المجلس العالمي للبصمة الكربونية
GLOBAL CARBON COUNCIL

Project Submission Form

V3.2 - 2020

Contents

COVER PAGE- Project Submission Form (PSF)	
Complete this form in accordance with the instructions attached at the end of this form.	
BASIC INFORMATION	
Title of the Project Activity	**Antai 1*40MW Waste Heat Utilization for Power Generation Project**
PSF version number	2.0
Date of completion of this form	31/08/2022
Project Owner(s) (Shall be consistent with De-registered CDM Type B Projects)	Shanghai Yunce Carbon Management Co., Ltd.
Country where the Project Activity is located	The People's Republic of China
GPS coordinates of the project site(s)	The central geographical coordinates of the proposed project is the latitude (N) 37°4'48.91" (37.0802°), and the longitude (E) 111°58'44.60" (111.9791°).
Eligible GCC Project Type as per the Project Standard (Tick applicable project type)	☐ **Type A:** ☐ Type A1 ☒ Type A2 ☐ **Type B – De-registered CDM Projects:**[1] ☐ Type B1 ☐ Type B2
Minimum compliance requirements	☒ Real and Measurable GHG Reductions ☒ National Sustainable Development Criteria (if any) ☒ Apply credible baseline and monitoring methodologies ☒ Additionality ☒ Local Stakeholder Consultation Process ☒ Global Stakeholder Consultation Process

[1] Owners of Type B projects shall fill in the form provided in Appendix 7.

<table>
<tr><td></td><td>☒ No GHG Double Counting
☒ Contributes to United Nations Sustainable Development Goal 13 (Climate Action)</td></tr>
<tr><td>Choose optional and additional requirements
(Tick applicable label categories)</td><td>☒ Do-no-net-harm Safeguards to address Environmental Impacts
☒ Do-no-net-harm Safeguards to address Social Impacts
☒ Contributes to United Nations Sustainable Development Goals (in addition to Goal 13)</td></tr>
<tr><td>Applied methodologies
(Shall be approved by the GCC or the CDM)</td><td>CDM Methodology: ACM0012 Waste energy recovery, Version 6.0</td></tr>
<tr><td>GHG Sectoral scope(s) linked to the applied methodology(ies)</td><td>GHG-SS#1: Energy industries (renewable - / non-renewable sources)</td></tr>
<tr><td>Applicable Rules and Requirements for Project Owners
(Tick applicable Rules and Requirements)</td><td>
<table>
<tr><th colspan="2">Rules and Requirements</th><th>Reference</th><th>Version</th></tr>
<tr><td colspan="2">☒ ISO 14064-2</td><td></td><td></td></tr>
<tr><td colspan="2">☒ Applicable host country legal requirements /rules</td><td></td><td></td></tr>
<tr><td rowspan="7">☒ GCC Rules and Requirements[2]</td><td>☒ Project Standard</td><td></td><td>V3.1</td></tr>
<tr><td>☐ Approved GCC Methodology (XXXXX)</td><td></td><td></td></tr>
<tr><td>☒ Program Definitions</td><td></td><td>V3.1</td></tr>
<tr><td>☒ Environment and Social Safeguards Standard</td><td></td><td>V2.0</td></tr>
<tr><td>☒ Project Sustainability Standard</td><td></td><td>V2.1</td></tr>
<tr><td>☒ Instructions in Project Submission Form (PSF)-template</td><td></td><td>V3.2</td></tr>
<tr><td>☐ Add rows if required</td><td></td><td></td></tr>
</table>
</td></tr>
</table>

[2] GCC Program rules and requirements: https://www.globalcarboncouncil.com/resource-centre.html

	☒ CDM Rules[3]	☒ Approved CDM Methodology (ACM0012)		V6.0
		☒ Tool for the demonstration and assessment of additionality	TOOL 01	V7.0.0
		☐ Combined tool to identify the baseline scenario and demonstrate additionality	TOOL 02	
		☒ Tool to calculate the emission factor for an electricity system	TOOL 07	V7.0
		☐ Demonstration of additionality of microscale project activities	TOOL 19	
		☐ Demonstration of additionality of small-scale project activities	TOOL 21	
		☐ Additionality of first-of-its-kind project activities	TOOL 23	
		☒ Common practice	TOOL 24	V3.1
		☒ Investment analysis	TOOL 27	V11.0
		☐ Positive lists of technologies	TOOL 32	
		☐ Guidelines for objective demonstration and assessment of barriers		
		☒ Tool to calculate project or leakage CO2 emissions from fossil fuel combustion	TOOL 03	V3.0
		☒ Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	TOOL 05	V3.0
		☒ Determine the baseline efficiency of thermal or electric energy generation systems	TOOL 09	V3.0

[3] CDM Program rules: https://cdm.unfccc.int/Reference/index.html

		☒ Tool to determine the remaining lifetime of equipment	TOOL 10	V01
Choose Third Party External Project Verification by approved GCC Verifiers[4] (Tick applicable verification categories)	☒ GHG emission reductions (i.e., Approved Carbon Credits **(ACCs)**) ☒ Environmental No-net-harm Label (**E+**) ☒ Social No-net-harm Label (**S+**) ☒ United Nations Sustainable Development Goals (**SDG+**) ☐ Bronze SDG Label ☒ Silver SDG Label ☐ Gold SDG Label ☐ Platinum SDG Label ☐ Diamond SDG Label ☒ CORSIA requirements (**C+**) ☐ Host Country Attestation on Double counting			

[4] **Note:** GCC Verifiers under the Individual Track are not eligible to conduct verifications for GCC Project Activities whose owners intend to supply carbon credits (ACCs) for use within CORSIA.

Declaration to be made by the Project Owner(s)[5] (Tick all applicable statements)	The Project Owner(s) declares that: ☒ The Project Activity complies with the eligibility of the applicable project type (A1, A2, B1 or B2) as stipulated by the Project Standard. ☒ The Project Activity shall start operations, and start generating emission reductions, on or after 1 January 2016. ☒ The Project Activity is eligible to be registered under the GCC program. ☒ No carbon credits generated by the proposed Project Activity will be claimed as carbon credits in any other GHG program anywhere in the world, either for compliance or voluntary purposes, for the entire 10-year GCC crediting period. ☒ The proposed Project Activity, if Type A, is NOT registered as a GHG Project Activity in any other GHG program or any other voluntary program anywhere in the world. ☒ The proposed Project Activity is NOT included as a component Project Activity (CPA) in a registered GHG Programme of Activities (PoA) under any GHG program (such as the CDM or any other voluntary program) anywhere in the world. ☒ The proposed Project Activity is NOT a CPA that has been excluded from a registered PoA under any GHG program (such as the CDM or any other voluntary program) anywhere in the world. Provide details (if any) below for the boxes ticked above.
	☒ If a GCC project chooses to apply to use ACCs under CORSIA, the Project Owner(s) is required to declare that they are aware that they must obtain and provide to the GCC and its Registry (operated by IHS Markit) a written attestation from the host country's national focal point (e.g., Ministry of Environment or Civil Aviation Authority) or focal point's designee, as required by CORSIA Emissions Unit Eligibility Criteria, which: ☒ Confirms the avoidance of double counting as required by CORSIA; ☒ Shall be made publicly available prior to the use of units from the host country under CORSIA; and ☒ Places all responsibility on the Project Owner(s) to replace any and all doubly claimed or counted ACCs by the host country, in the GCC registry operated by IHS Markit. Provide details below for the boxes ticked above

[5] The "Project Owner" means the legal entity or organization that has overall control and responsibility for the Project Activity.

	The Project Owner(s) declares that: ☒ All of the information provided in this document, including any supporting documents submitted to the GCC or its registry operator IHS Markit at any time, is true and correct; ☒ They understand that a failure by them to provide accurate information or data, or concealing facts and information, can be considered as negligence, fraud or willful misconduct. Therefore, they are aware that they are fully responsible for any liability that arises as a result of such actions. Provide details below for the boxes ticked above
Appendixes 1-7	Details about the Project Activity are provided in Appendixes 1 through 7 to this document.
Name, designation, date and signature of the Project Owner(s)	**On behalf of Shanghai Yunce Carbon Management Co., Ltd.** **Jian Qian, Project Manager**
	31 August 2022

1. PROJECT SUBMISSION FORM

Section A. Description of the Project Activity

A.1. Purpose and general description of the Project Activity

>>
Antai 1*40MW Waste Heat Utilization for Power Generation Project (hereafter referred to as "the project") is located in Antai Iron & Steel plant in Jiexiu city, Shanxi province, the People's Republic of China.

The purpose of the project is to recover and utilize waste blast furnace gas to generate electricity by installing one unit of 140t/h gas-fired boiler, one unit of single extraction condensing turbine with the capacity of 40MW and one unit of 45MW electricity generator. It is estimated that system will run for 7200h per year so the net power supplied to the Antai plant's internal electricity system can achieve 267,840MWh annually. The system will be boosted to 35kV and then connected to the 110kV Antai substation, thus substitute the equivalent electricity imported from the North China Power Grid (NCPG), which is the baseline scenario in the absence of the project activity.

By supplying an annual average of 267,840MWh of electricity to Antai's internal electricity system during the fixed 10-year crediting period will replace the power generation of those fossil fuel-fired power plants delivered to the NCPG under the baseline scenario. The project is expected to achieve greenhouse gas emission reductions of 190,675tCO_2e annually. The total emission reductions during the fixed 10-year crediting period are to be 1,906,750tCO_2e.

The project is expected to contribute to SDG 8, 9 and 13.

SDG 8 Economic Growth: The project creates direct and indirect employment opportunities during construction and operation phases, so it contributes to SDG Target 8.5 "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities and equal pay for work of equal value".

SDG 9 Resilient Infrastructure: The project recovers and utilizes waste heat for power generation which then replaces the electricity from fossil fuel dominated power sources. Therefore, it contributes to SDG Target 9.4 "By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies."

SDG 13 Climate Change: The implementation of the project reduces the CO_2 emissions to the atmosphere. Therefore, it contributes to SDG Target 13.3 "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning".

