Project design document form
(Version 11.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the project activity	Dapein (1) Hydropower Project in Union of Myanmar
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	06.1
Completion date of the PDD	03/12/2020
Project participants	Dapein (1) Hydropower Company Limited (Myanmar) Cleantec Development PCC(Netherlands) Dapein (1) Hydropower Company Limited (China)
Host Party	Myanmar
Applied methodologies and standardized baselines	ACM0002 (Version 20.0)-Grid-connected electricity generation from renewable sources
Sectoral scopes	Sectoral scope 01: Energy Industries (renewable/non-renewable sources)
Estimated amount of annual average GHG emission reductions	403,153 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Dapein (1) Hydropower Project in Union of Myanmar (hereafter referred to as “the project” or “project”) is located on Dapein River in Bhamo city, Kachin state, Myanmar. The project is a newly-built hydropower project with the installed capacity of 240MW (60MW×4). The electricity is expected to be delivered to the regional power grid consisting of Myanmar National Power Grid (hereafter referred to as “MNPG”) and South China Power Grid (hereafter referred to as “SCPG”). The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

The project is operated by Dapein(1) Hydropower Company Limited which is the Joint Venture (hereafter referred to as “JV”) company found by Datang (Yunnan) United Hydropower Developing Company Limited (hereafter referred to as “DUHD”) in China and the Department of Hydropower Planning Ministry of Electric Power No.(1)(hereafter referred to as “DHPP”) in Myanmar.

In accordance with Development Operation Transfer (hereafter referred to as “DOT”) signed be both DUHD and DHPP and the Feasibility Study Report (FSR), The estimated annual operational hours are 4,458h, with the Plant Load Factor (PLF) of 0.5089, and the annual electricity generation is 1,070,000 MWh. 8% of the annual total production of electricity is supposed to be supplied to Myanmar as free power for the first 25 years and 10% for remaining 15 years.

Therefore, the annual grid-connected electricity of the project is as follows:

Table A-1 Annual grid-connected electricity of the project (MWh)

	The first 25 year (year 4 - year 28)		The second 15 year (year 29 - year 43）	
	Value	Calculation formula	Value	Calculation formula
Annual grid-connected electricity to SCPG	950,290	Annual electricity generation (1,070,000MWh) × (1-Free electricity (8%)) × Effective coefficient (98%[1]) × (1-Rate of internal consumption (0.5%[2])) × (1-Rate of transmission loss (1%[3]))	929,630	Annual electricity generation (1,070,000MWh) × (1-Free electricity (10%)) × Effective coefficient (98%) × (1-Rate of internal consumption (0.5%)) × (1-Rate of transmission loss (1%))
Annual grid-connected electricity to MNPG	79,636	Annual electricity generation (1,070,000MWh) × Free electricity (8%) ×Effective coefficient (100%) × (1-Rate of internal consumption (0.5%)) × (1-Rate of transmission loss (6.5%[4]))	99,545	Annual electricity generation (1,070,000MWh) × Free electricity (10%) ×Effective coefficient (100%) × (1-Rate of internal consumption (0.5%)) × (1-Rate of transmission loss (6.5%))
Total (MWh)	1,029,926		1,029,175	

Therefore, the project will substitute a part of the electricity of SCPG, resulting in reducing the CO_2 emission of SCPG on one hand, and it also will substitute a part of the electricity of MNPG,

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[1] The project is a hydropower plant with daily regulation. According to SL16-95, the recommended value range of effective coefficient is 0.8~0.9 for the hydropower plants with daily regulation, so the effective coefficient of 0.98 adopted by project is reasonable.

[2] The recommended value range of the rate of internal consumption is 0.5%~1% in Hydroenergy design code for small hydro power projects (SL76-94), so the rate of internal consumption of 0.5% adopted by project is reasonable.

[3] According to SL76-94, the rate of transmission loss for hydropower power project should be lower than 11%, so the rate of transmission loss of 1% adopted by project is reasonable and conservative.

[4] Data source: From HPGE (Hydropower Generation Enterprise) of MOEP(1) (Ministry of Electric Power No.(1).

resulting in reducing the CO_2 emission of MNPG on the other. The baseline scenario of the project activity is the same as the scenario existing prior to the start of implementation of the project activity. The total annual emission reductions for the second crediting period of the project are estimated to be 403,153 tCO_2e.

The project will achieve electricity generation by utilizing renewable water resources. It can promote local sustainable development from the following aspects:

1) The electricity generated by the proposed project will substitute part of electricity in SCPG which is dominated by fossil fuel generated electricity, and will substitute part of electricity in MNPG. In addition to CO_2 emission reductions, the proposed project will help to reduce the emission of other pollutants, such as NO_x, SO_2, Total Suspended Particles, etc.;

2) The construction and operation of the proposed project will increase Myanmar government revenue through tax, and stimulate the economic development of local area;

3) It also will create more job opportunities for local people. Rural labors could be arranged for on-site construction during the construction period, and some long-term job opportunities could be offered during the operation period.

A.2. Location of project activity

The project is located on Dapein River in Bhamo city, Kachin state, Myanmar. The geographical coordinates of the dam are east longitude of 97°31´35" and north latitude of 24°25´18". The geographical coordinates of the power plant are east longitude of 97°30´02" and north latitude of 24°24´15"15. The detailed project location is shown in Figure A-1.

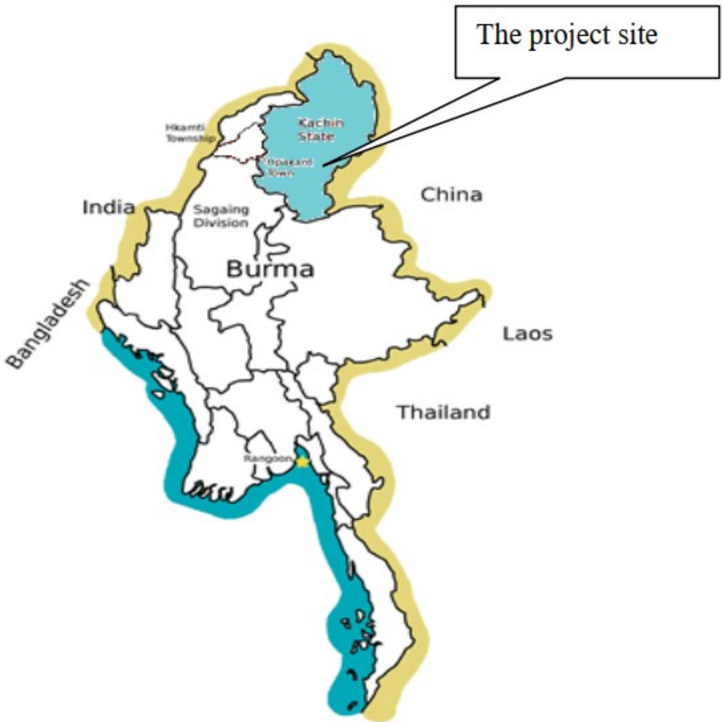

Figure A-1. Geographical location of the project

A.3. Technologies/measures

The project is a newly-built hydropower project. There is no equipment and system in operation at the project site prior to the start of the implementation of the proposed project. The electricity will be delivered to the regional electricity system consisting of MNPG and SCPG. As identified in section B.4, the baseline scenario is "the same amount power provided by SCPG and MNPG", which is the same as the scenario existing prior to the start of implementation of the project.

According to ACM0002 (Version 20.0), the main emission source for the hydro power plants is the emissions of CH_4 from the reservoir. The power density of the project is 585 W/m^2 which is greater than 10 W/m^2, so the project emission is zero.

The project involves the installation of 4 sets of water turbine and generator unit, each of which has a rated capacity of 60MW, providing a total capacity of 240MW. The main constructions of the project include the dam, water diversion system, power plant and booster stations, etc. The project adopts technologies from China, which have been used worldwide. The technologies adopted by the project are safe on environment and will not result in a negative damage to the ecosystem. The major parameters of the equipment are as follows:

Table A-2 The parameters of equipment adopted by the proposed project

	Number & Model	Manufacturer	Major Parameters
Water turbine	Four sets of HLA883-LJ-345	Multipower Hydroelectric Development Corporation	Rated Power Output: 61.54MW; Rated Speed: 187.5 r/min; Rated Water Head: 68.5m; Rated Flow: 96.5 m^3/s; Operation year: 40 years
Generator	Four sets of SF60-32/690	Multipower Hydroelectric Development Corporation	Capacity per set: 60 MW; Power Factor: 0.85; Rated Speed: 187.5r/min; Operation year: 40 years

During this crediting period, the electricity generated by the project was delivered to the regional power grid including SCPG and MNPG.

