



**CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01**

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NOTE:

- (i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.
- (ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)^{1,2} that is specified to the proposed PoA by using the provisions stated in the SSC-PoA-DD. At the time of requesting registration the SSC-PoA-DD must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC-CPA-DD.

¹ The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

² At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).



SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

(Company name) **MW Waste Heat Recovery for Power Generation Project

Version of document: ***

Date of document: **/**/****

A.2. Description of the small-scale CPA:

(Company name) **MW Waste Heat Recovery for Power Generation Project (hereafter referred as the proposed CPA) developed by (Company name and summary of the company).

The proposed CPA will install waste heat recovery system and **MW electricity generation system with a new / existing **** tonnes/day rotary kiln cement product line. Waste heat recovery system will collect the low temperature waste heat of the exit gases from Suspension Pre-heater (SP) and Air Quenching Chamber (AQC) in cement kiln with SP boiler and AQC boiler, and the steam from SP boiler and AQC boiler will go into to a **MW steam turbine generator for power generation. And all the generated power will be used into the self-production / be supplied to the regional Central China Power Grid (CCPG), which is dominated by fossil fuel of cement to decrease the power supply purchased from CCPG. Therefore, the electricity generated from the proposed CPA will effectively alternate part of electricity from the fossil fuel power plants of CCPG, which will reduce the GHG emission.

The proposed CPA plans to generate **** MWh of electricity annually, and replace for **** MWh of electricity from CCPG, so it can reduce **** tCO₂e of GHG emission per year.

In Chongqing City, more than 35% of heat out of total heat consumed in the clinker calcinations process in cement plants is commonly discharged as waste heat to the surroundings without utilization, and this makes a great deal of energy waste and heat pollution. In the proposed CPA, if it is not constructed that the waste heat power generation plant with new / existing **** tonnes/day rotary kiln cement product line is not constructed.

Contribution to the sustainable development:

The proposed CPA accords with China's Energy Industry Development Policies. While using the waste heat power generation, it will contribute to local sustainable development from the following aspects:

- The proposed CPA is helpful for supporting the circular economy concept of the National Development and Reform Commission of China reducing energy consumption and achieving comprehensive utilization of energy during the course of cement production. Therefore, reduce production cost and achieve sustainable development, increase social and economic benefits.
- Electric power generated by the proposed CPA can replace a part of the electricity generated by coal-fired units, through which reduce the local environmental pollution which caused by coal firing.
- The proposed CPAs can reduce emissions of waste heat and heat pollution of the environment, and reduce the dust content of waste gas by recovering a part of materials from the head and rear of kiln, in favour of the local environmental protection.
- The local electricity supply is not enough, so electricity generated by the proposed CPA will not only further reduce the energy consumption of cement production process, but also can further reduce the pressure on the local power supply, and promote local economic development.



- The proposed CPA is helpful for increasing the local employment opportunity, some rural labor can work here during the construction and operation phase of the plant. The proposed CPA will offer ** long-term jobs after the proposed CPA enters into operation.

A.3. Entity/individual responsible for the small-scale CPA:

Here the information on the entity/individual responsible of the CPA shall be included, hence forth referred to as CPA implementer(s). CPA implementers can be project participants of the PoA, under which the CPA is submitted, provided their name is included in the registered PoA.

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	(Company name)	No
Japan	Tepia Corporation Japan Co., Ltd.*	No

*Tepia Corporation Japan Co., Ltd. is a company whose headquarter is located in Japan. TEPIA has been developing CDM projects in China since 2005 and contributes actively to GHG emission reduction through improving industrial energy efficiency and developing renewable energy.

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

People's Republic of China

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

Geographic reference or other means of identification³, Name/contact details of the entity/individual responsible for the CPA, e.g. in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.

³ E.g. in case of stationary CPA geographic reference, in case of mobile CPAs means such as registration number, GPS devices.



The proposed CPA is located in **** town, **** district, Chongqing city. The geographical coordinate of the proposed CPA site are: ****°****' E, ****°****' N. Figure.1 gives the specific location of the proposed CPA.