A.2. Location of the Project Activity

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Address and geodetic coordinates of the physical site of the Project Activity		
Physical address	**Latitude (N)**	**Longitude (E)**
Jiexiu city, Shanxi province, the People's Republic of China	37°4'48.91" (37.0802°)	111°58'44.60" (111.9791°)

Figure 1: Project Location

A.3. Technologies/measures

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The project will use waste blast furnace gas to generate electricity by installing gas-fired boiler and turbine-generator system. The project mainly consists of circulating water system, condensing water system, lubricant system, air cooling system, main steam system, reheat system, gas-fired boiler, turbine and generator system, high and low voltage electric distribution, etc.

The designed fuel is 100% waste blast furnace gas with a small quantity of coke oven gas as the inflaming fuel in the project activity. The waste blast furnace gas and waste coke oven gas come both from the coal gas tunnel of Antai Iron & Steel plant. The main fuel, waste blast furnace gas from gas tunnel, will then enter into the boiler to heat the water to generate steam with high temperature and high pressure, and then the steam will be led into a steam turbine driving a generator for producing electricity, transferring the energy contained in the steam to electricity output. The main process is illustrated in Figure 2 below.

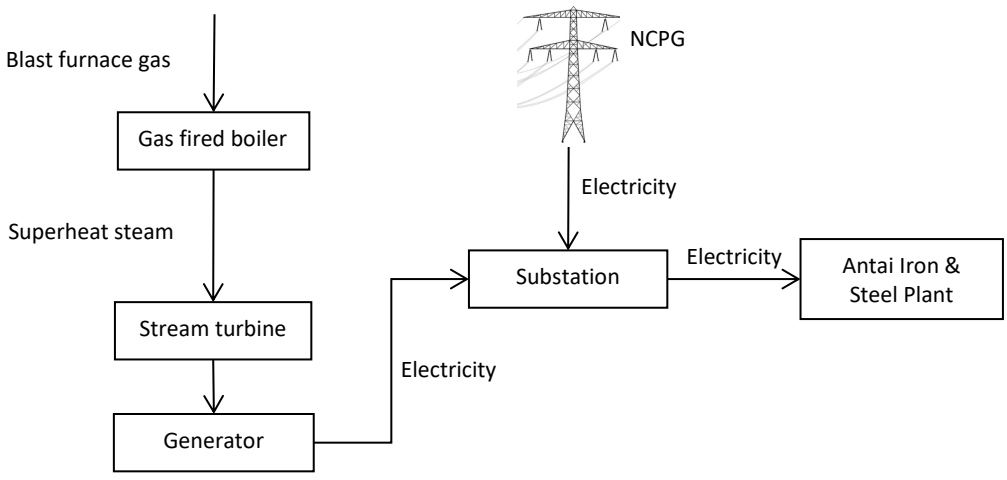

Figure 2: Project process

The technical parameters of the main equipment are listed in the table below.

Table 1: Technical specifications of main equipment

Main Equipment	**Value**
Gas fired boiler	
Model	NG-140/13.7-Q
Rated capacity	140t/h
Efficiency	90%
Steam Turbine	
Model	N40-13.24/535/535
Rated capacity	40MW

Steam pressure	13.2 MPa
Steam temperature	535℃
Generator	
Rated capacity	45MW
Rated voltage	10.5kV
Rated speed	3000r/min

A.4. Project Owner(s)

Location/ Country	Project Owner(s)	Where applicable[6], indicate if the host country has provided approval (Yes/No)
P.R.China	Shanghai Yunce Carbon Management Co., Ltd.	N/A

A.5. Declaration of intended use of Approved Carbon Credits (ACCs) generated by the Project Activity

>> The project activity is expected to generate ACCs for a full 10-year crediting period and supply the credits to offset the following GHG emissions:

Period		Name of the Entities	Purpose and Quantity of ACCs to be supplied
From	To		
05/09/2020	04/09/2030	To be confirmed during issuance	To be confirmed during issuance

ACCs from the project activity is used to create an additional revenue stream for the investment and for reducing the project financial risks and thus enabling the sustainability of the project. No double counting occurs in the scope of this project since GCC is the only program applied.

A.6. Additional requirements for CORSIA

>>
Please see Section E and F.

Section B. Application of selected methodology(ies)

B.1. Reference to methodology(ies)

[6] For example, *Project Coordination Form* is to be filled-in by Project Owners for projects located in Qatar. A written attestation from the host country's national focal point or the focal point's designee, as required by CORSIA (Refer section A.5 of the PSF guidelines).

>>
CDM Methodology: ACM0012 Waste energy recovery (V6.0).

Applied CDM tools:

- TOOL01: Tool for the demonstration and assessment of additionality (Version 7.0.0)
- TOOL03: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (Version 03.0)
- TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)
- TOOL07: Tool to calculate the emission factor for an electricity system (Version 7.0)
- TOOL09: Determine the baseline efficiency of thermal or electric energy generation systems (Version 03.0)
- TOOL10: Tool to determine the remaining lifetime of equipment (Version 01)
- TOOL24: Common practice (Version 3.1)
- TOOL27: Investment analysis (Version 11.0)

Please refer to the following link for applied methodology and tools:
https://www.globalcarboncouncil.com/standards/baseline-monitoring-methodologies/
https://cdm.unfccc.int/methodologies/PAmethodologies/approved

B.2. Applicability of methodology(ies)

>>
The project is applicable to ACM0012.

Applicability	Project Activity
The useful energy generated form the utilization of waste energy carried in the WECM stream(s) for a project activity may be one or a combination of the below: (a) Generation of electricity; (b) Cogeneration; (c) Direct use as process heat source in as unit process/chemical reactor; (d) Generation of heat in element process; (e) Generation of mechanical energy; or (f) Supply of heat of reaction with or without process heating.	Yes (a) The project utilizes the waste heat from blast furnace gas to generate electricity.
In the absence of the project activity, the following situations for the WECM stream(s) would occur: (a) WECM would not be recovered and therefore would remain unutilized (e.g. flared or released to the atmosphere) at the existing or Greenfield WEG facility; or (b) WECM would be partially recovered and/or recovered in less efficient equipment of recipient facility, and the uncovered portion of WECM stream would remained unutilised at the existing or Greenfield WEG facility. In this case, the type of useful energy produced from this WECM by the project activity	Yes. (a) In the absence of the project, the WECM streams from the blast furnace would be flared then released to the atmosphere without recovery and further utilization.

shall be the same type of useful energy that is produced in the absence of project activity implementation using partially recovered WECM and/or less efficient use of WECM (e.g. if the WECM is partially used to produce electricity in the absence of project activity then the methodology is only applicable if the WECM is recovered in the project to produce electricity).	
This methodology applies to the following two categories of project activities: (a) Category 1: Project activities that involve recovery of WECM as per situation in paragraph 4(a) above; and (b) Category 2: Project activities that involve enhanced/improved energy recovery of the WECM as compared to the baseline scenario as per situation in paragraph 4(b) above.	The project follows Category 1.
Project activities under Category 2 would include improving the WECM recovery that may: (i) capture and utilize a larger quantity of WECM stream as compared to the historical situation in an existing WEG facility, or capture and utilize a larger quantity of WECM stream as compared to a "reference waste energy generating facility" fr a Greenfield facility; and/or (ii) apply better energy efficient equipment to replace/modify/expand waste energy recovery equipment in an existing recipient facility, or implement a better energy efficient equipment than the "reference energy generation facility" for a Greenfield facility.	N/A
The methodology is applicable under the following conditions: (a) Regulations do not require the WEG facility to recover and/or utilize the waste energy prior to the implementation of the project activity; (b) For project activities which recover waste pressure, the methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable; (c) If the production capacity of the WEG facility is expanded as a result of the project activity, the added production capacity shall be treated as a Greenfield facility; (d) WECM that is released under abnormal operation (for example, emergencies, shut down) of the WEG facility shall not be included in the emission reduction calculations.	Yes. (a) Currently regulations do not require the WEG facility to recover and/or utilize waste energy. The project doesn't involve recover waste pressure and expansion of WEG facility. WECM release under abnormal operation of the WEG facility if occurred will be excluded in the emission reduction calculations.
For project activities which supply useful energy from recovery and use of waste energy to existing recipient facilities, the methodology is applicable to those project activities that generate electricity and/or mechanical energy to supply up to and beyond the maximum capacity of the pre-project equipment of existing recipient facilities. The methodology, however, is not applicable to project activities that supply additional thermal energy beyond the maximum pre-project capacity of existing recipient facility(ies).	N/A The project includes the installation of new turbine and electricity generator to utilize the recovered blast furnace gas to produce electricity. No existing recipient facilities is involved.

The methodology is **not** applicable to cases where a WECM stream is partially recovered in the absence of the CDM project activity to supply the heat of reaction, and the recovery of this WECM stream is increased under the project activity to replace fossil fuels used for the purpose of supplying heat of reaction.	N/A In the absence of the project, there is no partial recovery of WECM stream.
This methodology is also **not** applicable to project activities where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power. However, projects recovering waste energy from single cycle and/or combined cycle power plants or any power only generation plant for the purpose of generation of heat only can apply this methodology.	N/A. The project is to recover and utilize waste blast furnace gas in an integrated system including gas fired boiler, steam turbine and generator units to produce electricity and other related auxiliary facilities such transformers, substations to supply and distribute the generated electricity.
No emission reduction credits can be claimed at and beyond the end of the lifetime of the waste energy generation equipment.	Yes. The operational lifetime of the project is 20 years, beyond the crediting period of 10 years.
In case the equipment at recipient facility(ies) that will be displaced by the project activity reaches end of its lifetime during the crediting period, separate guidance is provided in the section on the identification of baseline scenario below.	N/A. All equipment applied in the project are new with operational lifetime more than 20 years.
The extent of use of waste energy from the WECM facilities in the absence of the CDM project activity will be determined in accordance with the procedures to this methodology provided in: (a) Appendix 1 for Greenfield project activities; and (b) Appendix 2 for existing project activities.	Yes. The project is a Greenfield project activities which will follow the procedures in Appendix 1.
If multiple WECM are available in the WEG facility and can be used interchangeably for various applications as part of the energy sources in the WEG facility, the implementation of the CDM project activity shall not result in the reduction of the recovery of any WECM, which would be totally or partially recovered in the absence of the project activity. This shall be demonstrated by use of the guidance provided in Appendix 3 of this methodology.	N/A

B.3. Project boundary, sources and greenhouse gases (GHGs)

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Th project utilizes the waste gas for power generation; the power generated will replace electricity purchased from the NCPG, which is dominated by thermal power. Therefore, according to the applicable methodology, the spatial extent of the project boundary includes:

– Waste gas sources, i.e. blast furnaces;

– The power plants connected physically to the electricity grid that the project will affect. In the project, the electricity will be used at the internal electricity system of Antai plant, which is connected to the NCPG. Therefore, the spacial boundary of electricity grid is the project and all other grids physically connected to the NCPG, which includes Beijing, Tianjin, Shanxi, Hebei, Shandong and Inner Mongolia provincial grids.