Two bidirectional electric energy meters with the accuracy class of 0.2S installed at the SCPG interface point of the project, which was assigned by the Yunnan Power Grid Corporation, have been used to measure the electricity exported to the SCPG ($EG_{PJ\ to\ SCPG,\ y}$) and imported from the SCPG ($EG_{SCPG\ to\ PJ,\ y}$) by the project. One is the main meter and the other one is the backup meter of the main meter in case of emergency use.

Two electric energy meters with the accuracy class of 0.2S installed at the MNPG interface point of the project, which was assigned by the project owner, have been used to measure the electricity exported to the MNPG ($EG_{PJ\ to\ MNPG,\ y}$). One is the main meter and the other one is the backup meter of the main meter in case of emergency use.

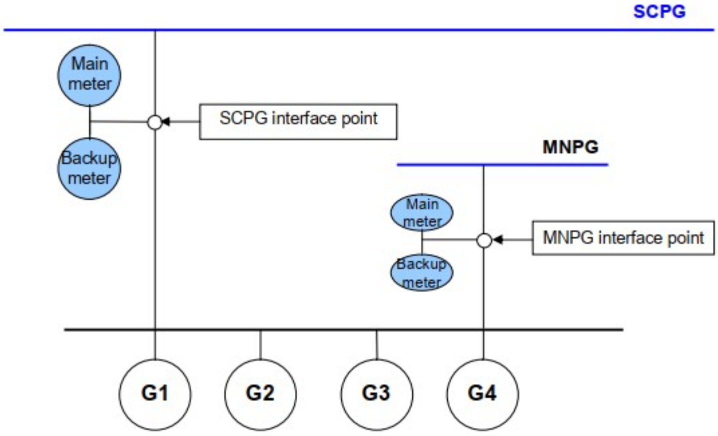

Figure A-2 Diagram of the monitoring system

The project adopts technologies from China, in favour of international technology transfer.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Myanmar (host Party)	Dapein (1) Hydropower Company Limited	No
Netherlands	Cleantec Development PCC	No
China	Dapein (1) Hydropower Company Limited	No

A.5. Public funding of project activity

No public funding was received by the project activity.

A.6. History of project activity

The project activity is a registered CDM project activity (UNFCCC reference number 7731) whose first crediting period lasts from 04/02/2013 to 03/02/2020 (Renewable).

Therefore, it can be confirmed that:

(a) The CDM project activity is not included as a component project activity (CPA) in a registered CDM programme of activities (PoA);

(b) The CDM project activity is not a project activity that has been deregistered.

And confirm that:

(a) The CDM project activity was not a CPA that has been excluded from a registered CDM PoA;

(b) The proposed project is not a registered CDM project activity whose crediting period has expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

A.7. Debundling

Not applicable.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

Approved large-scale consolidated methodology ACM0002: Grid-connected electricity generation from renewable sources (Version 20.0)

TOOL07: Tool to calculate the emission factor for an electricity system (Version 07.0);

TOOL11: Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1);

For more information on the baseline and monitoring methodology we refer to the UNFCCC website:

https://cdm.unfccc.int/methodologies/PAmethodologies/approved

B.2. Applicability of methodologies and standardized baselines

The baseline and monitoring methodology ACM0002 is applicable to the project, because the project meets all the applicability criteria stated in the methodology and the other applied methodological regulatory documents:

- The project involves the installation of a new grid-connected renewable hydropower plant at a site where no renewable power plant was operated prior to the implementation of the project activity.
- The project is a hydroelectric power project with a new single reservoir. The water surface of the new reservoir is 410,000 m^2 and the power density is 585 W/m^2. The power density is larger than 4 W/m^2.
- The project is not integrated hydro power project.
- The project does not involve an on-site switch from fossil fuels to a renewable source.
- Both MNPG and SCPG which the project being connected to, can be identified clearly both on the geographic location and the system boundary; as well as the grid character is public available.

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

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the MNPG and SCPG that the CDM project power plant is connected to. The flow diagram of the project boundary is delineated as FigureB-1:

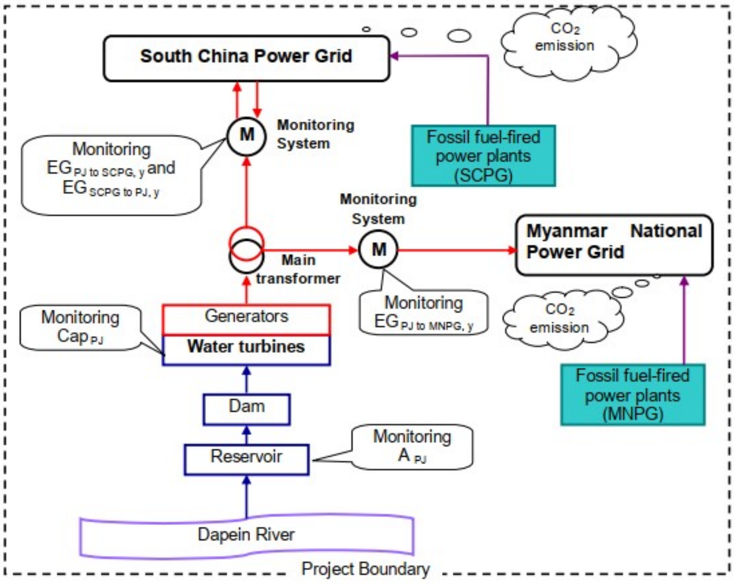

Figure B.1 Flow diagram of the project boundary

Emission sources and gases included in the project boundary for the purpose of calculating project emissions and baseline emissions are determined in the methodology, and shown in Table B.1 below.

Table B.1 Inclusion of gases and sources in the calculation of the emission reductions

Source		GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	Emissions of CH_4 from the reservoir	CO_2	Yes	Minor emission source (Power density is greater than 4 W/m^2 as stated above)
		CH_4	Yes	
		N_2O	No	Minor emission source

B.4. Establishment and description of baseline scenario

The project activity is the installation of a new grid-connected renewable power plant and is not a capacity addition, retrofit, rehabilitation or replacement of existing grid-connected renewable power plant/unit. Therefore, the baseline is identified in the methodology and defined as:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in “Tool to calculate the emission factor for an electricity system” (Version 07.0).

In accordance with “*CDM project standard for project activities” (Version 02.0)*, “*The project participants shall demonstrate the validity of the original baseline or update it in accordance with paragraphs 283-286*”, thus the *methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1)* is adopted to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period. The tool consists of two steps:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The project is a hydroelectric power project that supplies electricity to displace the electricity generated by the MNPG and SCPG and reduce CO_2 emission. As the project activity is connected to both MNPG and SCPG, the combined margin (CM) is used to determine baseline emission factor.

The project activity is a renewable hydropower project that supplies electricity to displace electricity from MNPG and SCPG. The project activity is claiming the emission reductions from the net exported quantity of electricity only.

From the latest information from the issued by Chinese DNA, the installed capacity of thermal power takes 51.54% of the whole SCPG, which means SCPG is still dominated by the thermal power plants. As per “Myanmar Energy Statistics 2019”, the electricity generation of thermal power is 8123 GWh and renewable energy is 9755 GWh in Myanmar, where the thermal power takes 45.44%. Since Myanmar is LDC, there is no requirement for domination of thermal power by “Tool to calculate the emission factor for an electricity system” (Version 07.0).

Therefore, the baseline remains unchanged and it complies with all relevant mandatory national and/or sectoral policies.

Step 1.2: Assess the impact of circumstances

The project is the installation of a new hydro-power plant and it has the same technical characteristics and energy sources and its energy production has been supplied to both MNPG and SCPG.

These circumstances are still valid continuously for the second crediting period and therefore, do not have an impact on the current baseline emissions.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology.

The project is newly-built hydropower project with the installed capacity of 240MW (60MW×4). The baseline scenario of the project is that electricity delivered to the grid is generated by the operation of grid-connected power plants and by the addition of new generation sources of both MNPG and SCPG. The project proponents or third party (or parities) would not undertake an investment later due. Therefore, the current baseline does not need to be updated for the second crediting period.

Step 1.4: Assessment of the validity of the data and parameters

Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated.

Updates should be undertaken in the following cases:

• Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC;

• Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity.

If any of the data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, the current baseline needs to be updated for the subsequent crediting period.