Figure.1 The location of the proposed CPA

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

dd/mm/yyyy



1. For the purposes of registration of a Programme of Activities (PoA)⁴ a proposed small-scale CPA of a PoA shall be deemed to be a de-bundled component of a large scale activity if there is already an activity⁵, which:
 - (a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same sectoral scope, and;
 - (b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.
2. If a proposed small-scale CPA of a PoA is deemed to be a debundled component in accordance with paragraph 2 above, but the total size of such a CPA combined with a registered small-scale CPA of a PoA or a registered CDM project activity does not exceed the limits for small-scale CDM and small-scale A/R project activities as set out in Annex II of the decision 4/CMP.1 and 5/CMP.1 respectively, the CPA of a PoA can qualify to use simplified modalities and procedures for small-scale CDM and small-scale A/R CDM project activities.

According to Appendix C of the simplified modalities and procedures for small-scale CDM project activities, the proposed CPA is neither a part of any larger scale project or program nor a de-bundled component of a larger project activity, since the proposed CPA participants further confirm that they have not registered any small-scale CDM activities or applied to register another small CDM project activity within 1km of the proposed CPA boundary, neither in the same project category and technology/measure, nor registered within the previous two years.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

According to information provided by UNFCCC and the CPA implementers of this CPA, this CPA is not registered as CPA under other PoA or as an individual CDM.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

Chongqing Waste Heat Recovery and Utilization Programme in Cement Industry

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA:

The proposed PoA is applicable to install cement waste heat recovery systems in Chongqing, China. The SSC-CPA which can be included in the proposed PoA should have the following characteristics:

1. The SSC-CPA to be included in the proposed PoA should meet the applicability requirements of the methodology AMS-III.Q., and

The proposed CPA is applicable for the requirements of the methodology AMS-III.Q..

2. The SSC-CPA should employ same technology, namely install waste heat recovery system and install

⁴ Only those PoAs need to be considered in determining de-bundling that are: (i) in the same geographical area; and (ii) use the same methodology; as the POA to which proposed CPA is being added

⁵ Which may be a (i) registered small-scale CPA of a PoA, (ii) an application to register another small-scale CPA of a PoA or (iii) another registered CDM project activity



steam turbine generator system, and

The proposed CPA will install a waste heat recovery system and install steam turbine generator system.

3. *The SSC-CPA should generate only electricity, not generate heat, mechanical energy, or other production, and*

The proposed CPA will generate only electricity, not generate heat, mechanical energy, or other production.

4. *The capacity of the installed generator in the SSC-CPA should be less than or equal to 15MW, and*

The capacity of the installed generator in the proposed CPA is **MW, less than 15MW

5. *The generated electricity in the SSC-CPA should be consumed in self-factory for cement production, alternate the regional Central China Power Grid (CCPG) which is dominated by fossil fuel, and*

The generated electricity in the proposed CPA will be consumed in the cement production process of the Fufeng Company, alternate the regional Central China Power Grid (CCPG) which is dominated by fossil fuel.

6. *The coordinating/managing entity of the SSC-CPA to be included in the proposed PoA should be Chongqing Clean Development Mechanism Technical Service Center, and*

The coordinating/managing entity of the proposed CPA is Chongqing Clean Development Mechanism Technical Service Center.

7. *There are no mandatory requirements issued by Chinese government to implement the proposed PoA when the SSC-CPA is included in the proposed PoA, and*

There are no mandatory requirements issued by Chinese and Chongqing municipal government to implement the proposed PoA when the proposed CPA is included in the proposed PoA

8. *The SSC-CPA is implemented in Chongqing City and the physical/geographical boundary of the SSC-CPA does not exceed the physical/geographical boundary of the proposed PoA, and*

The proposed CPA is implemented in Chongqing City

9. *Emission reductions of the SSC-CPA limited in less than or equal to 60 kt CO₂ equivalent annually.*

Emission reductions of the proposed CPA is ***** CO₂ equivalent annually, less than or equal to 60 kt CO₂ equivalent annually.

<p>B.3. Assessment and demonstration of additionality of the small-scale CPA, as per eligibility criteria listed in the Registered PoA:</p>
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The additionality of the each CPA of the proposed PoA is demonstrated based on the requirement of Appendix A to the *Simplified Modalities and Procedures for Small-scale CDM Project Activities*.

An investment analysis shall be performed below to demonstrate that the proposed CPA faces an investment barrier.