Table below illustrates which emission sources are included and which are excluded from the project boundary for determination of both baseline and project emissions.

Source		GHG	Included?	Justification/Explanation
Baseline	Electricity consumption, grid or captive source	CO_2	Yes	Major emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Fossil fuel consumption in element process for thermal energy	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A
	Fossil fuel consumption in cogeneration plant	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A
	Fossil fuel consumption for generation of steam used in the flaring process, if any	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A
Project Activity	Fossil fuel consumption for supply of process heat and/or reaction heat	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A
	Supplemental fossil fuel consumption at the project plant	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A
	Supplemental electricity consumption	CO_2	Yes	Main emissions
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification
	Electricity import to replace captive electricity, which was generated using waste energy in absence of project activity	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A
	Energy consumption for gas cleaning	CO_2	No	N/A
		CH_4	No	N/A
		N_2O	No	N/A

B.4. Establishment and description of the baseline scenario

>>

In accordance with the methodology ACM0012, the baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternatives.

Realistic and credible alternatives should be determined for:
(a) Waste energy use in the absence of the project activity at the WEG facility;
(b) Power generation in the absence of the project activity for each recipient facility if the project activity involves electricity generation for that recipient facility;
(c) Heat generation (process heat and/or heat of reaction) in the absence of the project activity, for each recipient facility if the project activity involves generation of useful heat for that recipient facility; and
(d) Mechanical energy generation in the absence of the project activity, for each recipient facility if the project activity involves generation of useful mechanical energy for that recipient facility.

The project activity is recovery and utilization of waste gas from blast furnaces at Antai plant to generate electricity for its own demand. The project does not involve heat and mechanical energy generation, therefore, plausible and credible baseline scenarios available to the project that provide outputs or services comparable to the project activity are determined in the following steps, excluding baseline options below as per the methodology.
(a) Do not comply with legal and regulatory requirements; or
(b) Involve fuels (used for the generation of heat, power or mechanical energy) at the recipient facility(ies) that are not produced or imported in the host country.

Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations.

As per the methodology ACM0012, for waste energy use in the absence of the project activity, the realistic and credible alternative(s) may include, inter alia:
W1: WECM is directly vented to the atmosphere without incineration;
W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released (or vented) to the atmosphere without incineration;
W3: Waste energy is sold as an energy source;
W4: Waste energy is used for meeting energy demand at the recipient facility(ies);
W5: A portion of waste energy is recovered for generation of heat and/or electricity and/or mechanical energy, while the rest of the waste energy available to the recipient facility is either flared/released to atmosphere or remains unutilized;
W6: All the waste energy produced at the WEG facility is captured and used for generating electricity for export or generating stream.

As per the methodology ACM0012, for power generation in the absence of the project activity, the realistic and credible alternative(s) may include, inter alia:
P1: Proposed project activity not undertaken as a CDM project activity;
P2: On-site or off-site existing fossil fuel fired cogeneration plant;

P3: On-site or off-site Greenfield fossil fuel fired cogeneration plant;
P4: On-site or off-site existing renewable energy based cogeneration plant;
P5: On-site or off-site Greenfield renewable energy based cogeneration plant;
P6: On-site or off-site existing fossil fuel based existing identified captive power plant;
P7: On-site or off-site existing identified renewable energy or other waste energy based captive power plant;
P8: On-site or off-site Greenfield fossil fuel based captive plant;
P9: On-site or off-site Greenfield renewable energy or other waste energy based captive plant;
P10: Sourced from grid-connected power plants;
P11: Existing captive electricity generation using waste energy, but at a lower efficiency or lower recovery (if the project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency or lower recovery than the project activity);
P12: Existing cogeneration using waste energy, but at a lower efficiency or lower recovery.

Of the 18 alternatives listed above:

Scenario analysis on W1:
In the absence of the project activity, WECM produced in the blast furnace is released directly to the atmosphere, which is in compliance with all applicable legal and regulatory requirements. Therefore, scenario W1 is included as baseline scenario.

Scenario analysis on W2:
Waste heat is released directly to the atmosphere in the absence of the project activity. W2 is the same as W1; therefore scenario W2 is also included as baseline scenario.

Scenario analysis on W3:
Although the recovery facilities which would be costly could be theoretically installed to capture the waste heat and sell to other users, in reality, there is no other major heat user in the vicinity of the project location to make this worthwhile. Therefore, this scenario W3 is not a credible and realistic alternative, it is then excluded.

Scenario analysis on W4:
Waste energy is used for meeting energy demand. The realistic situation of scenario W4 is just to implement this power generation project to meet the energy demand of the steel plant but not to develop it as a GCC project; therefore, scenario W4 is included as baseline scenario.

Scenario analysis on W5:
Antai plant mainly consumes electricity from the NCPG in the absence of the project. By recovering waste energy as much as possible to generate electricity and replace a portion of the purchased electricity is the most plausible choice for Antai plant. Therefore, scenario W5 is excluded.

Scenario analysis on W6:

Antai plant is the manufacturer of iron and steel, who is not permitted to export and sell electricity to other users or the pubic grid. In addition, as described in scenario W3, there is no other major heat users near the project site, the export of steam is also unlikely. Therefore, scenario W6 is excluded.

Scenario analysis on P1:
This scenario is in compliance with all applicable legal and regulatory requirements. Therefore, scenario P1 is included as baseline scenario.

Scenario analysis on P2:
There is no on-site or off-site existing fossil fuel fired cogeneration plant. Therefore, scenario P2 is not credible and realistic then excluded.

Scenario analysis on P3:
Since no corresponding heat demand exists at the project site, the project only involves electricity generation. Therefore, scenario P3 is not credible and realistic, then excluded.

Scenario analysis on P4:
There is no on-site or off-site existing renewable energy based cogeneration plant. Therefore, scenario P4 is excluded.

Scenario analysis on P5:
Since there is no wind, hydro, biomass, tidal or geothermal resources near the project site, and a lack of available land and huge investment cost required for constructing a solar power plant with equal capacity as well as no thermal load demand, scenario P5 is not credible and realistic, then excluded.

Scenario analysis on P6:
There is no existing on-site or off-site fossil fuel based captive plant nearby, all electricity needed for the coke production is sourced from the NCPG. Therefore, scenario P6 is excluded.

Scenario analysis on P7:
Based on the same reason as scenario P6, scenario P7 is excluded.

Scenario analysis on P8:
When considering an alternative with equal annual power generation, the installed capacity in case of a coal-fired power plant shall be 65MW. According to China’s regulations, construction of thermal power plants with the installed unit capacity of 135MW or below is prohibited in areas that are covered by large grids such as provincial grids. Therefore, scenario P8 is not credible and realistic and then excluded.

Scenario analysis on P9:

As there is no wind, hydro, biomass, tidal or geothermal resources near the project site and the cost of constructing a renewable energy based captive plant is prohibitive and therefore not credible. In addition, renewable energy is constrained by resources with obvious daily fluctuation, it is not suitable for a stable power supply demand. Moreover, there is no other greenfield captive power plant, the waste heat in the stream used for the project is impossible to be used in other plant. Therefore, scenario P9 is excluded.

Scenario analysis on P10:
The electricity generated by the project is used for replace the electricity sourced from the grid-connected power plants, therefore scenario P10 included as baseline scenario.

Scenario analysis on P11:
This scenario P11 represents captive generation with lower efficiency or lower recovery than the project activity. Since there is no such existing captive electricity generation in the project boundary, scenario P11 is excluded.

Scenario analysis on P12:
Since there no corresponding heat demand at the project site, the project activity is to generate electricity only. Therefore, scenario P12 is not credible and realistic and then excluded.

Based on the analysis, the combination of possible baseline alternatives are listed in the table below.

Waste heat / Power	W1 & W2 Waste energy is vented to atmosphere with/without incineration	W4 Waste energy is recovered for power generation, but not as a GCC project
P1 Implementation of the project activity but not undertaken as a GCC project	This combination is not possible, because there is no power generation if the waste energy is vented to atmosphere.	Combination 2: The implementation the project activity but not as a GCC. It is the possible scenario.
P10 Electricity supplied by the NCPG	Combination 1: Waste energy is vented to the atmosphere, and all electricity is supplied by the NCPG. This combination is the existing baseline scenario, and is consistent with the current laws and regulations.	This combination is not possible. The project activity aims to replace the electricity from the grid.

Step 2: Step 2 and/or Step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" shall be used to identify the most plausible baseline scenarios by eliminating non-feasible options (e.g. alternatives where barriers are prohibitive or which are clearly economically unattractive).

According to the methodology, the project participants are required to use investment analysis for the identification of the baseline scenario for the following situation:
Where, for an existing WEG facility, the WECM utilised by the project activity was totally or partially recovered in the absence of the CDM project activity.
Combination 1 is the existing scenario. It doesn't face any prohibitive obstacles. Combination 2 is to implement the project activity but not as a GCC project. The investment analysis in section B.5 indicates that without carbon revenues, the project IRR is 8.77%, lower than the IRR of reference facilities, which is not financially viable.

Step 3: If more than one credible and plausible alternative scenario remain, the alternative with the lowest baseline emissions shall be considered as the baseline scenario

Based on above analysis, the only plausible alternative scenario to the project is Combination 1: Waste energy is vented to the atmosphere, and all electricity is supplied by the NCPG.

B.5. Demonstration of additionality

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As per GCC Project Standard, the GCC applies the following approach for demonstrating additionality, consisting of two components:
(a) A Legal Requirement Test; and
(b) An Additionality Test either based on a Positive List test or a project-specific additionality test.

The project is not enforced by law. The project passes the legal requirement test since there are no enforced laws, statues, regulations, court orders, environmental-mitigation agreements, permitting conditions of other legally-binding mandates requiring its implementation. Furthermore, as per para. 46 of Project Standard, voluntary commitments/agreements within a sector or by an entity do not constitute the legal requirement. An Additionality Test is further applied as follows.