The calculation of the grid emission factor with all underlying data are updated and presented in the section B.6 in accordance with the “*Tool to calculate the emission factor for an electricity system*”.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.

As assessed in Sub-step 1.1, in accordance with the procedures for renewal of the crediting period of a registered CDM project activity, the original baseline, as updated, remains valid taking new relevant national and/or sectoral policies and circumstances into account.

Step 2.2: Update the data and parameters

If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4.

The calculation of the grid emission factor with all underlying data are updated and presented in the section B.6 in accordance with the "*Tool to calculate the emission factor for an electricity system*".

Conclusion regarding the assessment of the validity of the original baseline scenario

In accordance with "*CDM project standard for project activities" and* the *methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period",* the original baseline, as updated in accordance with step 2.2 in section B.6, remains valid taking new relevant national and/or sectoral policies and circumstances into account.

B.5. Demonstration of additionality

Not applicable for the second crediting period.

In accordance with "CDM project standard for project activities" (Version 02.0), "*For renewal of crediting period of a registered CDM project activity, the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality*".

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

The calculation of emission reductions by the project is following ACM0002 (Version 20.0).

1. Project emissions

According to the Methodology chosen, the project emissions shall be calculated by the following equation:

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

Where

PE_y = Project emissions in year y (tCO_2e/y);

$PE_{EF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2e/y);

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2/MWh)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y(tCO_2/MWh)

The project does not involve the fossil fuel consumption and geothermal power, so $PE_{EF,y}$ =0, and $PE_{GP,y}$=0.

For the emissions from water reservoirs of hydro power plants ($PE_{HP,y}$), the power density (PD) of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \qquad (2)$$

Where

PD = Power density of the project activity (W/m^2)

CAP_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W);

CAP_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero;

A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2);

A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero;

The project is a new hydro power plant, with a new single reservoir, so the CAP_{BL} and A_{BL} is zero. The total installed capacity is 240 MW and the surface area of full reservoir is 410,000 m^2, thus the Power Density (PD) is equal to 585 W/m^2, which is greater than 10 W/m^2, as per the methodology, $PE_{HP,y}$ = 0.

Based on the analysis above,

PE_y= 0.

2. Baseline emissions

According to the methodology, the baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.

The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \qquad (3)$$

Where:

BE_y = Baseline emissions in year y (tCO_2/yr);

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr);

$EF_{grid,CM,y}$ = Combined Margin CO_2 emission factor for grid connected power generation in year y, calculated using the latest version of “TOOL07: Tool to calculate the emission factor for an electricity system” (tCO_2/MWh).

As for the project, the electricity is expected to be delivered to both MNPG and SCPG. So:

$$BE_y = BE_{SCPG,y} + BE_{MNPG,y} \qquad (4)$$

Where:

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

$BE_{SCPG,y}$ = Baseline emissions to SCPG in year y (tCO_2e/yr)

$BE_{MNPG,y}$ = Baseline emissions to MNPG in year y (tCO_2e/yr)

1) Calculation of baseline emissions to SCPG

The baseline emissions to SCPG were calculated as the product of the net electricity exported to SCPG and the baseline emission factor of SCPG. According to ACM0002 (Version 20.0), the baseline emissions to SCPG are to be calculated as follows:

$BE_{SCPG, y} = EG_{PJ\ net\ to\ SCPG, y} \times EF_{SCPG, CM, y}$ (5)

Where:

$BE_{SCPG,y}$	=	Baseline emissions to SCPG in year y (tCO_2e/yr)
$EG_{PJ\ net\ to\ SCPG, y}$	=	Quantity of net electricity generation that is produced and fed into SCPG as a result of the implementation of the CDM project activity in year y (MWh/yr).
$EF_{SCPG, CM, y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"

As the project involves the construction of a new grid-connected renewable hydropower station at a site where no renewable power plant was operated prior to the implementation of the project activity, then the $EG_{PJ,y}$ are to be calculated as:

$EG_{PJ,y} = EG_{facility,y} = EG_{PJ\ net\ to\ SCPG, y}$ (6)

Where:

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

For the calculation of Combined Margin (CM) CO_2 emission factor, $EF_{grid,CM,y}$, the methodology refers to the '*Tool to calculate the emission factor for an electricity system*'. In accordance with this tool, the baseline emission factor is calculated as a combined margin: a weighted average of the operating margin emission (OM) factor and the build margin (BM) emission factor. Both the OM and BM emission factors are calculated *ex ante* and will not be updated during the second crediting period.

Calculation of $EF_{SCPG, CM, y}$

In line with the methodology, the baseline emission factor is calculated as a combined margin ($EF_{SCPG, CM, y}$), consisting of the combination of operating margin ($EF_{SCPG,,OM,y}$) and build margin ($EF_{SCPG, BM, y}$) factors according to the following steps defined in "*Tool to calculate the emission factor for an electricity system*" .

Details of the calculations and data follow the published data from the Chinese DNA[5], which uses official national statistics.

Step 1. Identify the relevant electricity systems

In accordance with the boundary definitions of the China DNA, the spatial extent of the project boundary includes the project and all power plants connected physically to the SCPG that the project is connected to. SCPG is defined as one of the project electricity systems, which consists of independent province-level electricity systems including Guangdong Province, Guangxi Autonomous Region, Yunnan Province, Guizhou Province, and Hainan Province. That can be dispatched without significant transmission constraints.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to the transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source.

- There are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data in the enclosed EF calculation spreadsheet shows that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

[5] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/201812/P020181220579925103092.pdf

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

0 tCO_2/MWh; or

The simple operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.1 of the Tool, if the conditions for this method, as described in Step 3 of the Tool, apply to the exporting grid; or

The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.2 of the Tool; or

The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 section 6.4.4 of the Tool.

Following the calculations of the DNA, the simple operating margin option (b) is used to calculate the CO_2 emission factors for net electricity imports ($EF_{grid,import,y}$).

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO_2 per MWh.

- There are no imports from Annex-I country(ies).

Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

- Electricity exports from the project electricity system to the connected electricity system are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

The Option I is chosen, because only grid power plants would be considered in the project electricity system.

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

The calculation of the operating margin emission factor ($EF_{SCPG,OM,y}$) 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

The simple OM method (Option a) can only be used if any one of the following requirements is satisfied:

(a) Low-cost/must-run resources constitute less than 50% of total grid generation (excluding electricity generated by off-grid power plants) in: 1) average of the five most recent years, and the average of the five most recent years shall be determined by using one of the approaches described below; or 2) based on long-term averages for hydroelectricity production.

(i) Approach 1

$$Share_{LCMR} = average\left[\frac{EG_{LCMR_{y-4}}}{total_{y-4}} \dots \frac{EG_{LCMR_y}}{total_y}\right] \quad (7)$$

(ii) Approach 2

$$Share_{LCMR} = \frac{average\left(EG_{LCMR_{y-4}} \dots EG_{LCMR_y}\right)}{average\left(total_{y-4} \dots total_y\right)} \quad (8)$$

Where,

$Share_{LCMR}$	The share of the low cost/must run resources (%)
EG_{LCMRy}	The electricity generation supplied to the project electricity system by the low cost/must run resources in year y (MWh)
$totall_y$	The total electricity generation supplied to the project electricity system in year y (MWh)
y	The most recent year for which data is available

(b) The average amount of load (MW) supplied by low-cost/must-run resources in a grid in the most recent three years is less than the average of the lowest annual system loads (LASL) in the grid of the same three years.

- The approach 1 is chosen for calculation and low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years3. Therefore, the project participants chose to use the simple OM method (option (a)).

The simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. The project participants have chosen to use the ex-ante option, and $EF_{SCPG,OM,y}$ is fixed for the duration of the second crediting period.

Ex ante option: If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

The date of the publication of the most recent official data for the calculation of the emission factor prior to the start of validation was 20/12/2018.

Power plants registered as CDM project activities should be included in the sample group that is used to calculate the operating margin if the criteria for including the power source in the sample group apply.

- Details of the calculations and data follow the published data from the Chinese DNA, which uses official national statistics. This data does not exclude CDM projects.

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

The Simple OM method (Option a) was chosen in Step 3 above.

(a) Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating sources serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following options:

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).

Following the calculations of the DNA, Option B is chosen. The criteria for Option B are met:

(a) The necessary data for Option A is not available, as indicated in the calculations of the DNA; 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) Option I is chosen in Step 2.