Investment Analysis

Step 1: Apply benchmark analysis

According to the “Construction Project Economic Evaluation Methods and Parameters” (3rd edition) issued by the National Development and Reform Commission and the Ministry of Construction in



December 2006, the SSC-CPA can be considered commercially viable only when the SSC-CPA's internal rate of return is higher than the baseline rate of return. The typical SSC-CPA is cement production line energy-saving project, thus, the pre-tax benchmark internal rate of return before financing is confirmed as 11% for cement industry.

Calculation and comparison of financial indicators

The main parameters used to calculate the proposed CPA's investment analysis in the proposed CPA feasibility study are as follows:

parameter	unit	value
Installed capacity	MW	
Running hours	Hour/annual	
Power generation	MWh/year	
Self consumption rate	%	
Net electricity replace the grid power	MWh/year	
Static total investment	1,000 Yuan RMB	
Current capital	1,000 Yuan RMB	
Average price of electricity from grid (Historic date)	Yuan RMB/kWh	
Annual operation and maintenance cost	1,000 Yuan RMB/year	
Value added tax rate	%	
Urban maintenance and construction tax rate	%	
Education tax rate	%	
Income tax rate	%	
Credit owned by the Government of China	%	
Expected CERs price	€/tCO ₂ e	
Exchange rate	RMB/€	
Estimated annual emission reductions	tCO ₂ e /year	
Project Life Cycle	year	
Crediting period Length	year	

The different calculation results of internal rate of return with and without considering the revenue of CERs are as follows:

Project	Unit	Without CERs revenue	With CERs revenue
IRR	%		
benchmark	%		11

As shown in the above table, it indicates that the project IRR without considering the revenue of CERs is only ****%, which is lower than the cement industrial benchmark yield. Therefore, the proposed CPA activity does not have the financial attractiveness or commercially viable. Taking the CERs revenue into account, the project IRR is increased to ****%, which is higher than the benchmark and the financial attraction will be dramatically improved.

Sensitivity analysis

Three impact factors are considered in the following sensitivity analysis:

- 1) Total investment
- 2) Operation and Maintenance Cost
- 3) Delivered electricity



4) Tariff of electricity

According to “Guidance on the Assessment of Investment Analysis”, assuming the above three factors vary in the range of -10%+10%, the IRR of the proposed project (without CERs revenue) varies in the different extent, as shown in the following:

	-10%	-5%	0%	+5%	+10%
Total investment					
O&M cost					
Power generation					
Electricity tariff					

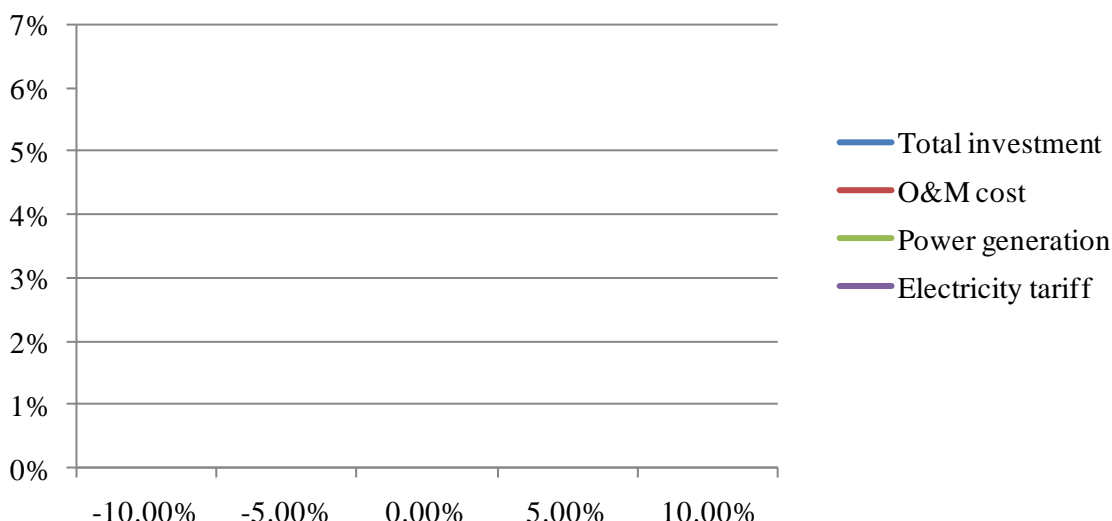


Figure.2 Sensitivity analysis of the project total investment IRR

Effect of CDM registration

Without the support from the CERs revenue, the project IRR will lower than the benchmark IRR, therefore, the proposed CPA does not have any attractive point for investment. For the investors, they would not be interested in this high financially risky project without the CDM support. If the proposed CPA will not be registered as CDM, the barriers of the proposed CPA cannot be overcome.