Additionality of the project is demonstrated by using the approved CDM tool: Tool for the demonstration and assessment of additionality (Version 7.0.0).

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

According to the analysis in section B.4, there are two combinations that could not be excluded among the alternatives in waste heat utilization and electricity supply, i.e.
Combination 1 (alternatives W1/W2 and P10): Waste energy is vented to the atmosphere, and all electricity is supplied by the NCPG.

Combination 2 (alternatives W4 and P1): The implementation the project activity but not as a GCC. It is the possible scenario.
According to the requirements of the "Tool for the demonstration and assessment of additionality", an investment analysis is chosen to demonstrate the additionality.

Step 2. Investment analysis

Sub-step 2a: Determine appropriate analysis method
"Tool for the Demonstration and Assessment of Additionality" recommends three analysis methods: simple cost analysis (Option I), investment comparison analysis (Option II) or benchmark analysis (Option III).

For Option I: Since the project will earn revenues not only from the carbon credits sales but also from savings the cost of purchase electricity from the grid, the simple cost analysis method (Option I) is not appropriate.
For Option II: Investment comparison analysis method is only applicable to the projects whose baseline scenarios are similar to investment projects. The baseline scenario of the project involves the NCPG rather than new investment projects, therefore Option II is not appropriate.
For Option III: The project will use benchmark analysis method (Option III) based on the consideration that the benchmark IRR for the investor is available.

Sub-step 2b: Option III. Apply benchmark analysis
According to the "Economical assessment and parameters for construction project, 3rd edition" jointly published by National Development and Reform Commission and Ministry of Housing and Urban-Rural Development of China, a project will be financially acceptable when the project Internal Return Rate is higher than the sectoral benchmark IRR, which is 12% for the project activity.

Sub-step 2c: Calculation and comparison of financial indicators
The following parameters and values in Table 2 below are applied for calculation and comparison of financial indicator, IRR.

Table 2: Parameters to determine the project IRR

Items	Unit	Value
Installed capacity	MW	40
Annual electricity supplied	MWh	267,840
Investment	Million CNY	154.27
Electricity tariff (excl. VAT)	CNY/kWh	0.462
Value Added Tax (VAT)	%	17
Income tax	%	25
City construction and maintenance tax	%	7
Educational surcharge	%	5
Project operational lifetime	year	20
Annual operational and maintenance	Million CNY	101.7

costs (O&M costs)		
Depreciation year	year	15
Residual rate	%	5

Data source: Feasibility Study Report, national and local regulations.

The input values in financial analysis are derived from the Feasibility Study Report (FSR) of the project, officially approved by the Development and Reform Commission of Jiexiu City.

The calculated IRR of the project with and without carbon credits revenue are compared in table below.

Table 3: Financial analysis results of the project

	IRR (after tax)
Without carbon credits revenue	8.77
With carbon credits revenue	14.43

Sub-step 2d: Sensitivity analysis

The sensitivity analysis is to show whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions.

According to CDM TOOL27 Investment analysis, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. For this project, the total static investment constitutes more than 20% of the total project costs; the product of electricity tariff and annual electricity delivered to the grid constitute more than 20% of the total revenue of the project; and the total O&M throughout the project lifetime also accounts for more than 20% of the project cost.

Therefore, considering the reasonable variations in the critical assumptions, the sensitivity analysis is conducted with four key factors of investment, O&M costs, annual electricity supplied and electricity tariff, as shown in Table 4.

Table 4: Sensitivity Analysis

IRR (%)	−10%	0	+10%
Investment	10.04	8.77	7.70
O&M costs	14.67	8.77	1.09
Annual electricity supplied	-0.99	8.77	15.73
Electricity tariff	-0.99	8.77	15.73

The actual operation data of the project shows that neither decrease in investment and O&M costs nor increase in electricity supplied and tariff occurred. Therefore, the project undertaken without carbon credits revenue is not financially attractive and the carbon credits revenue will improve the financial indicators of the project.

Step 3. Barrier analysis

The proposed project is additional in terms of financial attractiveness and is applicable to Step 2. Therefore, Step 3 is not developed.

Step 4. Common practice analysis

Sub-step 4a: The proposed project activity(ies) applies measure(s) that are listed in the definitions section above
Common practice analysis is carried out as per CDM TOOL24 Common Practice.

Sub-step 4a-1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity
The installed capacity of the project is 40MW, so the applicable capacity range as +/-50% of the total design capacity is 20MW~60 MW.

Sub-step 4a-2: identify similar projects which fulfill all of the following conditions:

a. The projects are located in the applicable geographical area.

Considering the geographical difference (e.g. access to natural resources, climate, terrain) as well as social-economic differences (e.g. regulatory framework, infrastructure, economic development levels, economic structure, access to technology, access to financing, tariff levels) between the provinces in China, see below, Shanxi province instead of entire country is selected for analysis.

b. The projects apply the same measure as the proposed project activity.

The applicable measure is power generation based on waste energy, same as the project.

c. The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the project activity.

The energy source is the waste energy from blast furnace, same as the project.

d. The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the project plant.

The applicable project is to produce electric power, same as the project.

e. The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1.

As defined in Step 4a-1, the applicable capacity range is from 20MW to 60MW.

f. The projects started commercial operation before the PSF is published for global stakeholder consultation or before the start date of project activity, whichever is earlier for the proposed project activity.

For common practice analysis, the start date should be as per CDM terminology. According to the “Glossary CDM terms”, start date is defined that “for the CDM project activity, where a contract is signed for such expenditures, it is the date on which the contract is signed. In other cases, it is the date on which such expenditures are incurred. If the CDM project activity or CPA involves more than one of such contracts or incurred expenditures, it is the first of the respective dates.” Therefore,

the start date of project is the signing date of the construction contract, which the earliest contract signed for the project.

The earliest contract signed date for the project is 12/08/2019. Thus, for the common practice analysis of the project, only projects which started commercial operation before 12/08/2019 are considered.

In summary, the waste blast furnace gas to power generation projects with the installed capacity of 20MW~60MW starting commercial operation before 12/08/2019 in Shanxi province are chosen for this analysis.

According to the publicly available information, there is no blast furnace gas to power generation projects within this range which are not applied or applying CDM or other carbon revenue mechanisms identified.

Sub-step 4a-3: within the projects identified in Step 2, identify those that are neither registered project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

According to sub-step 4a-2, therefore, $N_{all} = 0$.

Sub-step 4a-4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

Similar as above, $N_{diff}=0$.

Sub-step 4a-5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

Since $N_{all}=0$ and $N_{diff}=0$, F does not exist, and the difference between N_{all} and N_{diff} is less than 3, therefore the project is NOT a common practice within a sector in the applicable geographical area.

B.6. Estimation of emission reductions

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B.6.1. Explanation of methodological choices

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Of the project scenarios mentioned in the methodology ACM0012, the project activity corresponds to scenario 1 which is the generation of electricity only. Therefore emissions reductions are calculated as described below:

Baseline Emissions

$BE_y = BE_{En,y} + BE_{flst,y}$ (1)

Where,

BE_y = The total baseline emissions during the year y in tCO_2

$BE_{En,y}$ = The baseline emissions from energy generated by the project activity during the year y in tCO_2

$BE_{flst,y}$ = Baseline emissions from fossil fuel combustion, if any, either directly for flaring of waste gas or for steam generation that would have been used for flaring the waste gas in the absence of the project activity (tCO_2). This is relevant for those project activities where in the baseline steam is used to flare the waste gas

Since the project only recovers waste energy for power generation, no fossil fuel would have been used for flaring the waste gas or for steam generation in absence of the project activity, therefore, $BE_{flst,y}=0$, $BE_y=BE_{En,y}$

Calculate the $BE_{En,y}$

$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y}$ (2)

Where,

$BE_{Elec,y}$ = Baseline emissions from electricity, which is used for power generation as well as electric motors used to provide mechanical energy during the year y (tCO_2)

$BE_{Ther,y}$ = Baseline emissions from thermal energy (due to heat generation by element process), which is used for both useful heat as well as driving steam turbines to provide mechanical energy during the year y (tCO_2)

Since no thermal supply in the project activity, $BE_{Ther,y}=0$. Therefore, $BE_{En,y}=BE_{Elec,y}$

Calculate the $BE_{Elec,y}$

$BE_{Elec,y} = f_{cap} \times f_{wcm} \times (\sum_j BE_{EL,y} + \sum_j BE_{ME,j,y})$ (3)

Where,

$BE_{Elec,y}$ = Baseline emissions from electricity during the year y (tCO_2)

f_{cap} = The ratio of waste energy generated at a historical level, expressed as a fraction of the total waste energy used in the project activity for producing useful in year y. The ratio is 1 if the waste energy generated in project year y is the same or less than that generated at a historical level. The value is estimated using the equations in section 5.4.3.2 (of ACM0012). For Greenfield facilities, f_{cap} is 1. If the project in appendix 1 (of ACM0012) concludes that the waste energy would have been partially utilised in the "reference waste energy generating facilities" this fact will be captured in the factor $f_{practice}$ (refer to equations in section 5.4.1.2.2 (of ACM0012) for the use of factor $f_{practice}$)

f_{wcm} = Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy.

$BE_{EL,j,y}$ = Baseline emissions corresponding to the electricity supplied in year y by the project activity to the recipient facility j as per case (1a) and case (1b) described

below during the year y (tCO_2)

$BE_{ME,j,y}$ = Baseline emissions corresponding to the supply of mechanical energy by the project activity to recipient facility j as per case (2a) and case (2b) described below during the year y (tCO_2)

In the absence of the project activity, all electricity will be supplied by the NCPG. No mechanical energy is involved both in the baseline scenario and the project activity. Therefore, $BE_{ME,j,y} = 0$. $BE_{EL,j,y}$ is calculated below as per case (1a) in the methodology.

$$BE_{EL,j,y} = EG_{i,j,y} \times EF_{Elec,i,j,y} \quad (4)$$

Determination of $EG_{i,j,y}$

$EG_{i,j,y}$ is the quantity of electricity supplied in the absence of the project activity during the year y in MWh. Since all electricity will be sourced from the NCPG in the absence of the project activity and be displaced after the project is implemented, the value of $EG_{i,j,y}$ is equal to the net electricity supplied by the project, that is 267,840MWh.