Option B: Calculation based on total fuel consumption and electricity generation of the system

The simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \sum i \; (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}) \, / \, EG_y \qquad (9)$$

Where

$EF_{grid,OMsimple,y}$	=	The simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	=	The amount of fuel type i consumed in the project electricity system in year y(mass or volume unit)
$NCV_{i,y}$	=	The net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	The CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
EG_y	=	The 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 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

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.

Based on the data available, the three-year average operating margin emission factor is calculated as a full-generation-weighted average of the emission factors. Details of the calculations and data follow the published data from the Chinese DNA, which uses official national statistics.

$EF_{SCPG,OMsimple,y}$ = 0.8367 tCO_2/MWh

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

In terms of vintage of data, the project participants chose Option 1, ex-ante, and $EF_{grid,BM,y}$ is fixed for the duration of the second crediting period:

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 CDMPDD 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.*

The build margin 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:

$$EF_{grid,BM,y} = \sum_m (EG_{m,y} \times EF_{EL,m,y}) / \sum_m EG_{m,} \quad (10)$$

Where:

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

Due to the limited availability of data on individual power units, the published grid emission factor calculations from the Chinese DNA uses the approved deviation[6] to calculate the build margin emission factor. The deviation is applied as follows:

- Generation capacity is used in formula (10) above, instead of generation.
- The newly added generation capacity that has been added to the grid most recently, and that comprises 20 percent of total installed capacity in the latest year for which data is available is used as the sample group of power units m to calculate the build margin. This option comprises a larger sample than the five units built most recently.
- The efficiency level of the best technology commercially available in the provincial/regional or national grid of China is used, as a conservative proxy, to determine the CO2 emission factor of thermal power plants using each fuel type.

Using this deviation, formula (10) can be re-written as follows:

$$EF_{grid,BM,y} = \sum_m (CAP_{m,y} \times EF_{EL,m,y}) / \sum_m CAP_{m,y} = \sum_m Share_{CAP,m,y} \times EF_{EL,m,y} \quad (11)$$

Where

$EF_{grid,BM,y}$	=	The build margin CO_2 emission factor in year y (tCO_2/MWh)
$CAP_{m,y}$	=	The added generation capacity by plant type m in year y (MW)
$EF_{EL,m,y}$	=	The CO_2 emission factor of plant type m in year y (tCO_2/MWh)
$Share_{CAP,m,y}$	=	The share of added generation capacity by plant type m in year y (%)
m	=	The plant type included in the build margin (thermal, hydro, nuclear, other)
y	=	The most recent historical year for which data is available

The CO_2 emission factor of all plant types other than thermal power plants is taken as zero.

The CO_2 emission factor of thermal power plants is weighted on the basis of the emissions from each of the fuel types in the latest year for which data is available, and using the average net energy conversion efficiency of the best technologies commercially available (advanced) power plants in China for each fuel type.

$$EF_{thermal,y} = \sum_m (EF_{m,Adv,y} \times \lambda_{m,y}) \quad (12)$$

Where

$EF_{thermal,y}$	=	The CO_2 emission factor of the best technologies commercially available thermal power plants in year y (tCO_2/MWh)
$EF_{m,Adv,y}$	=	The CO_2 emission factor of the best technologies commercially available power plants using fuel type m in year y (tCO_2/MWh)

[6] M-DEV0004, DNV (07/10/2005), see http://cdm.unfccc.int/Projects/deviations/87512

$\lambda_{m,y}$ = The share of emissions of fuel type m in year y (%)

M = The fuel type of thermal plant (coal/solid, oil/liquid, gas)

y = The most recent historical year for which data is available

Using the equation of option A2 from guidance in Step 4 section 6.4.1 of the Tool, the CO_2 emission factor of advanced power plants using fuel type m can be calculated as follows:

$$EF_{m,Adv,y} = EF_{CO2,m,y} \times 3.6 / \eta_{m,y} \quad (13)$$

Where,

$EF_{m,Adv,y}$ = The CO_2 emission factor of the best technology commercially available power plants using fuel m in year y (tCO_2/MWh)

$EF_{CO2,m,y}$ = The average CO_2 emission factor of fuel type m in year y (tCO_2/GJ)

$\eta_{m,y}$ = The average net energy conversion efficiency of the best technologies commercially available power plants using fuel type m in year y (%)

m = The fuel type of thermal plant (coal/solid, oil/liquid, gas)

y = The relevant year as per the data vintage chosen

The build margin emission factor is calculated using this methodology in the enclosed EF calculation spreadsheet:

$EF_{SCPG,BM,y}$ = 0.2476 tCO_2/MWh

Step 6. Calculate the combined margin emission factor

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

(a) Weighted average CM; or

(b) Simplified CM.

Option (a) is the preferred option. Option (b) cannot be used as the project activity does not take place in an LDC or in a country with less than 10 registered projects. Therefore, Option (a) is chosen.

(a) Weighted average CM

The combined margin emissions factor is calculated as follows:

$$EF_{SCPG,CM,y} = EF_{SCPG,OM,y} \times w_{OM} + EF_{SCPG,BM,y} \times w_{BM} \quad (14)$$

Where

$EF_{SCPG,OM,y}$ = The operating margin CO_2 emission factor in year y (tCO_2/MWh)

w_{OM} = The weighting of operating margin emissions factor (%)

$EF_{SCPG,BM,y}$ = The build margin CO_2 emission factor in year y (tCO_2/MWh)

w_{BM} = The weighting of build margin emissions factor (%)

According to the Tool, the default values for w_{OM} and w_{BM} for hydropower projects in the second and third crediting period, which should be used, are: w_{OM} = 0.25 and w_{BM} = 0.75 .

Based on these weights for the second crediting period, the combined margin emission factor is calculated, and fixed ex-ante for the duration of the second crediting period (conservatively rounded down to the fourth digit) as given below.

Table B-1 **Combined Margin Calculation**

	CO_2 emission factor (tCO_2/MWh)	**Weighting (%)**
Operating margin (see step 4)	0.8367	25

Build margin (see step 5)	0.2476	75
Combined margin	0.3948	

Baseline emissions to SCPG ($BE_{SCPG,y}$) now can be calculated as Quantity of net electricity generation that is produced and fed into SCPG ($EG_{PJ\ net\ to\ SCPG,\ y}$) multiplied by the combined margin CO_2 emission factor of SCPG ($EF_{SCPG,CM,y}$).

2) <u>Calculation of baseline emissions to MNPG</u>

The baseline emission of MNPG is calculated as the product of the net electricity exported to Myanmar National Power Grid and the baseline emission factor of MNPG. The electricity will substitute a part of the electricity of MNPG, resulting in reducing the CO_2 emission of MNPG.

According to ACM0002 (Version 20.0), the baseline emission of MNPG is to be calculated as follows:

$$BE_{MNPG,y} = EG_{PJ\ net\ to\ MNPG,\ y} \times EF_{MNPG,\ CM,\ y} \quad (15)$$

Where

$BE_{MNPG,y}$	=	Baseline emissions to MNPG in year y (tCO_2e/yr)
$EG_{PJ\ net\ to\ MNPG,\ y}$	=	Quantity of net electricity generation that is produced and fed into MNPG as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{MNPG\ CM,\ y}$	=	Combined margin CO_2 emission factor for MNPG connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh).

$$EG_{PJ\ net\ to\ SCPG,\ y} = EG_{PJ\ to\ SCPG,\ y} - EG_{SCPG\ to\ PJ,\ y}) \quad (16)$$

Where

$EG_{PJ\ net\ to\ SCPG,\ y}$	=	Quantity of net electricity generation that is produced and fed into SCPG as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EG_{PJ\ to\ SCPG,\ y}$	=	Quantity of electricity exported to SCPG by the project in year y (MWh/yr)
$EG_{SCPG\ to\ PJ,\ y}$	=	Quantity of electricity imported from SCPG by the project in year y (MWh/yr)

Calculation of $EF_{MNPG,\ CM,\ y}$

As requested by "*Tool to calculate the emission factor for an electricity system*" (Version 07.0), the calculation of the combined margin (CM) emission factor ($EF_{MNPG,CM,y}$,) is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

According to the tool applied, the simplified CM method (option b) can only be used if:

• The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and

• The data requirements for the application of step 5 above cannot be met.

The project is located on Dapein River in Bhamo city, Kachin state, Myanmar. Myanmar is one of LDC and a country with less than 10 registered projects at the starting date of validation. Therefore, the simplified CM method is applicable to the project.