If the proposed CPA is registered as CDM, the revenue of CERs (according to expected price of **** €/tCO₂e, 10-year crediting period for calculation) will have a great impact on internal rate of return. The project IRR will increase to ****% and the financial situation will be improved significantly. Thus commercial viability is enhanced.



Based on all the statements on above, the proposed CPA does not belong to the baseline scenario and could be adopted by additionality.

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

The proposed CPA is to recover and utilize the waste heat from cement kiln for generation of electricity. In the absence of the proposed CPA, the same amount of electricity should be supplied from the regional grid system (CCPG) which is dominated by fossil fuel. Thus, the proposed CPA baseline emissions mainly arise CO₂ emissions from the power generation using the fossil fuel of the grid system (CCPG). And the proposed CPA will use the waste heat to generate power; no auxiliary fossil fuels are needed.

Overview of emission sources included in or excluded from the project boundary is provided in the following table:

	Source	Gas	Including?	Justification / Explanation
Baseline	Grid Power generation	CO ₂	Including	Main emission source
		CH ₄	Excluded	Excluded for simplification. This is conservative
		N ₂ O	Excluded	Excluded for simplification. This is conservative
Project activity	Project activity	CO ₂	Excluded	Project activity excluded the auxiliary fuel
		CH ₄	Excluded	Excluded for simplification. This is conservative
		N ₂ O	Excluded	Excluded for simplification. This is conservative

The proposed CPA is located in Chongqing city, People Republic of China, which is easily located within the geographical boundary of the registered PoA.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data / Parameter:	$EG_{grid,i,y}$
Data unit:	MWh
Description:	The quantity of electricity supplied to the recipient j by generator, that in the absence of the project activity would have been sourced from CCPG during the year y
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO ₂ /MWh
Description:	perating margin CO ₂ emission factor in year y
Source of data used:	Please refer to the Report on Determination of Baseline Grid Emission Factor by China DNA NDRC at http://cdm.ccchina.gov.cn .



Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the latest version of “Tool to calculate the emission factor for an electricity system (Ver.2)”, the proposed project uses the specific national values.
Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO ₂ /MWh
Description:	Build margin CO ₂ emission factor in year y
Source of data used:	Please refer to the Report on Determination of Baseline Grid Emission Factor by China DNA NDRC at http://cdm.ccchina.gov.cn .
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the latest version of “Tool to calculate the emission factor for an electricity system (Ver.2)”, the proposed project uses the specific national values.
Any comment:	

Data / Parameter:	f_{wcm}
Data unit:	-
Description:	The proportion electricity generated by waste heat accounts for in the total electricity generated
Source of data used:	AMS-III.Q.
Value applied:	1
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to AMS-III.Q., this fraction is 1 if the electricity generation is purely from use of waste energy.
Any comment:	

Data / Parameter:	$Q_{OE,BL}$
Data unit:	MJ/h
Description:	Output energy that can be theoretically produced (in appropriate unit), to be determined on the basis of maximum recoverable energy from the WECM, which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of CDM project activity
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Calculation used for f_{cap}

Data / Parameter:	$Q_{OE,y}$
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Data unit:	MJ/h
Description:	Quantity of actual output energy during year y (in appropriate unit)
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Calculation used for f_{cap}

B.5.2. Ex-ante calculation of emission reductions:

CALCULATION OF THE BASELINE CO₂ EMISSION (BE_y)

Baseline scenario for the proposed CPA only take electricity generation into account, hence, there is no thermal supply. Thus, according to the methodology AMS-III.Q., the baseline emissions formula is as follows:

$$BE_y = BE_{elec,y} \quad (\text{AMS-III.Q :1})$$

Where:

BE_y Baseline emissions during the year y in tons of CO₂
 $BE_{elec,y}$ Baseline emissions due to displacement of electricity during the year y in tons of CO₂

$$BE_{elec,y} = f_{cap} * f_{wcm} * \sum_j \sum_i (EG_{i,j,y} * EF_{elec,i,j,y}) \quad (\text{AMS-III.Q :2})$$

Where:

$EG_{i,j,y}$ The quantity of electricity supplied to the recipient j by generator, that in the absence of the project activity would have been sourced from i^{th} source (i can be either grid or identified source) during the year y in MWh
 $EF_{elec,i,j,y}$ The CO₂ emission factor for the electricity source i ($i=gr$ (grid) or $i=is$ (identified source)), displaced due to the project activity, during the year y in tons CO₂/MWh
 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.
 f_{cap} The maximum limit factor is to eliminate the impact of the increased waste heat usage rising from the increased project activity level in year y . The factor is related to the project activity level during baseline year before the project started, f_{cap} should be calculated on a basis of the relevant section of methodology ACM0012.