Calculate the $EF_{Elec,i,j,y}$

$EF_{Elec,i,j,y}$ is the CO_2 emission factor for the electricity source i (i= grid), displaced due to the project activity, in year y in tCO_2e/MWh. The baseline scenario for the project is to purchase electricity from the NCPG. For the project, source i is the NCPG. “Tool to calculate the emission factor for an electricity system” is applied to determine the emission factor of the NCPG.

According to “Tool to calculate the emission factor for an electricity system” (V7.0), six steps are applied to calculate the baseline emission factor.
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 ($EF_{grid,OM,y}$);
Step 5: Calculate the build margin (BM) emission factor ($EF_{grid,BM,y}$);
Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$).

As China DNA has published the calculation method for emission factor of grid, the published data and method have been applied for this project to calculate operating margin (OM) and build margin, as following steps.

Step 1: Identify the relevant electricity systems

The NCPG which covers Beijing, Tianjin, Hebei province, Shanxi province, Shandong province and Inner Mongolia Autonomous Region is involved in the project. Therefore, the NCPG is identified as the relevant electric power system.

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

(optional)

The **Option I** (only grid power plants are included in the calculation) is chosen.

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

Calculation of Operating Margin should be based on one of the four following methods according to the tool:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

As the low-cost/must run resources constituted less than 50% of total power generation of the NCPG in recent five years. The method (a) Simple OM is selected and the following data vintage is chosen to calculate the emission factor.

Under method (a), ex ante option is selected, the emission factor is determined once at the validation stage, thus no monitoring and recalculate 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.

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_2e/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants. It may be calculated:

Option A: Based on data on the net electricity generation and a CO_2 emission factor of each power plant / 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.

The project adopts Option B due to,

a) The necessary data for option A is not available;
b) Only nuclear and renewable power generation is considered as low-cost/must-run power sources; the quantity of electricity supplied to the grid by above sources is known; and
c) Off-grid power plants are not included in the calculation.

Where Option B is used, the simple OM emission factor is calculated as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2i,y})}{EG_y} \quad (5)$$

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 fuel i in year y (GJ/ mass or volume unit)
$EF_{CO2,i,y}$	= 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/must-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

Based on the most recent three years (2015-2017) where the data are the latest and publicly available at the time of this PSF submission, the calculation result of $EF_{grid,OM,y}$ is 0.9419 tCO_2e/MWh. The data is published by China DNA[7].

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

As per Section 6.5 of TOOL07 (Version 7.0), in terms of vintage of data, project participants can choose between one of the following two options:

(a) 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 PSF submission to the GCC verifier 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 crediting period renewal request to the GCC verifier. 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.

(b) 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 emission 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.

In line with 2019 Baseline Emission Factors for Regional Power Grids in China published by China DNA, Option 1 is chosen for the project; the BM emission factor is calculated ex ante based on the most recent information available on units already built for sample group m at the time of this project description submission.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as GCC 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);

[7] https://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/t20201229_815386.shtml

(b) Determine the annual electricity generation of the proposed project electricity system, excluding power units registered as GCC project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as GCC 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 ($AEG_{SET \geq 20\%}$, 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:

(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 GCC project activities, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the net set comprises 20% of the annual electricity generation of the proposed 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 ($SET_{sample\text{-}GCC}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}GCC}$, in MWh); If the annual electricity generation of that set comprises at least 20% of the annual electricity generation of the proposed project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}GCC \geq 20\%} * AEG_{total}$), then use the sample group $SET_{sample\text{-}GCC}$ to calculate the build margin Ignore steps (e) and (f).

Otherwise:

(e) Include in the sample group $SET_{sample\text{-}GCC}$ 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 proposed 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 ($SET_{sample\text{-}GCC \geq 10yrs}$).

The BM emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (6)$$

Where,

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor of the NCPG 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)
$FE_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m = Power units included in the build margin
y = The most recent year for which power generation data is available

As it is difficult to obtain the detailed data on the power generation, fuel consumption and thermal efficiency of each newly built power unit from public documents, a deviation of TOOL07 (Version 7.0) is adopted following the clarifications given by the CDM EB concerning the BM emission factor calculation:

(1) The CDM EB suggested using the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin.
(2) The EB agreed the use of capacity additions during last 1-3 years for estimating the build margin emission factor for grid electricity.
(3) The EB also agreed to use of weights estimated using installed capacity in place of annual electricity generation.

The newly built power plants in the past few years are bundled into “grouped new power plant” according to their construction year, their province and their fuel type. The annual net electricity generation in the year y of each “grouped new power plant” $EG_{m,y}$ is estimated according to their total capacity and the average utilization hours, as the following equation:

$$EG_{m,y} = CAP_m \times H_{m,y} \quad (7)$$

Where,
$EG_{m,y}$ = Annual net electricity generation the unit m in year y (MWh)
CAP_m = Installed capacity of the unit m (MW)
$H_{m,y}$ = Utilization hour of the unit m in the year y (h), determined according to the average utilization hour of the same type of unit in the same province
y = The most recent year for which the generation data is available. For the calculation of BM in 2019, y =2017
m = Grouped new power plant

Since the newly built power plants in the same province (A), in the same year (t) and using the same fuel type (k) are grouped into “a grouped new power plant”, CAP_m represents the total installed capacity of fuel type k power plants located in the provinces A and in the year t:

$$CAP_m = CAP_{A,t,k} \quad (8)$$

Where,
CAP_m = Installed capacity of the unit m (MW), with m representing the specified combination of A, t, and k
$CAP_{A,t,k}$ = Total installed capacity of fuel type k power plants located in the province A and in the year t
A = Provinces covered by the NCPG, namely, Beijing, Tianjin, Hebei province, Shanxi province, Shandong province and Inner Mongolia Autonomous Region

t = Years related to the grouped new power plants, for the 2019 calculation, t represents 2017, 2016, 2015…. until the aggregated electricity generation of the grouped new plants reaches 20% of the total electricity generation of the NCPG
k = Fuel type of the grouped new power plants, including solar, thermal (coal, gas, oil, waste incineration, other thermal), nuclear, wind, solar and others

The emission factors of each fuel type $EF_{EL,m,y}$ are determined according to the Option A2 in the TOOL07, as the following equation:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad (9)$$

Where,
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{CO2,m,i,y}$ = Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$ = Average net energy conversion efficiency of power unit m in year y (ratio)
m = All power units serving the grid in year y except low-cost/must-run power units
3.6 = Conversion factor (GJ/MWh)

Among the fuel types, the emission factors of solar, nuclear, wind, solar, other thermal and others are 0. Concerning the emission factors of coal, gas, oil and waste incineration, equation takes the following form due to conservativeness:

$$EF_{best,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{best,y}} \quad (10)$$

Where,
$EF_{best,m,y}$ = Emission factor of power unit m with the best technology commercially available in year y (tCO_2/MWh)
$\eta_{best,y}$ = Power generation efficiency of the best technology commercially available in year y
m = Power units serving the grid with coal, gas, oil or waste incineration in year y

According to the latest and available data at the time of this PSF submission, $EF_{grid,BM,y}$ is calculated to be 0.4819 tCO_2/MWh. The data is published by China DNA.

Step 6: Calculate the combined margin (CM) emission factor

The calculation of the combined margin 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.

The simplified CM method (option b) can only be used if:

a) The project activity is located in: (i) a Least Developed Country (LDC); or in (ii) a country with less than 10 registered CDM projects at the starting date of validation; or (iii) a Small Island Developing States (SIDS); and
b) The data requirements for the application of step 5 above cannot be met.

This PSF choose option A.

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (11)$$

Where,

$EF_{grid,OM,y}$	= operating margin emission factor of the NCPG (tCO_2e/MWh)
$EF_{grid,BM,y}$	= build margin CO_2 emission factor of the NCPG (tCO_2e/MWh)
w_{OM}	= the weighting of operating margin emission factor (%)
w_{BM}	= the weighting of build margin emission factor (%)

According to the tool, as a solar power generation project, w_{OM} =0.5 and w_{BM}=0.5 for the full 10-year crediting period.

$EF_{grid,CM,y}$ = 0.9419×0.5 + 0.4819×0.5 = 0.7119 tCO_2e/MWh

Determination of f_{wcm}

f_{wcm} is the fraction of total electricity generated by the project activity using waste energy. The project employs waste energy recovery for power generation technology, so the value of f_{wcm} is 1.

Determination of f_{cap}

f_{cap} is the energy that would have been produced in project year y using waste energy generated in base year expressed as a fraction of total energy produced using waste source in year y. The ratio is 1 if the waste energy generated in project year y is same or less than that generated in base year. As per the methodology ACM0012, the value of f_{cap} can be estimated using the three methods. For ex ante calculation, f_{cap} is 1.

Project Emissions

According to the methodology, the project emissions include emissions due to: 1) combustion of auxiliary fuel to supplement waste gas/heat; and 2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption.

$$PE_y = PE_{AF,y} + PE_{EL,y} \quad (12)$$

Where,

PEy	= Project emissions due to the project activity (tCO_2)
$PE_{AF,y}$	= Project activity emissions from on-site consumption of fossil fuels by the unit

process(es) and/or cogeneration plant(s) if they are used as supplementary fuels due to non-availability of waste energy to the project activity or due to any other reason (tCO_2)

$PE_{EL,y}$ = Project activity emissions from on-site consumption of electricity for gas cleaning equipment or other supplementary electricity consumption (tCO_2)

The project will not require any additional combustion of fossil fuel; therefore, $PE_{AF,y}=0$. According to "Tool to calculate baseline, project and/or leakage emissions from power consumption", the project emission is the following:

$$PE_{EL,y} = PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1+TDL_{j,y}) \quad (13)$$

Where,

$PE_{EC,y}$ = Project emissions from consumption of power in gas cleaning equipment of project activity or other supplementary project power consumption (tCO_2/yr)

$EC_{PJ,j,y}$ = Additional power consumed in year y as a result of the implementation of the project activity source j (MWh)

$EF_{EL,j,y}$ = Emission factor for power generation for source j in year y (tCO_2/MWh), in this case it is grid emission factor of the NCPG

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing power to source j in year y. A default value of 20% has been adopted

Therefore, $PE_y = PE_{EL,y} = PE_{EC,y}$

Leakage

According to the methodology, there is no GHG emission caused by leakage emission of the proposed project activity, i.e. $LE_y = 0$.