Under the simplified CM, the operating margin emission factor ($EF_{MNPG,OM,y}$) must be calculated using the average OM (option (d) in step 3).

The project chooses the "Ex ante option". The average OM is calculated ex-ante using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation for renewal of the crediting period, without requirement to monitor and recalculate the emissions factor during the second crediting period.

Calculation Average OM ($EF_{MNPG, OM, y}$)

The average OM emission factor ($EF_{MNPG, OM, y}$) is calculated as the average emission rate of all power plants serving MNPG, using the methodological guidance as described under (a) above for the simple OM, but including in all equations also low-cost/must-run power plants.

The simple OM may be calculated:

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

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

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)

For data of each power station and power unit is not publicly available in Myanmar, it can't adopt option A. Meanwhile, only 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. Therefore, option B could be used to calculate OM emission factor.

Option B - Calculation based on total fuel consumption and electricity generation of the system

Under this option, the simple OM emission factor is calculated based on the net electricity supplied to MNPG by all power plants serving the system, including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{MNPG,OM,simple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad (17)$$

Where

$EF_{MNPG,OMsimple,y}$	=	Simple operating margin CO_2 emission factor of MNPG in year *y* (tCO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* in Myanmar (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* in Myanmar (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* in Myanmar (tCO_2/GJ)
$EG_{MNPG,y}$	=	Net electricity generated and delivered to MNPG by all power sources serving the system, 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* in Myanmar
y	=	The relevant year as per the data vintage chosen 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 MNPG, 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.

Calculation CM ($EF_{MNPG, CM, y}$)

The combined margin is calculated using equation below:

$$EF_{MNPG\ CM\ y} = w_{OM} \times EF_{MNPG\ OM\ y} + w_{BM} \times EF_{MNPG\ BM\ y}$$

Where:

$EF_{MNPG,CM,y}$ = Combined margin CO_2 emission factor in year y (tCO_2/MWh);

$EF_{MNPG,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh);

$EF_{MNPG,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh);

w_{OM} = Weighting of operating margin emission factor (%);

w_{BM} = Weighting of build margin emission factor (%)

Where, w_{BM}= 0, w_{OM}= 1.

Thus $EF_{MNPG,CM,y} = 1*EF_{MNPG,OMsimple,y} + 0*EF_{MNPG,BMsimple,y} = EF_{MNPG,OMsimple,y}$=0.3513 tCO_2/MWh

Calculation of $EG_{PJ\ net\ to\ MNPG,\ y}$

According to ACM0002 (Version 20.0), the net quantity of electricity supplied will be calculated as follows:

$EG_{PJ\ net\ to\ MNPG,\ y} = EG_{PJ\ to\ MNPG,\ y} - EG_{MNPG\ to\ PJ,\ y}$

Where

$EG_{PJ\ net\ to\ MNPG,\ y}$ = quantity of the net exported electricity from the project to MNPG in year y;

$EG_{PJ\ to\ MNPG,y}$ = quantity of exported electricity from the project to MNPG in year y;

$EG_{MNPG\ to\ PJ}$ = quantity of imported electricity from MNPG to the project in year y. The project is likely to import the electricity from the SCPG in case of equipment shutdown or overhaul. The project is not imported the electricity from the MNPG. So, $EG_{MNPG\ to\ PJ}$ =0

Therefore, $EG_{Pt\ net\ to\ MNPG,\ y} = EG_{PJ\ to\ MNPG,\ y}$

According to ACM0002 (Version 20.0), based on the calculation of $EF_{MNPG,\ CM,\ y}$ and $EG_{PJ\ net\ to\ MNPG,\ y}$ above, calculation method of the project baseline emission is as follows:

$BE_{MNPG,y} = EG_{PJ\ net\ toMNPG,y} \times EF_{MNPG,CM,y} = EG_{PJ\ to\ MNPG,y} \times EF_{MNPG,OM,y}$

$BE_y = BE_{SCPG,y} + BE_{MNPG,\ y}$

3. Leakage

According to ACM0002 (Version 20.0), no leakage emissions are considered.

4. Emission reductions

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y$

Where

ER_y = Emission reduction in year y (tCO_2e/y);

BE_y = Baseline emission in year y (tCO_2e/y);

PE_y = Project emission in year y (tCO_2e/y)

Based on the analysis above:

$ER_y = BE_y - PE_y - LE_y = BE_y - 0 - 0 = BE_y$

$= EG_{PJ\ net\ to\ SCPG,\ y} \times EF_{SCPG,CM,y} + EG_{PJ\ to\ MNPG,\ y} \times EF_{MNPG,OM,y}$

$= (EG_{PJ\ to\ SCPG,\ y} - EG_{SCPG\ to\ PJ,\ y}) \times EF_{SCPG,CM,y} + EG_{PJ\ to\ MNPG,\ y} \times EF_{MNPG,\ OM,\ y}$

B.6.2. Data and parameters fixed ex ante

Data/Parameter	w_{OM}
Data unit	%
Description	Weighting of operating margin emissions factor for the second crediting period
Source of data	“Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value(s) applied	25 for SCPG 100 for MNPG
Choice of data or measurement methods and procedures	Follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	w_{BM}
Data unit	%
Description	Weighting of build margin emissions factor for the second crediting period
Source of data	“Tool to calculate the emission factor for an electricity system” (Version 07.0)
Value(s) applied	75 for SCPG 0 for MNPG
Choice of data or measurement methods and procedures	Follow the “Tool to calculate the emission factor for an electricity system” (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{SCPG,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor of SCPG in year y
Source of data	2017 Baseline Emission Factors for Regional Power Grid in China
Value(s) applied	0.8367
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{SCPG,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor of SCPG in year y
Source of data	2017 Baseline Emission Factors for Regional Power Grid in China
Value(s) applied	0.2476
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{SCPG,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor of SCPG in year y
Source of data	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value(s) applied	0.3948
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{MNPG,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor of MNPG in year y
Source of data	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value(s) applied	0.3513
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	$EF_{MNPG,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor of MNPG in year y
Source of data	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Value(s) applied	0.3513
Choice of data or measurement methods and procedures	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of data	Calculation of baseline emissions
Additional comment	N/A

Data/Parameter	CAP_{BL}
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity
Source of data	Project site
Value(s) applied	0
Choice of data or measurement methods and procedures	For new hydro power plants, this value is zero
Purpose of data	Calculation of project emissions
Additional comment	This parameter is used to calculate the power density

Data/Parameter	A_{BL}
Data unit	M^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2).
Source of data	Project site
Value(s) applied	0
Choice of data or measurement methods and procedures	For new reservoirs, this value is zero
Purpose of data	Calculation of project emissions
Additional comment	This parameter is used to calculate the power density

B.6.3. Ex ante calculation of emission reductions

1. Project emissions

The power density of the project is 585 W/m^2, which is larger than 10 W/m^2. According to ACM0002 (version 20.0), the emission of the project is zero, PE_y=0.

2. Baseline emissions

1) Based on the formula in section B.6.1 and data from section B.6.2, the figures of emission factors of SCPG are as follows:

Table B-1 emission factors value of SCPG

	Value	Unit
$\mathbf{EF_{SCPG,OM,y}}$	0.8367	tCO_2e/MWh
$\mathbf{EF_{SCPG, BM, y}}$	0.2476	tCO_2e/MWh

$EF_{SCPG, CM, y}$	0.3948	tCO_2e/MWh

The annual average grid-connected electricity of the project to SCPG is estimated to be 950,290 MWh, and ex-ante estimated emission reductions, adopt grid-off electricity of the proposed project is zero, therefore, estimated annual average $baseline_{SCPG}$ emission is as follows:

$BE_{SCPG,y}$ = $EG_{Pt\ net\ to\ SCPG,\ y}$ ×$EF_{SCPG,CM,y}$ = ($EG_{PJ\ to\ SCPG,\ y}$-$EG_{SCPG\ to\ PJ,\ y}$) ×$EF_{SCPG,\ CM,\ y}$

= (950,290 - 0) × 0.3948 =375,174 tCO_2e

2) Based on the formula in section B.6.1 and data from section B.6.2, the figures of emission factors of MNPG are as follows:

- $EF_{MNPG,OM,y}$: 0.3513 tCO_2e/MWh;
- $EF_{MNPG,CM,y}$: 0.3513 tCO_2e/MWh.