CALCULATION OF CO₂ EMISSION FACTOR (EF_{elec,i,j,y})

According to the methodology AMS.III.Q.(Ver.02), ‘Tool to calculate the emission factor for an electricity system’ (Ver.02) (hereafter, referred as the Tool) must be used to calculate the project baseline emission factor. Based on the Tool, the calculation is followed as described below:

Step 1: Identify the relevant electric power system

According to the delineation of China DNA, Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan are counted as CCPG. The proposed CPA is in Chongqing City, the relevant electric power system of the proposed project activity is CCPG.



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

In Fufeng Company, the electricity for the cement product process has ever been supplied from CCPG, so the proposed CPA should apply Option I: Only grid power plants are included in the calculation.

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

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

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

Taking dispatching data to analyze OM needs the data from CCPG. Those data needed are confidential and cannot be obtained from public channel that the way of (c) is not applicable for the proposed CPA. Due to shortage of the CCPG load diagram data that the way of (b) is also not applicable. If the low-cost of CCPG / must-run resources constitute more than 50% of total grid generation, the average OM way could be taken. But the actual proportion of the two aspects are respectively 1.46% (2007), 1.52% (2006), 1.58% (2005), 1.64% (2004), 1.66% (2003), thus the way of (d) is not applicable. Because the proportion is lower than 50% that the way of (a) simple OM is applicable to calculate the baseline emission factor of operating margin ($EF_{OM,y}$) for the proposed CPA.

The proposed CPA will use ex-ante data (the latest 3 years data of CCPG to calculate $EF_{OM,y}$. In the first crediting period, the emission factors will not be calculated and updated.

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

(a) Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit; or
 Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

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

The net electricity generation and a CO₂ emission factor of each power unit is not released in China, so it is not available. Moreover, only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known, and off-grid power plants are not included in the calculation. Therefore, Option B is applicable to calculate the operating margin emission factor according to the selected method for the proposed CPA.

Under Option B, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:



$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2i,y}}{EG_y} \quad (\text{"Tool": 7})$$

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 by power plant / unit m in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit)
$EF_{CO2i,y}$	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 power plant / unit m in year y (MWh)
i	All fossil fuel types combusted in power plant / unit m in year y
y	Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 3

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants / units delivering electricity to the grid, not including low-cost/must-run power plants / units, and including electricity imports to the grid. Electricity imports should be treated as one power plant *m*.

The Chinese DNA published the latest simple OM emission factor of CCPG, which is calculated according to the above formula will of be adopted in this CPA-DD and its value is **** (tCO₂/MWh).The detail calculation is shown as Annex 3.

Step 5: Identify the cohort of power units to be included in the build margin

The sample group of power units *m* used to calculate the build margin consists of either:

- The set of five power units that have been built most recently, or
- The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently

The CPA-DD identifies option (b) for sample group of power units *m*, as the information for five power units that have been built most recently is not available in China.

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be



calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 is selected.

As the crediting period for the proposed project is fixed 10 years, the build margin emission factor ex-ante will be the only BM emission factor calculated for the proposed project.

Step 6: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid\ BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (\text{"Tool": 13})$$

Where:

- $EF_{grid,BM,y}$ Build margin CO₂ emission factor in year *y* (tCO₂/MWh)
- $EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
- $EF_{EL,m,y}$ CO₂ emission factor of power unit *m* in year *y* (tCO₂/MWh)
- m* Power units included in the build margin
- y* Most recent historical year for which power generation data is available

Same as the OM, The Chinese DNA published the latest BM emission factor of CCPG, which is calculated according to the above formula will be adopted in this CPA-DD and its value is **** (tCO₂/MWh). The detail calculation is shown as Annex 3.