Emission Reductions

According to the methodology, the emission reduction by the project activity during a given year y is:

$$ER_y = BE_y - PE_y \quad (14)$$

Where,

ER_y = Total emissions reductions during the year in tons of CO_2

PE_y = Emissions from the project activity during the year in tons of CO_2

BE_y = Baseline emissions for the project activity during the year in tons of CO_2

B.6.2. Data and parameters fixed ex ante

>>

Data / Parameter

Data / Parameter:	**$EF_{EL,j,y}$ ($EF_{Elec,i,j,y}$ / $EF_{grid,CM,y}$)**
Methodology	ACM0012

reference	
Data unit	tCO_2/MWh
Description	Combined margin emission factor of the NCPG
Measured/calculated /default	Calculated
Data source	2019 Baseline Emission Factors for Regional Power Grids in China, published by China DNA.
Value(s) of monitored parameter	0.7119
Measurement/ Monitoring equipment (if applicable)	-
Measuring/reading/ recording frequency (if applicable)	Ex-ante determined and fixed for the crediting period
Calculation method (if applicable)	Calculated as per TOOL07: Tool to calculate the emission factor for an electricity system
QA/QC procedures	Official data from DNA
Purpose of data	Baseline emission calculation
Additional comments	The detailed calculation process of $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ can be found at the following link: http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/t20201229_815386.shtml

Data / Parameter:	**$TDL_{j,y}$**
Methodology reference	ACM0012
Data unit	%
Description	Average technical transmission and distribution losses from providing electricity to source j in year y
Measured/calculated /default	Default
Data source	Tool to calculate baseline, project and/or leakage emissions from electricity consumption
Value(s) of monitored parameter	20%
Measurement/ Monitoring equipment (if applicable)	-
Measuring/reading/ recording frequency (if applicable)	Ex-ante determined and fixed for the crediting period

Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Baseline emission calculation
Additional comments	-

B.6.3. Ex-ante calculation of emission reductions

>>

Baseline Emissions

According to equations (1) ~ (11),

$BE_y=BE_{En,y}=BE_{Elec,y}= f_{cap} \times f_{wcm} \times EG_{i,j,y} \times EF_{Elec,i,j,y}$

$= 1 \times 1 \times 267{,}840 \text{ MWh} \times 0.7119 \text{ tCO}_2\text{/MWh} = 190{,}675 \text{ tCO}_2$

Project Emissions

According to equations (12) ~ (13)

$PE_y = PE_{EL,y} = PE_{EC,y} = EC_{PJ,j,y} \times EF_{EL,j,y} \times (1+TDL_{j,y})$

According to the FSR, the annual additional electricity consumption of the project ($EC_{PJ,y}$) is estimated to be 0 MWh. Therefore, PE_y=0. This will be monitored during the crediting period.

Leakage

Leakage emission LE_y =0.

Emission Reductions

According to equation (14) and above results,

$ER_y = BE_y - PE_y - LE_y = 190{,}675 - 0 - 0 = 190{,}675 \text{ tCO}_2$

B.6.4. Summary of ex ante estimates of emission reductions

>>

Year	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage (tCO_2e)	Emission reductions (tCO_2e)
05/09/2020 - 04/09/2021	190,675	0	0	190,675
05/09/2021 - 04/09/2022	190,675	0	0	190,675

05/09/2022 - 04/09/2023	190,675	0	0	190,675
05/09/2023 - 04/09/2024	190,675	0	0	190,675
05/09/2024 - 04/09/2025	190,675	0	0	190,675
05/09/2025 - 04/09/2026	190,675	0	0	190,675
05/09/2026 - 04/09/2027	190,675	0	0	190,675
05/09/2027 - 04/09/2028	190,675	0	0	190,675
05/09/2028 - 04/09/2029	190,675	0	0	190,675
05/09/2029 - 04/09/2030	190,675	0	0	190,675
Total	**1,906,750**	**0**	**0**	**1,906,750**
Total number of crediting years	**10**			
Annual average over the crediting period	**190,675**	**0**	**0**	**190,675**

B.7. Monitoring plan

>>

B.7.1. Data and parameters to be monitored

>>

Data / Parameter

Data / Parameter:	**$EG_{i,j,y}$**
Methodology reference	ACM0012
Data unit	MWh
Description	Quantity of electricity generated and supplied by the project in year y
Measured/calculated /default	Monitored
Data source	Electricity meters
Value(s) of monitored parameter	267,840
Measurement/ Monitoring equipment	Type of meter: Electricity meter Location of meter: Antai substation Accuracy of meter: 0.5S
Measuring/reading/ recording frequency	Measure continuously and record monthly

Calculation method (if applicable)	-
QA/QC procedures	The calibration of electricity meter, including the frequency of calibration, should be done in accordance with national standards or meter manufacturer's specifications.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter:	**$EG_{PJ,j,y}$**
Methodology reference	ACM0012
Data unit	MWh
Description	Quantity of the grid electricity consumed by the project in year y
Measured/calculated /default	Monitored
Data source	Electricity meters
Value(s) of monitored parameter	0
Measurement/ Monitoring equipment	Type of meter: Electricity meter Location of meter: Antai substation Accuracy of meter: 0.5S
Measuring/reading/ recording frequency	Measure continuously and record monthly
Calculation method (if applicable)	-
QA/QC procedures	The calibration of electricity meter, including the frequency of calibration, should be done in accordance with national standards or meter manufacturer's specifications.
Purpose of data	Calculation of baseline emissions
Additional comments	-

B.7.2. Monitoring-program of risk management actions

>>

There is no parameter evaluated as "Harmful" in Section E.

B.7.3. Sampling plan

>>

N/A.

B.7.4. Other elements of the monitoring plan

>>
This monitoring plan is established to ensure the completion, coherence and accuracy of monitoring and calculation of the emission reductions from the project during the entire crediting period.

1. Management organization

To ensure all data are reliable and transparent, the project owner has established Quality Assurance and Quality Control (QA&QC) measures to effectively control and manage data reading, recording, auditing as well as archiving data and all relevant documents. This monitoring plan is carried out by a team, designated by the project owner, which consists of a team leader, an assistant and operators who are responsible for recording the metering readings (Figure 3).

The team leader has the overall responsibility for the monitoring and verification process, training and managing all team members, and acts as the focal point for the project related to the verifications.

The assistant helps the team leader to supervise the operation of the project, including data monitoring, negotiations with the grid company, and to collect the electricity settlement receipts.

The operators are responsible for inspecting and maintaining the equipment, measuring and recording relevant readings, collecting, checking, archiving and managing data, and making summary according to the project's requirements in a regular basis, and so on.

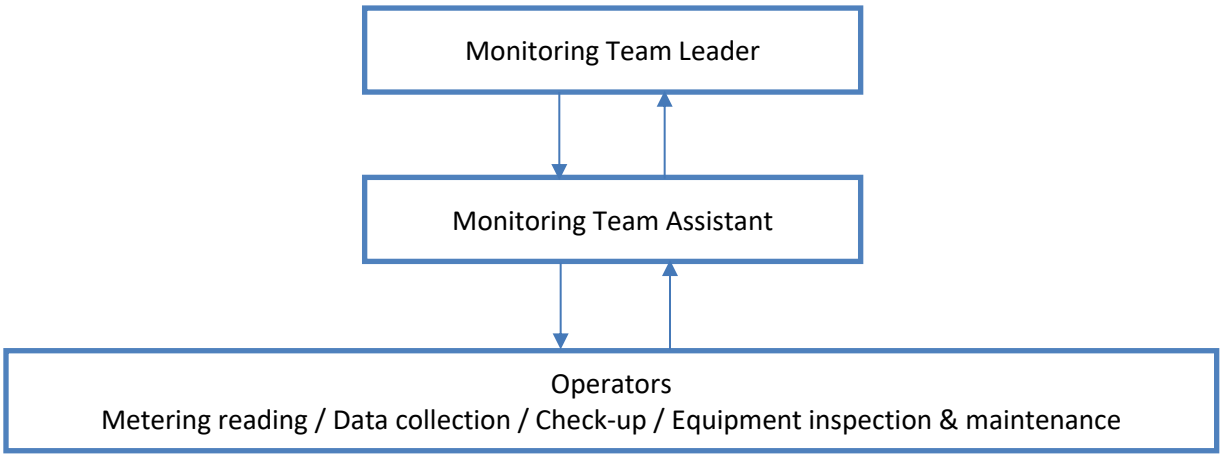

Figure 3: Organization Structure of Monitoring Team

2. Installation of Metering Devices

An electricity meter monitoring the electricity supplied by the project and electricity consumed by the project with bidirectional function of reading data is installed at the substation. Another bidirectional meter is installed at the project site as a backup. The meters are installed in accordance with the national standard. The accuracy of the meters is not less than 0.5S.

3. Quality assurance and quality control (QA/QC)

The metering equipment is subject to periodical calibration carried out by qualified parties in line with the national standards or manufacturer specifications.

All data collected as part of monitoring is archived electronically. All information should be stored properly with backups. All data including records is kept until 2 years after the end of the crediting period.

Section C. Start date, crediting period type and duration

C.1. Start date of the Project Activity

>>

05/09/2020, the date when the project started operation.

C.2. Expected operational lifetime of the Project Activity

>>

20 years

C.3. Crediting period of the Project Activity

>>

C.3.1. Fixed crediting period

>>

The crediting period is fixed as 10 years.

C.3.2. Start date of the crediting period

>>
05/09/2020, the date when the project started operation.

C.3.3. Duration of the crediting period

>>
10 years and 0 month (05/09/2020 – 04/09/2030)

Section D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The potential environmental impacts during the operation of the project are analyzed below.

Mitigation of air pollution
Once the project is implemented, the electricity purchased by Antai plant from the NCPG,, which is dominated by fossil fuel power sources, will be decreased and displaced by the project. In theory, such displacement avoids equivalent fossil fuel consumption, and reduces CO_2, SO_2, NO_x and other pollutants emissions. The project will improve the local air quality.

Thermal recovery
A large amount of waste energy would be directly released into the atmosphere in absence of the project activity. By implementation of the project, waste energy is recovered and fully utilized for power generation, which greatly lessens thermal pollution.

Wastewater
Wastewater from cooling system will be reused and recycled after treatment or directly used as garden water. Other wastewater which cannot be reused in the project will be discharged as per the Integrated Wastewater Discharge Standard, which will have no adverse impact on recipient water body.