The annual average grid-connected electricity of the project to MNPG is estimated to be 79,636 MWh, and ex-ante estimated emission reductions, adopt grid-off electricity of the proposed project is zero, therefore, estimated annual average BE_{MNPG} emission is as follows:

$BE_{MNPG,y}$ = $EG_{PJ\ to\ MNPG,y}$ × $EF_{MNPG,CM,y}$ = (79,636 - 0) × 0.3513 = 27,979 tCO_2e

Therefore,

BE_y = $BE_{SCPG,y}$ + $BE_{MNPG,y}$ = 375,174+27,979= 403,153 tCO_2e

3. Leakage emissions

According to ACM0002 (Version 20.0), no leakage emissions are considered.

4. Emission reductions

As stated in section B.6.1,

$ER_y = BE_y – PE_y – LE_y = BE_y – 0 – 0= BE_y$ = 403,153 tCO_2e

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
04/02/2020-03/02/2021	403,153	0	0	403,153
04/02/2021-03/02/2022	403,153	0	0	403,153
04/02/2022-03/02/2023	403,153	0	0	403,153
04/02/2023-03/02/2024	403,153	0	0	403,153
04/02/2024-03/02/2025	403,153	0	0	403,153
04/02/2025-03/02/2026	403,153	0	0	403,153
04/02/2026-03/02/2027	403,153	0	0	403,153
Total	2,822,071	0	0	2,822,071
Total number of crediting years	7			
Annual average over the crediting period	403,153	0	0	403,153

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{PJ\ to\ SCPG\ ,\ y}$
Data unit	MWh
Description	Electricity exported to SCPG by the project
Source of data	On-site measurement

Value(s) applied	950,290 for the first 25 year (year 4 – year 28)
Measurement methods and procedures	Monitored by Main meter and Backup meter installed at the SCPG interface point of the project, whose accuracy class are 0.2S. Continuously measured and monthly recorded each month in the Monthly Record Form of Electric Volume (MRF), and then the Yunnan Power Gird Corporation issues Electric Volume and Power Bill Settlement (EBS) to the project owner on a monthly basis. MRF serve as the basis for ERs calculation; EBS serve as the electricity sales receipts for cross-check. The conservative values between MRF and EBS are used for ERs calculation.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	Both Main meter and Backup meter should be calibrated by the qualified third party as per the relevant national or industrial standard annually. Measurement results should be cross-checked against electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	Archived electronically and keep at least 2 years after the end of the last crediting period. The accuracy of the two meters should be 0.2s to meet the requirement of DL/T448-2006.

Data/Parameter	$EG_{SCPG\ to\ PJ,y}$
Data unit	MWh
Description	Electricity imported from SCPG to the project
Source of data	On-site measurement
Value(s) applied	0
Measurement methods and procedures	Monitored by Main meter and Backup meter installed at the SCPG interface point of the project, whose accuracy class are 0.2S. Continuously measured and monthly recorded in the Monthly Record Form of Electric Volume (MRF), and then the Yunnan Power Gird Corporation issues Electric Volume and Power Bill Settlement (EBS) on a monthly basis. MRF serve as the basis for ERs calculation; EBS serve as the electricity sales receipts for cross-check. The conservative values between MRF and EBS are used for ERs calculation.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	Both Main meter and Backup meter should be calibrated by the qualified third party as per the relevant national or industrial standard annually. Measurement results should be cross-checked against electricity sales receipts.
Purpose of data	Calculation of baseline emissions
Additional comment	Archived electronically and keep at least 2 years after the end of the last crediting period. The accuracy of the two meters should be 0.2s to meet the requirement of DL/T448-2006.

Data/Parameter	$EG_{PJ\ to\ MNPG,\ y}$
Data unit	MWh
Description	Electricity exported to MNPG by the project
Source of data	On-site measurement
Value(s) applied	79,636 for first 25 year (year 4 - year 28)
Measurement methods and procedures	Monitored by Main meter and Backup meter installed at the MNPG interface point of the project, whose accuracy class are 0.2S. Continuously measured and monthly recorded in the Monthly Record Form of Electric Volume (MRF). Accordance to the registered PDD, the electricity supplied to the Myanmar by the project are all free, this part of electric volume doesn't involve the settlement between the MNPG and the project owner, so the MRF which are together signed and stamped by MNPG and the project owner are the only data basis for ERs calculation.
Monitoring frequency	Continuous measurement and at least monthly recording

QA/QC procedures	Both Main meter and Backup meter should be calibrated by the qualified third party as per the relevant national or industrial standard annually. Measurement results should confirm and sign and stamp by the MNPG and the project owner.
Purpose of data	Calculation of baseline emissions
Additional comment	Archived electronically and keep at least 2 years after the end of the last crediting period. The accuracy of the two meters should be 0.2s to meet the requirement of DL/T448-2006.

Data/Parameter	CAP_{PJ}
Data unit	MW
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Value(s) applied	240
Measurement methods and procedures	Verified by the nameplate of water turbine generators
Monitoring frequency	Once at the beginning of each crediting period
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	This parameter is used to calculate the power density

Data/Parameter	A_{PJ}
Data unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
Source of data	Project site
Value(s) applied	410,000
Measurement methods and procedures	Measured by the qualified design institute
Monitoring frequency	Once at the beginning of each crediting period
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	This parameter is used to calculate the power density

B.7.2. Sampling plan

Not applicable.

B.7.3. Other elements of monitoring plan

1. Monitoring team

Monitoring is carried out by the monitoring team, and the detailed responsibility of each team member is as below:

1) CDM manager is the team leader and responsible for the overall CDM management and data review;

2) Operation technician is responsible for monitoring data recording;

3) Data administrator is responsible for data collection, archiving;

4) Internal auditor is responsible for cross-check of the monitoring data

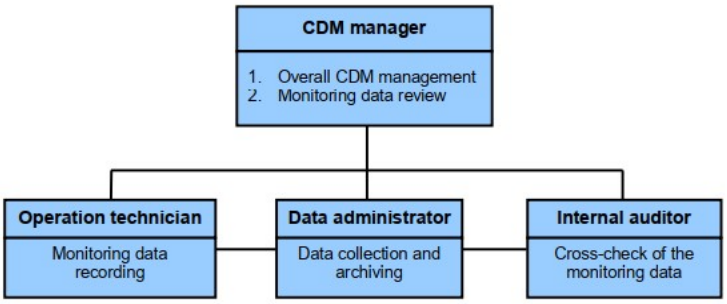

Figure B-1 Monitoring management structure

2. Monitoring system

During the second crediting period, the electricity generated by the project is delivered to the regional power grid including SCPG and MNPG.

Two bidirectional electric energy meters with the accuracy class of 0.2S installed at the SCPG interface point of the project, which was assigned by the Yunnan Power Grid Corporation, have been used to measure the electricity exported to the SCPG ($EG_{PJ\ to\ SCPG,\ y}$) and imported from the SCPG ($EG_{SCPG\ to\ PJ,\ y}$) by the project. One is the main meter and the other one is the backup meter of the main meter in case of emergency use.

Two electric energy meters with the accuracy class of 0.2S installed at the MNPG interface point of the project which was assigned by the project owner have been used to measure the electricity exported to the MNPG ($EG_{PJ\ to\ MNPG,\ y}$). One is the main meter and the other one is the backup meter of the main meter in case of emergency use.

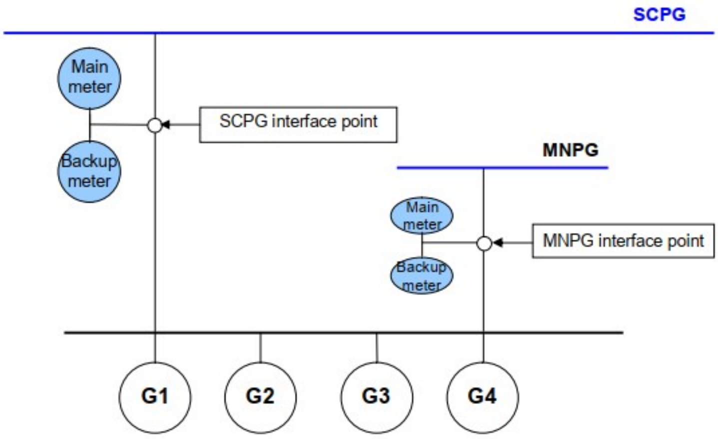

Figure B-2 Diagram of the monitoring system

The diagram of the monitoring system are as follows:

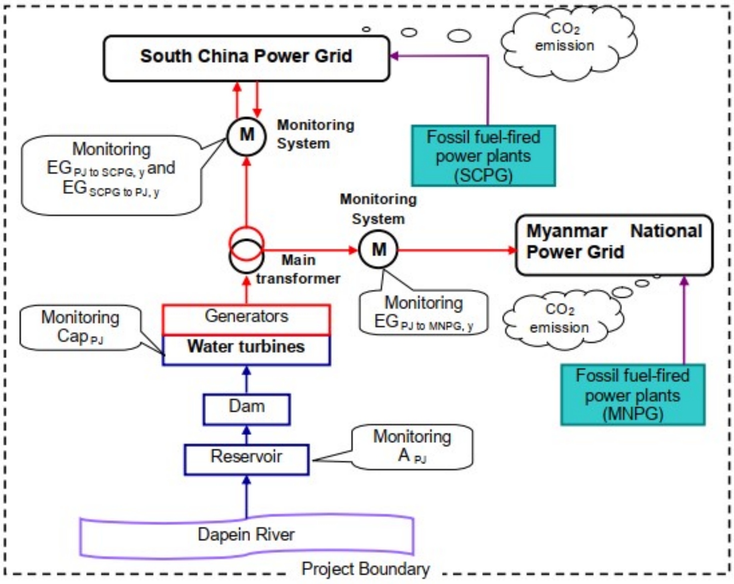

Figure B-3 The technical process diagram of the project

3. Data collection procedures

EG $_{PJ\ to\ SCPG,\ y}$, EG $_{SCPG\ to\ PJ,\ y}$ are continuously measured and monthly recorded at 15:00 of the 25th day of each month in the Monthly Record Form of Electric Volume (MRF), and then the Yunnan Power Gird Corporation issues Electric Volume and Power Bill Settlement (EBS) to the project owner on a monthly basis. MRF serve as the basis for ERs calculation; EBS serve as the electricity sales receipts for cross-check. The conservative values between MRF and EBS are used for ERs calculation.
EG PJ to MNPG, y are continuously measured and monthly recorded at 15:00 of the 25th day of each month in the Monthly Record Form of Electric Volume (MRF). Accordance to A.1 of the updated PDD, the electricity supplied to the Myanmar by the project are all free, these part of electric volume doesn't involve the settlement between the MNPG and the project owner, so the MRF which are together signed and stamped by MNPG and the project owner are the only data basis for ERs calculation.

Cap $_{PJ}$ is monitored by CDM management team. Cap $_{PJ}$ of the project could be verified by the nameplates of water turbine and generator units.

A $_{PJ}$ is planned to be measured by qualified design institute.

4. Emergency procedures

In normal condition, meter records from the main meters are used for ER calculation. In the case of main meters malfunction, the meter records from the backup meters will be used for ER calculation.

5. Staff training

CDM monitoring staffs are trained by the qualified training engineers before the operation of the project, if the personnel alternation happens, the new staffs will receive the same training before work.

6. Internal audit

Firstly, all the monitoring data are reviewed by the CDM manager to ensure the accuracy**.**

After review by the manager, the monitoring data are forwarded to the internal auditor for the cross-check. EG $_{PJ\ to\ SCPG,\ y}$ and EG $_{SCPG\ to\ PJ,\ y}$ are cross-checked against the Electric Volume and Power Bill Settlement (EBS) issued by the Yunnan Power Grid Corporation. EG $_{PJ\ to\ MNPG,\ y}$ are together signed and stamped by MNPG and the project.

7. Data management

All of the data records relevant to monitoring such as Power Purchase Agreement, DL/T448-2016, technical parameters of the energy meters, monthly meter records, electricity transaction receipts, calibration records, failure detection result, training records and so on will be archived electronically and kept at least for 2 years after the end of the last crediting period.

8. Monitoring and management manual

Monitoring and management manual of the proposed project has been compiled. The monitoring system diagram, monitoring frequency, calibration, data collection procedures and organizational structure are clearly described in the manual. It will be also updated according to the upgrade of DL/T448-2016.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

26/06/2008 (the date of contract of water diversion tunnel)

C.2. Expected operational lifetime of project activity

40 years

C.3. Crediting period of project activity

C.3.1. Type of crediting period

A renewable crediting period is used.

C.3.2. Start date of crediting period

Start date of the second crediting period: 04/02/2020

C.3.3. Duration of crediting period

7 years 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

PEIA was completed by Jiangxi Provincial Design Institute of Water Conservancy & Hydropower on Apr.2008, and was approved by Ministry of Forestry of Myanmar on 01/06/2008. EIA was completed by Jiangxi Provincial Design Institute of Water Conservancy & Hydropower on Nov.2009. The EIA report for the proposed project was approved by Ministry of Forestry of Myanmar on 18/03/2010. The environmental impacts likely to be caused by the proposed project, protective actions adopted by the proposed project and effect analysis are analyzed as follows:

Waste Air

The main source of waste air is CO, NOx and SO2, which are caused by transportation and construction machine. This air pollution is temporary which will end with the end of construction period. The following measure will be taken: cement container will be adopted. The bag filter will be used as the device for dust separation of mixing machine. Material with the dusty will be compacted with canvas.

Meterial yards and roads will be watered timely. The speed of vehicles will be restricted. A sprinkler will sprinkle water on the roads to lay the dust every day.

These measures will ensure that the discharge of air pollutants will meet the Level-two standard of “Integrated Emission Standard of Air Pollutants” (GB16297-1996).

Wastewater

The production wastewater produced during the construction phase consists of the wastewater of sand and stone processing, that of concrete mixing, oily wastewater etc. The wastewater of sand and stone processing will be dealt with secondary sedimentation treatment. The sediment will be delivered to slag yard and then be dealt; the wastewater of concrete mixing will be dealt in the sedimentation tank; oily wastewater will be dealt with oil separating tank; water will be deprived from oil and then meet the demand of wastewater discharged. After the measures mentioned above, both production wastewater will meet the Level-one standard of Integrated Wastewater Discharge Standard (GB8978-1996).

Domestic wastewater will be treated via a septic-tank to meet Standard for Irrigation Water Quality.

Noise

The sources of noise in the construction period derive from the operation of machines such as excavation, boring, blasting, sand crushing and concrete pouring etc., transportation of vehicles and reparation & maintenance of machines. The following measure will be taken to reduce noise: Low-noise machines are encouraged to be used; strengthen the repair and maintenance of equipment; bursting is prohibited in the night; construction staffs are instructed to wear earplugs in the high-noise situation; traffic control is taken to reduce noise caused by transport vehicles.
The above measures will ensure that the noise in the construction period meets the standard of Noise Limitations of Construction Site (GB12523-90).

Soil and water conservation

The main protection targets are ground vegetation submerged by the reservoir, destroyed and squashed by construction, etc. The both side of the roads, material yards and slag yards will be fenced during the construction period. After the construction period, the exposed areas of the power plant, dam, living quarters will be afforested and landscaped.

D.2. Environmental impact assessment

According to the approved EIA of the proposed project, the project owner of the proposed project will carry out the environment protection and environment management well during construction and operation period, the proposed project will not cause significant reverse impacts.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

In order to get feedback the opinions from the stakeholder about the proposed project applying for CDM from the stakeholder, the inviting of comments was done. The survey scope of the stakeholder of the proposed project was the site of the proposed project, and the main objects of investigation are aimed at the local people. The main investigation way for stakeholder is questionnaire survey. The project owner held a stakeholder meeting and distributed the questionnaires in June 2008. So during the survey of stakeholders, 31 questionnaires were distributed and 31 effective questionnaires were returned, and the recovery rate is 100%. Among the stakeholders were peasants, polices and intellectuals.

The contents of this questionnaire survey were as follows：

- Do you know the proposed project?
- What do you think is the necessity for the construction of the proposed project?
- What do you think are the positive impact of the proposed project on your living?
- What do you think are the negative impact of the proposed project on your living?
- Do you know what CDM is?
- Do you support the proposed project to apply for CDM?