Step 7. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_y = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (\text{"Tool": 14})$$

Where:

- $EF_{grid,BM,y}$ Build margin CO₂ emission factor in year *y* (tCO₂/MWh)
- $EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
- $EF_{EL,m,y}$ CO₂ emission factor of power unit *m* in year *y* (tCO₂/MWh)
- m* Power units included in the build margin
- y* Most recent historical year for which power generation data is available
- $EF_{grid,BM,y}$ Build margin CO₂ emission factor in year *y* (tCO₂/MWh)
- $EF_{grid,OM,y}$ Operating margin CO₂ emission factor in year *y* (tCO₂/MWh)
- w_{OM} Weighting of operating margin emissions factor (%)
- w_{BM} Weighting of build margin emissions factor (%)

The following default values should be used for w_{OM} and w_{BM} :



- Wind and solar power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;
- All other projects: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period, unless otherwise specified in the approved

Therefore, for the proposed CPA, $w_{OM} = 0.5$ and $w_{BM} = 0.5$ are chosen. Then CO₂ emission factor for CCPG: $EF_{Elec,gr,j,y}$ is ***** (tCO₂/MWh). ($0.5 * ***** + 0.5 * ***** = *****$)

CALCULATION OF THE MAXIMUM LIMIT FACTOR (f_{cap})

According to description of methodology AMS-III-Q, f_{cap} will be calculated on a basis of the relevant sections in methodology ACM0012.

For a conservative estimate, the methodology requires the categories of project, whether planned, unplanned, or any real increase in production, changes in operating parameters and conditions, fuel type and amount changes, which caused the waste heat increase, should be determined. For the scheduled increase-capacity project, it is required to apply CDM project individually for the increased part. f_{cap} should be calculated by the following 3 methods. If data sufficient, it is advised to take method 1. For the newly built plant or the built plant but without 3-year production data, it is advised to take method 2. For heat energy of the medium with evidence to prove the portable waste heat/waste pressure cannot be tested directly due to the technical condition limit, it is advised to take method 3.

Method 1: On the condition of a historical heat energy data existing, the baseline scenario emission can be prescribed a limit through the maximum waste heat quantity released to the environment in the past 3 years under a normal operation condition.

Method 2: Take the data from facility supplier to calculate the volume of waste heat/afterheat/residual pressure (typical data from a certain section or the whole plant is ok) produced by manufacturer's facilities. If the project changes or the facility suppliers have no relevant data, it's necessary to hire an independent qualified or certified external process specialist such as a registered engineer to evaluate it, and conservatively estimate the heat produced by unit product during process of producing waste heat/afterheat/residual pressure. Based on the f_{cap} estimated on above mentioned, the DOE responsible for the eligibility of the proposed CPA will exam the assessment report.

Method 3: Usually, the waste heat (such as afterheat, moist heat, reaction heat, combustion heat, etc.), enthalpy contained in portable media or pressure is unlikely to be measured directly. Thus such projects have no relevant historical data. This case can be divided into the following two situations:

Situation 1: The energy is obtained from portable media and converts to final energy by waste heat recovery facility. For that case, use the theoretical maximum value, which can be recovered with the energy recovery equipment, to divide the actual energy generated by the project (can be measured directly), the outcome is f_{cap} . Parameters provided by supplier can be used to calculate the theoretical recovery energy. Also it can be obtained by inviting a qualified or certified external process specialist such as a registered engineer to make an independent technical evaluation.

Situation 2: Energy is obtained from the portable media of the middle energy recovery equipment by intermediate medium. For example, intermediate medium of portable energy from initial portable media includes water, oil or air, etc., these intermediate medium can obtain waste energy from chemical substances (reaction heat) or solid (sensible heat). Those intermediate medium can be used to produce the final energy output in the last waste heat recovery equipment. In such condition, f_{cap} is the ratio of the



theoretical maximum recovery energy and the actual energy generated by the project (can be measured directly). Also it can be obtained by hiring a qualified or certified external process specialist such as a registered engineer to make an independent technical evaluation.

According to relevant chapter of ACM0012, the cement production line was built and launched in the next half year of 2007 that there is no relevant historical data of last 3 years before the project started. Therefore, method 1 is unavailable. The collection efficiency of domestic dust removal plant is not high, but this project contains large amount of dust. The wear and tear speed of monitoring instrument for waste heat monitoring is too fast that it needs to change instrument frequently. So the method 2 is also unavailable for technology. The proposed CPA utilizes waste heat boiler to convert waste heat to high-quality steam, and the steam will push turbine engine to generate electricity. Therefore, f_{cap} calculation adopts the method 3 of situation 2.