Noise pollution
The noise of the project mainly comes from the operation of steam turbine generator unit. By installing the unit indoor and enclosing soundproof measures, the project has insignificant impact on the surroundings.

Solid Waste
During the project construction period, there is a small quantity of solid waste due to the construction and transportation. These waste are collected and disposed according to the relevant environmental protection requirements (e.g. most of the construction waste will be sent to designated landfill sites, and some other could be reused in the steel plant).

D.2. Environmental impact assessment

>>
The Environmental Impact Assessment (EIA) of the project was approved by Jiexiu Branch of Jinzhong City Environment Protection Bureau in May 2020.

The EIA approval states that all environmental protection measures recommended in the EIA report will be adopted by the project to ensure that all environmental impacts and pollutants emissions comply with national standards and regulations.

Section E. Environmental and social safeguards

>>

E.1. Environmental safeguards

>>

Impact of Project Activity on		Information on Impacts, Do-No-Harm Risk Assessment and Establishing Safeguards									Project Owner's Conclusion	
		Description of Impact *(both positive and negative)*	**Legal requirement / Limit**	**Do-No-Harm Risk Assessment**			**Risk Mitigation Action Plans**		**Do-No-Harm Residual Risk Assessment**		**Self-Declaration**	
				Not Applicable *(No actions required)*	**Harmless** *(No actions required)*	**Harmful** *(Actions required)*	**Operational Controls**	**Program of Risk Management Actions**	**Re-evaluate Risks**	**Monitoring**	**Explanation of Conclusion**	**The Project Activity will not cause any harm**
Environmental impacts on the identified categories[8] indicated below.	*Indicators for environmental impacts*	*Describe anticipated environmental impacts, both positive and negative from all sources (stationary and mobile), that may result from the Project Activity, within and outside the project boundary, over which the Project Owner(s) has control, and beyond what would reasonably be expected to occur in the absence of the Project Activity.*	*Describe the applicable national regulatory requirements /legal limits related to the identified risks of environmental impacts.*	*If no environmental impacts are anticipated, then the Project Activity is unlikely to cause any harm (is safe) and shall be indicated as **Not Applicable** (No actions required)*	*If environmental impacts are anticipated, but are expected to be in compliance with applicable national regulatory requirements/ below the legal limits, then the Project Activity is unlikely to cause any harm (is safe) and shall be indicated as **Harmless** (No actions required)*	*If environmental impacts are anticipated that will not be in compliance with the applicable national regulatory requirements or are likely to exceed legal limits, then the Project Activity is likely to cause harm (may be un-safe) and shall be indicated as **Harmful** (Actions required).*	*Describe the operational controls and best practices, focusing on how to implement and operate the Project Activity, to reduce the risk of impacts that have been identified as **Harmful**.*	*Describe the Program of Risk Management Actions (refer to Table 3), focusing on additional actions (e.g., installation of pollution control equipment) that will be adopted to reduce the risk of impacts that have been identified as **Harmful**.*	*Re-evaluate risks after Risk Mitigation Action Plans have been developed (refer to previous two columns) for impacts that have been identified as Harmful. Indicate whether the risks have been eliminated or reduced and, where appropriate, indicate them as **Harmless** (No actions required)*	*Describe the monitoring approach and the parameters to be monitored for each impact that has been identified as Harmful and described in the PSF (refer to Table 3).*	*Describe how the Project Owner has concluded that the Project Activity is likely to achieve the identified Risk Mitigation Action Plan targets for managing risks to levels that are unlikely to cause any harm.*	*Confirm that the Project Activity risks of negative environmental impacts are expected to be managed to levels that are unlikely to cause any harm (Mark +1 for **Yes** or and -1 for **No**)*
Environmental Safeguards												
Environment *- Air*	*SO_x emissions*	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	NO_x emissions	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

[8] sourced from the CDM SD Tool and the sample reports are available (https://www4.unfccc.int/sites/sdcmicrosite/Pages/SD-Reports.aspx)

	CO_2 emissions	The project reduces CO_2 emissions by generating electricity from waste energy which would have been otherwise generated from the fossil fuel-based power plants in the absence of project activity.	N/A	-	This impact is positive and this KPI can be monitored, thus it will be deemed as harmless.	-	N/A	N/A	N/A	The electricity generated will be monitored and CO_2 emission reductions will be calculated accordingly.	The project is expected to result in lower CO_2 emission than the baseline throughout the crediting period.	+1
	CO emissions	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Suspended particulate matter (SPM) emissions	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Fly ash emissions	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Non-Methane Volatile Organic Compounds (NMVOCs)	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Odor emissions	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Noise Pollution	The equipment may cause noise pollution in operation. The low noise equipment have been chosen for the project, and the equipment will be installed indoor and enclosed.	<Emission standard for industrial enterprises noise at boundary> (GB12348-2008) Class 2.	-	The noise by the project is expected to be lower than legal limits, hence it is negligible.	-	N/A	N/A	N/A	N/A	The noise at the project boundary meets the national standard. Furthermore, there is no residents settlement around the project.	+1

Environment *- Land*	*Solid waste Pollution from Plastics*	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Solid waste Pollution from Hazardous wastes	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Solid waste Pollution from Bio-medical wastes	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Solid waste Pollution from E-wastes	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Solid waste Pollution from Batteries	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Solid waste Pollution from end of life products/ equipment	The waste electric equipment may be generated due to broken down or malfunction during the operation	N/A	N/A	The wasted equipment will be sent to the the producer to repair or recycle. Hence the project is deemed harmless.	-	N/A	N/A	N/A	The repair and recycle of the wasted equipment will be recorded in the operating log.	The wasted electric equipment will be sent to the producer to repair or recycle accordingly.	+1
	Soil Pollution from Chemicals (including Pesticides, heavy metals, lead, mercury)	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Soil erosion	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Others	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
Environment *- Water*	*Reliability/ accessibility of water supply*	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Water Consumption	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

	from ground and other sources											
	Generation of wastewater	The project generates wastewater mainly due to cooling system. A large portion of wastewater is properly treated and reused. The remaining discharged is in line with national regulations.	Class 2 of <Integrated Wastewater Discharge Standard> (GB8978-1996)	-	Wastewater from cooling system will be treated and reused in the project, or for garden water. Hence it is deemed negligible.	-	N/A	N/A	N/A	N/A	Wastewater from cooling system will be treated and reused in the project, or for garden water. Hence it is deemed negligible.	+1
	Wastewater discharge without/with insufficient treatment	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Pollution of Surface, Ground and/or Bodies of water	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Others	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
Environment *– Natural Resources*	*Conserving mineral resources*	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Protecting/ enhancing plant life	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Protecting/ enhancing species diversity	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Protecting/ enhancing forests	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Protecting/ enhancing other depletable	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

	natural resources											
	Conserving energy	The project recovers the waste energy which would be released into atmosphere and fully utilizes the waste energy to produce electricity, which displaces the fossil fuel based power sources from the public grid.	N/A	The project brings benefits to the environment by recovering and utilizing waste energy, and replacing the fossil fuels.	-	-	N/A	N/A	N/A	The waste energy recovered and utilized, the electricity generated by this project will be monitored throughout the crediting period.	The project is expected to replace average of 267,840MWh waste energy-based electricity to the NCPG annually in the crediting period.	+1
	Replacing fossil fuels with renewable sources of energy	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Replacing ODS with non-ODS refrigerants	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Others	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

Note: If the score is: (a) zero or greater, the overall impact is neutral or positive and there is no net harm; and (b) less than zero, the overall impact is negative and there is net harm to Environment. Score is obtained after adding the individual scores in each of the rows in the last column of the above table.

Net Score:	**5**
Project Owner's Conclusion in PSF:	The Project Owner confirms that the Project Activity will not cause any net harm to the environment.

E.2. Social Safeguards

>>

Impact of Project Activity on		Information on Impacts, Do-No-Harm Risk Assessment and Establishing Safeguards									Project Owner's Conclusion	
		Description of Impact *(both positive and negative)*	**Legal requirement /Limit**	**Do-No-Harm Risk Assessment**			**Risk Mitigation Action Plans**		**Do-No-Harm Residual Risk Assessment**		**Self-Declaration**	
				Not Applicable *(No actions required)*	**Harmless** *(No actions required)*	**Harmful** *(Actions required)*	**Operational Controls**	**Program of Risk Management Actions**	**Re-evaluate Risks**	**Monitoring**	**Explanation of Conclusion**	**The Project Activity will not cause any harm**
Social impacts on the identified categories[9] indicated below.	*Indicators for social impacts*	*Describe the impacts on society and stakeholders, both positive and negative, that may result from constructing and operating of the Project Activity.*	*Describe the applicable national regulatory requirements / legal limits related to the identified risks of social impacts.*	*If no social impacts are anticipated, then the Project Activity is unlikely to cause any harm (is safe) and shall be indicated as **Not Applicable** (No actions required)*	*If social impacts are anticipated, but are expected to be in compliance with applicable national regulatory requirements/ legal limits, then it the Project Activity is unlikely to cause any harm (is safe) and shall be indicated as **Harmless** (No actions required)*	*If social impacts are anticipated that will not be in compliance with the applicable national regulatory requirements/ legal limits, then the Project Activity is likely to cause harm (may be unsafe) and shall be indicated as **Harmful** (Actions required).*	*Describe the operational controls and best practices, focusing on how to implement and operate the Project Activity, to reduce the risk of impacts that have been identified as **Harmful**.*	*Describe the Program of Risk Management Actions (refer to Table 3), focusing on additional actions (e.g., construction of crèche for workers) that will be adopted to reduce the risk of impacts that have been identified as **Harmful**.*	*Re-evaluate risks after Risk Mitigation Actions plans have been developed (refer to previous two columns) for impacts that have been identified as Harmful. Indicate whether the risks have been eliminated or reduced and, where appropriate, indicate them as **Harmless** (No actions required)*	*Describe the monitoring approach and the parameters to be monitored for each impact that has been identified as Harmful and to be described in the PSF (refer to Table 3).*	*Describe how the Project Owner has concluded that the Project Activity is likely to achieve the identified Risk Mitigation Action Plan targets for managing risks to levels that are unlikely to cause any harm.*	*Confirm that the Project Activity risks of negative social impacts are expected to be managed to levels that are unlikely to cause any harm (Mark +1 for **Yes** or and -1 for **No**)*
Social Safeguards												
Social - *Jobs*	*Long-term jobs (> 1 year) created/ lost*	The project creates long-term jobs during operation.	N/A	-	The social impact is expected to increase employment; This impact is positive and can be monitored hence the project is	-	N/A	N/A	N/A	It will be monitored through employment records.	The social impact is expected to increase employment , which can be confirmed by records of payrolls etc.	+1