E.2. Summary of comments received

100% of stakeholders believe that the proposed CDM project activity will have positive impacts on the local ecology, environment and employment situation; 100% of stakeholders expressed their support for the project. The results of the surveyed are as follows:

Serial number	Contents of this questionnaire	Option	Proportion	Option	Proportion
1	Do you know the proposed project?	Familiar	16%	Know	84%
		Don't know	0%		
2	What do you think is the necessity for the construction of the proposed project?	Increase local tax revenue	13%	Promote local employment	100%
		No comment	0%		
3	What do you think are the positive impact of the proposed project on your living?	Increase electric power supply	81%	Improve housing environment	58%
		Increase income	6%	Increase employment opportunities	58%
		Improve living standard	74%	Others	0%
4	What do you think are the potential negative of the proposed project on your living?	Noise	48%	Land occupation	35%
		Aggravate soil and water loss	0%	Destroy local ecological environment	0%
		Reduce amount of fishing	3%	Impact down stream ecological flow	0%
		Others	0%	No comment	58%
5	Do you know what CDM is?	Yes	6%	No	94%[7]
6	Do you support the proposed project to apply for CDM?	Yes	71%	No comment	29%
		No	0%		

From the survey, it can be seen that:

- Most respondents thought that the proposed project can promote local employment and increase local revenue.
- Most respondents thought the most positive impact of the project construction was the increase electric power supply and the increase of employment opportunities and income.
- Most respondents thought the most negative impact of the project construction was noise and land occupation.
- Vast majority of the stakeholders actively supported the proposed project to apply for CDM.

E.3. Consideration of comments received

No negative comments have been received on the project. Moreover, the local community possesses strong positive comments on the effects that the project will make on the local economy and infrastructure. There has therefore been no need to modify the project due to comments received. And meanwhile, the project owner will concern much on the suggestions from stakeholders, especially for the compensation part; and put all of the measures listed in the EIA into effect during construction and operation, so as to achieve environmental, social and economic benefits.

As for the comments of the stakeholders, most stakeholders and local government are very supportive for the proposed project. Toward the considerations and opinions of the stakeholders, the solutions are as follows:

[7] Vast majority of the stakeholders were not know CDM at first. The project owner explained CDM in the stakeholder meeting. So the stakeholders understand and supported the proposed project to apply for CDM.

- Toward the noise, measurement mentioned in the approved EIA report should be implemented strictly, so that the noise can meet the relevant environmental standard.

- Consequently, since no big counterview is showed in the survey, essential changes in the project design, construction and operation need not be made.

Based on the above measures, opinions and views of the public can be basically solved. Therefore it is not necessary to modify design, construction and the run way of this proposed project.

SECTION F. Approval and authorization

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The Letters of Approval for the project activity are available and has been uploaded with the registration.

Appendix 1. Contact information of project participants

Organization name	Cleantec Development PCC
Country	United Kingdom of Great Britain and Northern Ireland
Address	
Telephone	+44 1534-615-011
Fax	+44 1534-500-402
E-mail	Fund@cleantecdev.com
Website	
Contact person	Sun Wei

Organization name	Dapein (1) Hydropower Company Limited
Country	Myanmar
Address	(No.(8/17), Bo Tauk Htein Street, Mingalar Quarter, Pyinmana Township, Nay Pyi Taw, the Union of Myanmar
Telephone	18988085125, 0871-64890454
Fax	
E-mail	huangguoqiang@china-cdto.com, 14430419@qq.com
Website	
Contact person	Huang Guoqiang

Organization name	Dapein (1) Hydropower Company Limited
Country	China
Address	(No.(8/17), Bo Tauk Htein Street, Mingalar Quarter, Pyinmana Township, Nay Pyi Taw, the Union of Myanmar
Telephone	18988085125, 0871-64890454
Fax	
E-mail	huangguoqiang@china-cdto.com, 14430419@qq.com
Website	
Contact person	Huang Guoqiang

Appendix 2. Affirmation regarding public funding

Not Applicable. There is no public funding from UNFCCC Annex 1 parties for the project.

Appendix 3. Applicability of methodologies and standardized baselines

The applicability of the selected methodology is described in B.2.

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

Calculation of Emission Factor of MNPG:

Net electricity generated and delivered to MNPG by all power sources serving the system (GWh)

	Ref	2016			2015			2014		
		Electricity Generation[1] (a+b+c+d+e+f+g+h)	*Rate of own use[2]*	*The electricity connected to the grid (Electricity Generation*(1-Rate of own use))*	*Electricity Generation[1] (a+b+c+d+e+f+g+h)*	*Rate of own use[2]*	*The electricity connected to the grid (Electricity Generation*(1-Rate of own use))*	*Electricity Generation[1] (a+b+c+d+e+f+g+h)*	*Rate of own use[2]*	*The electricity connected to the grid (Electricity Generation*(1-Rate of own use))*
Total		**17,877.73**		**17,665.34**	**15,984.16**		**15,804.87**	**14,175.97**		**14,022.19**
1 Gas-fired (steam and gas)	a+b	8,052.43		7,891.38	6,517.75		6,387.40	5,193.04		5,089.18
2 Oil-fired	c	61.12	3.50%	58.98	55.23	3.50%	53.30	64.89	3.50%	62.62
3 Coal-fired	d	9.59	5.00%	9.11	-	5.00%	-	69.53	5.00%	66.05
4 Hydro	e	9,743.85	0.50%	9,695.13	9,398.98	0.50%	9,351.99	8,828.85	0.50%	8,784.71
5 Photovoltaic (Electricity)	f	9.47	0.00%	9.47	10.94	0.00%	10.94	13.91	0.00%	13.91
6 Wind Turbine	g	0.02	0.00%	0.02	0.01	0.00%	0.01	-	0.00%	-
7 Micro Hydro	h	1.25	0.50%	1.24	1.25	0.50%	1.24	5.75	0.50%	5.72

Sources:

1 Table 1.23. Electricity Generation by Source, Myanmar Energe Statistics 2019, P20
Table 1.26. Renewable Energy Supply, Myanmar Energe Statistics 2019, P22

2 Myanmar Energy Statistics 2019, P80

3 “a” refers to “steam”; “b” refers to “gas”

Calculation of Operating Margin Emission Factor of MNPG

Fuel Type		Fuel Consumption		Net Calorific Value	Fuel Specific EF	CO2 Emission
	Symbol	FCi,y		NCVi,y	EFCO2,m,i,y	FCi,y x $EF_{CO2,m,i,y}$ x $NCV_{i,y}$
		Unit	Value	MJ/Unit	$kgCO_2/TJ$	tCO_2
			1	*2*	*3*	*Calc.*
2016						
gas		million cubic metres	3,144.26	36,351.22	54,300	6,206,365.09
coal		1,000 metric tons	26.87	11,896.61	90,900	29,057.27
oil		kilotons of oil equivalent	19.00	41,868.00	72,600	57,752.72
Total Generation (incl. export)					**Total Emission**	6,293,175.08
17,665.34		**GWh**				
2015						
gas		million cubic metres	2,746.06	36,351.22	54,300	5,420,369.47
coal		1,000 metric tons	19.99	11,896.61	90,900	21,617.23
oil		kilotons of oil equivalent	17.00	41,868.00	72,600	51,673.49
Total Generation (incl. export)					**Total Emission**	5,493,660.18
15,804.87		**GWh**				
2014						
gas		million cubic metres	2,437.08	36,351.22	54,300	4,810,482.67
coal		1,000 metric tons	25.63	11,896.61	90,900	27,716.33
oil		kilotons of oil equivalent	20.00	41,868.00	72,600	60,792.34
Total Generation (incl. export)					**Total Emission**	4,898,991.34
14,022.19		**GWh**				
Operating Margin Emission Factor / yr						**0.3513**

Sources:

1,2 Myanmar Energe Statistics 2019

3 IPCC 2006, Guidelines for National Greenhouse Gas Inventories

Calculation of Emission Factor of SCPG:

Combined Emission Calculation of SCPG

Operating Margin (tCO_2e/MWh)	Build Margin (tCO_2e/MWh)	Combined Margin (tCO_2e/MWh)
A	B	C*＝0.25*A+0.75*B
0.8367	0.2476	0.3948

Data Source: http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/201812/P020181220579925103092.pdf

Emission Reduction Calculation

Calculation of Baseline Emission

	MNPG	SCPG	Unit
Calculation of Combined Margin (tCO_2e/MWh)	0.3513	0.3948	tCO_2/MWh
On-grid Electric Quantity (MWh)	79,636	950,290	MWh/yr
Baseline Emission (tCO_2e)	27,979	375,174	tCO_2
	403,153		

Appendix 5. Further background information on monitoring plan

All the details on monitoring plan are described in B.7.

Appendix 6. Summary report of comments received from local stakeholders

All the details on comments received from local stakeholders are described in Section E.

Appendix 7. Summary of post-registration changes

The project was registered on 04/02/2013. There is no post-registration changes.

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Document information

Version	Date	Description
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.

Version	*Date*	*Description*
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document