Calculation of f_{cap} is as follows:

$$f_{cap} = \frac{Q_{OE,BL}}{Q_{OE,y}} \quad (\text{“ACM0012”}: 1h)$$

Where:

$Q_{OE,BL}$ Output/intermediate energy that can be theoretically produced (in appropriate unit), to be determined on the basis of maximum recoverable energy from the WECM, which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of CDM project activity

$Q_{OE,y}$ Quantity of actual output/intermediate energy during year y (in appropriate unit)

The theoretically produced output energy or energy contained in portable medium. The value is the maximum energy recovered by portable medium theoretically. Those energy cannot be used and discharged directly into air (or portable medium be combusted or wasted) without project activity. For this project, the value is the usable steam heat in principle by steam turbine which can be calculated through steam turbine parameter. According to the project feasibility study, it can be calculated as the $Q_{OE,BL}$ of **** MJ/h.

$Q_{OE,y}$: The actual output energy or the intermediate medium energy in year y . For the proposed CPA, the value should be the steam heat used for power generation during the actual running process.

In this CPA-DD, f_{cap} takes 1 for the ex-ante calculation of emission reductions and its actual value is determined by ex-post monitoring.

Therefore, the ex-ante baseline CO₂ emission (BE_y) is :

$$\begin{aligned} BE_{elec,y} &= f_{cap} * f_{wcm} * \sum_j \sum_i (EG_{i,j,y} * EF_{elec,i,j,y}) \\ &= 1 * 1 * **** * **** \\ &= **** \quad tCO_{2e} \end{aligned}$$

CALCULATION OF THE LEAKAGE (LE_y)

According to the AMS-III.Q, the leak is not taken into consideration.



CALCULATION OF THE PROJECT EMISSION (PE_y)

According to the AMS-III.Q, project emissions include emissions due to combustion of auxiliary fuel to supplement waste gas and emissions due to consumption of electricity by the project activity.

If the waste gas contains carbon monoxide or hydrocarbons, other than methane, and the waste gas is vented to the atmosphere in the baseline situation, project emissions have to include CO₂ emissions due to the combustion of the waste gas.

CALCULATION OF THE EMISSION REDUCTION (ER_y)

According to the methodology AMS-III.Q., the emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{(AMS-III.Q :8)}$$

Where:

- ER_y Emission reductions in year y (t CO₂e/yr)
- BE_y Baseline emissions in year y (t CO₂e/yr)
- PE_y Project emissions in year y (t CO₂/yr)
- LE_y Leakage emissions in year y (t CO₂/yr)

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
Total				

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

The monitoring plan is based on AMS-III.Q. monitoring methodology developed by the requirements.

The purpose of the development of the monitoring plan



Monitoring System

Information collection and management

Management

Monitoring the implementation of the operation and management-level chart is as follows:

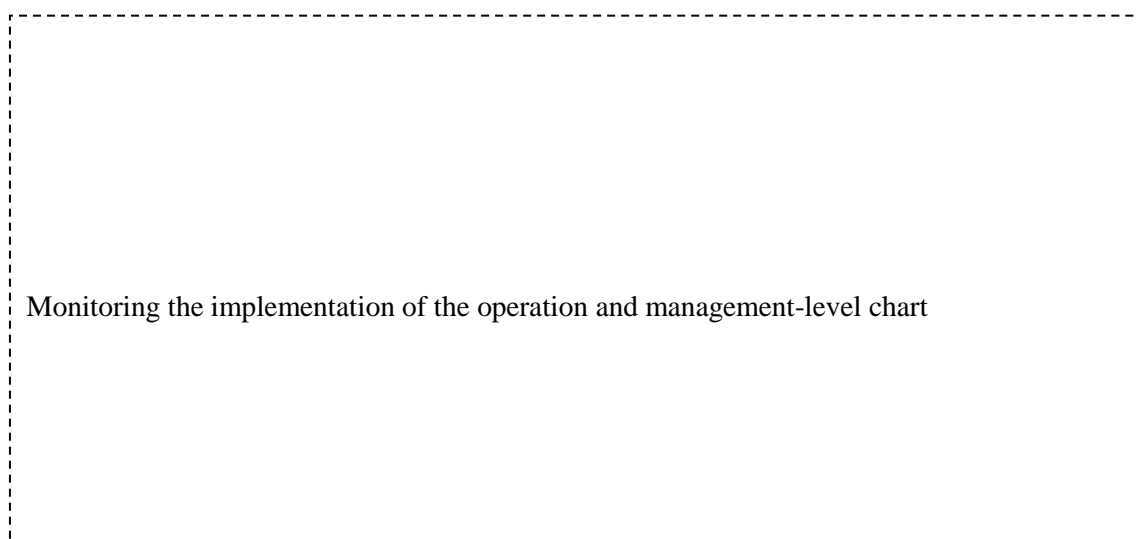


Figure 3. Monitoring the implementation of the operation and management-level chart

Monitoring plan

To verify the results of monitoring

Data and parameters monitored:

Data / Parameter:	$EG_{grid,i,y}$
Data unit:	MWh
Description:	The quantity of electricity supplied to the recipient j by generator, that in the absence of the project activity would have been sourced from CCPG during the year y
Source of data to be used:	
Value of data	
Description of measurement methods	



and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$T_{steam,i,y}$
Data unit:	°C
Description:	steam temperature into the steam engine
Source of data to be used:	Thermometer readings
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Calculation used for f_{cap}

Data / Parameter:	$P_{steam,i,y}$
Data unit:	MPa
Description:	Steam pressure into the steam engine
Source of data to be used:	Manometer reading
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Calculation used for f_{cap}

Data / Parameter:	$F_{steam,i,y}$
Data unit:	t/h
Description:	Steam flow into the steamer
Source of data to be used:	Steam meter reading
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Calculation used for f_{cap}



Data / Parameter:	$T_{water,i,y}$
Data unit:	°C
Description:	Hot water temperature into the waste heat boiler
Source of data to be used:	Temperature reading
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Calculation used for f_{cap}

Data / Parameter:	$P_{water,i,y}$
Data unit:	MPa
Description:	Hot water pressure into the waste heat boiler
Source of data to be used:	Manometer reading
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Calculation used for f_{cap}

Data / Parameter:	$F_{water,i,y}$
Data unit:	t/h
Description:	Hot water flow into the waste heat boiler
Source of data to be used:	Flowmeter reading
Value of data	
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Calculation used for f_{cap}

SECTION C. Environmental Analysis



C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

Environmental Analysis is done at CPA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

According to Chinese law, all construction projects should be carried out Environmental Impact Assessment (EIA) Report in China. The EIA report of the proposed CPA was completed by ****, and approved by **** on dd/mm/yyyy (Document No.: ****).

According to the EIA report, environmental impacts possibly caused by the Project and protect and guard measures adopted by the project owner are analyzed as follows:

Noise:

Waste Water:

Air:

Solid Waste:

The proposed CPA has no transboundary impact.

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

The project is utilization of waste gas and waste heat, almost do not need any fuel and raw materials, energy-saving effect is very significant, will not have a negative impact on the environment, the project will achieve the large environment and social benefits, not existing significant environmental impact and factors which restrict the project's construction and operation, the project has positive impact to the local environment on the whole.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form..

Local stakeholder consultation is done at CPA level

D.2. Brief description how comments by local stakeholders have been invited and compiled:

In order to understand the stakeholders' attitude of the project, listen to public opinion, from dd/mm/yyyy to dd/mm/yyyy, Chongqing city CDM technical service centers issued the use and recovery of the questionnaire method to investigate the stakeholders. Participants invited in this investigation are following units:



Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postfix/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	



Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project is not involved with the official development assistance funds of Annex I countries.

**SMALL-SCALE CDM PROGRAMME ACTIVITY DESIGN DOCUMENT FORM
(CDM-SSC-CPA-DD) - Version 01**



**NAME /TITLE OF THE PoA: Chongqing Waste Heat Recovery and Utilization
Programme in Cement Industry**



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Annex 3

BASELINE INFORMATION

**SMALL-SCALE CDM PROGRAMME ACTIVITY DESIGN DOCUMENT FORM
(CDM-SSC-CPA-DD) - Version 01**



**NAME /TITLE OF THE PoA: Chongqing Waste Heat Recovery and Utilization
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Annex 4

MONITORING INFORMATION