[9] sourced from the CDM SD Tool and the sample reports are available (https://www4.unfccc.int/sites/sdcmicrosite/Pages/SD-Reports.aspx)

					harmless.							
	New short-term jobs (< 1 year) created/ lost	The project creates short-term jobs during construction period.	N/A	-	The social impact is expected to increase employment; hence the project is harmless.	-	N/A	N/A	N/A	Construction of the project was implemented by a third company. Hence the short-term jobs cannot be records by the project owner.	The project owner has no access to the employment records done by the construction company. Hence this parameter is not scored.	N/A
	Sources of income generation increased / reduced	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
Social - *Health & Safety*	*Disease prevention*	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Reducing / increasing accidents	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Reducing / increasing crime	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Reducing / increasing food wastage	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Reducing / increasing indoor air pollution	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Efficiency of health services	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Sanitation and waste management	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Other health and safety issues	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

	Add more rows if required	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
Social - *Education*	*Job related training imparted or not*	The project owner provides job related training for the employees.	There is no legal requirement from local authority to providing training to local people.	-	The project provides job related training for all employees, this impact is positive and can be monitored, hence it is harmless.	-	N/A	N/A	N/A	The project provides job related training, it can be verified from the training records and attendance sheet.	Job related training can be confirmed by training records.	+1
	Educational services improved or not	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Project-related knowledge disseminatio n effective or not	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Other educational issues	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Add more rows if required	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
Social - *Welfare*	*Improving/ deteriorating working conditions*	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Community and rural welfare	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Poverty alleviation (more people above poverty level)	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Improving / deteriorating wealth distribution/	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

	generation of income and assets											
	Increased or / deteriorating municipal revenues	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Women's empowerment	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Reduced / increased traffic congestion	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Other social welfare issues	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A
	Add more rows if required	N/A	N/A	N/A	-	-	N/A	N/A	N/A	N/A	N/A	N/A

Note: If the score is: (a) zero or greater, the overall impact is neutral or positive and there is no net harm; and (b) less than zero, the overall impact is negative and there is net harm to society. Score is obtained after adding the individual scores in each of the rows in the last column of the above table.

Net Score:	2
Project Owner's Conclusion in PSF:	The Project Owner confirms that the Project Activity will not cause any net harm to society.

Section F. United Nations Sustainable Development Goals (SDG)

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UN-level SDGs	UN-level Target	Declared Country-level SDG	Defining Project-level SDGs					Project Owner(s)'s Conclusion	
			Project-level SDGs	**Project-level Targets/ Actions**	**Project-level Indicators**	**Contribution of Project-level Actions to SDG Targets**	**Monitoring**	**Explanation of Conclusion**	**Are Goal/ Targets Likely to be Achieved?**
Describe UN SDG targets and indicators *See: https://unstats.un.org/sdgs/indicators/indicators-list/*	*Describe the UN-level target(s) and corresponding indicator no(s)*	*Has the host country declared the SDG to be a national priority? Indicate Yes or No*	*Define project-level SDGs by suitably modifying and customizing UN/ Country-level SDGs to the project scope.* ***For guidance see:*** *Integrating the SDGs into Corporate Reporting- A Practical Guide: https://www.unglobalcompact.org/docs/publications/Practical_Guide_SDG_Reporting.pdf* *Case-study from Coca-Cola and other organizations to develop organization-wide SDGs (page 114):* https://pub.iges.or.jp/pub/realising-transformative-potential-sdgs	*Define project-level targets/actions, by suitably modifying and customizing UN/Country-level targets to the project scope. Define the target date by which the Project Activity is expected to achieve the project-level SDG target(s). Refer to the previous column for guidance*	*Define project-level indicators by suitably modifying and customizing UN/Country-level indicators to the project scope or creating a new indicator(s). Refer to the previous column for guidance*	*Describe and justify how actions taken under the Project Activity are likely to result in a direct positive effect that contributes to achieving the defined project-level SDG targets and is additional to what would have occurred in the absence of the Project Activity*	*Describe the monitoring approach and the monitoring parameters to be applied for each project-level SDG target and Indicator*	*Describe how the Project Owner has concluded that the project is likely to achieve the identified Project level SDGs target(s).*	*Describe whether the project-level SDG target(s) is likely to be achieved by the target date (Yes or No)*
Goal 1: End poverty in all its forms everywhere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 3. Ensure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

healthy lives and promote well-being for all at all ages									
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 5. Achieve gender equality and empower all women and girls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 6. Ensure availability and sustainable management of water and sanitation for all	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	SDG Target 8.5	Yes	The project creates long-term jobs during the operation, supports economic productivity through technology upgrade and innovation by training of employees, protects labour rights and promotes safe and secure working environment, supports a transition to a low carbon society through employment training, etc.	The project provides 60 long-term jobs. By implementation of the project, the economic development has also been achieved in the project location by creating opportunities to the other allied services and indirect employment.	60 people to be recruited including all levels.	The project creates job opportunities in both construction and operation periods. It creates long-term employment for 60 people who are directly working at the site.	The 60 long-term job opportunities are equally provided to the local residents including men and women. The project provides equal pay and training for all workers, which can ensure all staff have productive	The project has already commissioned. Hence it complies to SDG No.8.	Yes

							working skills and work in a safe and stable situation. Quantity, gender, age, payment, and training of employment will be monitored through employment records and training records.		
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	SDG Target 9.4	Yes	The project is to use innovative technology to recover and utilize waste energy from blast furnace gas to produce electricity.	The project is to produce annual 267,840MWh electricity from waste energy and replace the same quantity from the fossil fuel power sources dominated NCPG.	140t/h gas fired boiler and 40MW steam turbine and generator unit are installed to recover waste energy from blast furnace and produce electricity.	The project helps the adaptation of waste energy recovery and utilization technologies.	N/A	The project has started commissioning, hence it complies to SDG No.9.	Yes
Goal 10. Reduce inequality within and among countries	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 12. Ensure sustainable consumption and production patterns	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Goal 13. Take urgent action to combat climate change and its impacts	SDG Target 13.3	Yes	The project generates waste energy-based electricity and mitigates CO_2 emissions which would have been generated from the fossil fuel-based power plants.	The project involves the installation of 140t/h gas fired boiler and 40MW steam turbine and generator unit to produce electricity.	The project will reduce 190,675tCO_2 annually and 1,906,750 tCO_2 during the crediting period.	Ensure optimum operation of the project.	The operators monitors the waste energy recovered and electricity generation and calculates the equivalent CO_2 emission reductions.	The project has already commissioned and started reducing the emissions. Hence it complies to SDG No.13.	Yes
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SUMMARY						**Targeted**		**Likely to be Achieved**	
Total Number of SDGs						**3**		**3**	
Certification label (Bronze, Silver, Gold, Platinum, or Diamond) for the ACCs as defined in the PSF						**Silver**		**Silver**	

Section G. Local stakeholder consultation

G.1. Modalities for local stakeholder consultation

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During the environmental impact assessment process in 2020, the stakeholders were invited to give their comments on the project. At the meeting, the project owner explained to the stakeholders the purpose, the implementation and approval process of the project, the environmental and social benefits that the project would bring. The stakeholders were invited to express and give their opinions freely. At the end of the meeting, 30 questionnaires were sent out to the participants including employees of Antai plant, local residents, local government departments, representative of local grid company, etc., who are directly or potentially impacted by the implementation of the project.

The structure of participants is shown in table below.

Indicators	Gender		Education		
	Female	Male	Primary school	Middle school	College
Number	8	22	3	10	17
Percentage	26.7%	73.3%	10%	33.3%	56.7%

The consultation questions are summarized as follows:

(1) Do you know the project?

(2) What are the main social and economic impacts of the project?

(3) Are there any impacts on local environment due to the project?

(4) What impact are you mostly concerned about?

(5) Do you support the project?

G.2. Summary of comments received

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The results of this survey are as follows:

30 questionnaires were distributed and 30 collected.

90% participants know the project.

67% think the project will create the job opportunities. The remaining think the project will promote the technology development and economic development.

100% think the project will have positive impacts and benefits to the local environment, especially

improving the local air quality.

70% concern about the noise from the project, the remaining about wastewater discharged to the surrounding water body.

100% express their support to the implementation of the project.

Although some participants think there will be certain negative impacts such as dust, noise, wastewater, traffic congestion during the construction of the project, they believe these impacts can be well managed by the project owner and cause no harm to their living standards. Instead, the project will greatly improve local air quality and enhance the productivity of local industries to make a better economy for local people.

G.3. Consideration of comments received

>>
The participants are supportive to the project. No negative comments have been received.

For the problems such as noise and wastewater as mentioned in Section D.1 and Section E.1, the project owner will take effective measures to avoid these impacts accordingly as mentioned above.

Section H. Approval and authorization

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As per the guideline available in this regard, submission of Host Country Attestation (HCA) on Double Counting as and when required by CORSIA.

Appendix 1. Contact information of project owners

Organization name	Shanghai Yunce Carbon Management Co., Ltd.
Country	The People's Republic of China
Address	Room 708, No.121 North Zhongshan Road, Shanghai, China
Telephone	+86-21-63063330
Fax	-
E-mail	tqj19955@126.com
Website	-
Contact person	Jian Qian

Appendix 2. Affirmation regarding public funding

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No public funding for the proposed project.

Appendix 3. Applicability of methodology(ies)

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Applicability of methodology has been discussed in section B.2. No further information is required.

Appendix 4. Further background information on ex ante calculation of emission reductions

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Ex-ante calculation of emission reductions has been detailed in section B.6. No further information is required.

Appendix 5. Further background information on monitoring plan

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Monitoring plant has been described in section B.7. No further information is required.

Appendix 6. Summary report of comments received from local stakeholders

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Summary of the comments from the stakeholders has been detailed in G.2. No further information is required.

Appendix 7. Summary of de-registered CDM project (Type B)

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Not applicable as this project activity is not a De-Registered CDM project activity.

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