, the amount of soil waste
>>			

			generated during construction phase is small. The solid waste is collected and reused and other materials which are not reusable are disposed of for recycling purpose. General erosion and sediment control measures would include: - 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.
Principle 9.2 Vulnerability to Natural Disaster			
Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No.	The design and construction of the plant are conducted by qualified engineering company following relevant industry standards, as per the signed EPC (Engineering, Procurement and Construction) contract. It will not lead to vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic condition.	N.A.
>>			
Principle 9.3 Genetic Resources			
Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development, or take	No.	The project use wind resources to generate electricity and the electricity is delivered to grid. No Genetically modified organisms is included in the project.	N.A.

place in facilities or farms that include GMOs in their processes and production)? >>			
Principle 9.4 Release of pollutants			
Could the Project potentially result in the release of pollutants to the environment? >>	Yes.	The project use wind resources to generate electricity and the electricity is delivered to grid. It is clean and renewable energy. Therefore, no other pollutants are released to the environment by the project. Dust emission would be happened during the construction phase of the project. During the operation phase, wind turbines do not use fossil fuel combustion to generate electricity, and hence no gas emissions to the atmosphere. Potential for soil contamination from possible spills of chemicals used in operations and maintenance activities, such as lubricating oils within the turbines, etc. During the implementation of the project, Chemicals, such as oils and paints, are kept within the dedicated storage area in the site control	In order to reduce dust emissions during the construction phase, the following dust suppression measures stipulated and implemented: ○ 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;

		room. This area will be sealed and designed to incorporate appropriate containment to prevent discharge of any spills to the ground.	○ Shut-down of diesel-powered mechanical equipment or trucks inside the worksites when they are not in operation.
Principle 9.5 Hazardous and Non-hazardous Waste			
Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials? >>	No.	The project use wind resources to generate electricity and the electricity is delivered to grid. It is clean and renewable energy. It does not involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials.	N.A.
Principle 9.6 Pesticides & Fertilisers			
Will the Project involve the application of pesticides and/or fertilisers? >>	No	The project use wind resources to generate electricity and the electricity is delivered to grid. It is clean and renewable energy. No pesticides is involved in the project.	N.A.
Principle 9.7 Harvesting of Forests			
Will the Project involve the harvesting of forests?	No.	It is not relevant to the project	N.A.

>>			
Principle 9.8 Food			
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No.	It is not relevant to the project	N.A.
>>			
Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry?	No.	The project use wind resources to generate electricity and the electricity is delivered to grid. Animal husbandry is not involved in the project.	N.A.
>>			
Principle 9.10 High Conservation Value Areas and Critical Habitats			
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No	The Project does not involve any effect on degradation, conversion of any critical natural habitat. The migratory birds are coming from the cold regions and they spent their winter season at the proposed site because the site is near to the Kenjhar Lake. Birds are killed or injured when they fly, the danger posed by rotating	N.A.

>>		blades. As per IEE report, according to statistics on birds mortality below, the ratio of bird's mortality (0.1%) is minimum as compare to the birds are killed during other circumstances. **Statistics on Birds Mortality** • Wind turbines ----0.1% • Communication towers----2.5% • Pesticides----7% • Vehicles----7% • High tension lines----8% • Cats----10% • Buildings and windows----55% • Others----10%	
Principle 9.11 Endangered Species			
a. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? b. Does the Project potentially impact	a. No b. No	a. There are no endangered species identified as per IEE report; b. The project activity is not expected either potentially impact other areas where endangered species may be present through transboundary affects.	

other areas where endangered species may be present through transboundary affects?			
>>			

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Sapphire Wind Power Co. Ltd.
Registration number with relevant authority	
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Organization name	UPM Umwelt-Projekt-Management GmbH

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APPENDIX 3- LUF ADDITIONAL INFORMATION

Not applicable.

APPENDIX 4-SUMMARY OF APPROVED DESIGN CHANGES

The project has been registered under CDM on 14/11/2012 and the UNFCCC Reference no is 8163. The project has the installed capacity change from 49.5MW to 52.8MW and the start date of crediting period is also changed to be 22/11/2015. Such post-registration change has been approved on 10/04/2017 (PRC ref no: PRC-8163-001). See the link for details: https://cdm.unfccc.int/PRCContainer/DB/prcp771647029/view

Revision History

Version	Date	Remarks
1.2	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Inclusion criteria table added Gender sensitive requirements added Prior consideration (1 yr rule) and Ongoing Financial Need added Safeguard Principles Assessment as annex and a new section to include applicable safeguards for clarity Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on Stakeholder Consultation information required Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1.0	10 July 2017	Initial adoption