



65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA



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(CTI)

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Summary:

Shenzhen CTI International Certification Co., Ltd (hereafter referred to as CTI) has been commissioned by Climate Bridge (Shanghai) Ltd. to perform a validation of the renewal of crediting period of “65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA” (Ref. No. 653) (hereinafter referred to as the project activity) in P. R. China.

The scope of the validation of the renewal of crediting period is defined as an independent and objective review of the updated sections of the PD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity. The validation opinion is finalized based on the assessment of the project description through applying standard auditing techniques including but not limited to document reviews, follow up actions (e.g. site visit, telephone or e-mail interviews) and also the review of the applicable approved methodology and underlying formulae and calculations.

The assessment was performed in accordance with the VCS standards and guidance version 4.0 and UNFCCC requirement including an assessment of:

- (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered VCS project activity at the time of requesting renewal of crediting period of the project activity;
- (b) The correctness of the application of the approved methodology and, where applicable, the approved standardized baseline for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period of the registered VCS project activity.

The project activity was registered as a CDM project activity on 09/05/2010 and renewed on 04/05/2017 which is available at <https://cdm.unfccc.int/Projects/DB/RWTUV1256040897.46/view?cp=1>. After the registration of CDM, the project has been registered as a VCS project which is available at <https://registry.terra.org/app/projectDetail/VCS/653>.

The purpose of “65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA” (hereafter referred to as the Project) developed by Gansu Zhangye Dagushan Hydropower Co., Ltd. is to generate renewable electricity by utilizing hydro power resource. The Project is a run-of-river hydropower project. The installed capacity of the project activity is 65 MW, consisting of 2 sets of hydropower turbine generators with unit capacity of 26 MW and another set of hydropower turbine generator with unit capacity of 13 MW. Total of 195,150 MWh clean electricity generated by the Project are expected to be delivered to the Northwest Power Grid of China (NWPG) annually. The project is located in the middle of the upper stream of the Heihe River, within the territory of Su’nan

Yugu Autonomous County of Gansu Province, approximately 102 km far from Zhangye City, China. The geographical coordinates of the project is 100°01'29"E, 38°37'21"N. The project activity will achieve greenhouse gases (GHGs) emission reductions by avoiding CO₂ emissions from the business-as-usual scenario electricity generation of those fossil fuel-fired power plants connected to the NWPG. The project activity contributes to sustainable development of the local community, the host country and the world.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

During this validation, no finding was identified in relation to relevant VCS standards, guidance and UNFCCC requirements and relevant host party criteria and the applied baseline and monitoring methodology etc.

In summary, it is CTI's opinion that the project activity "65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA" (Ref. No. 653) in P. R. China, as described in the PD, version 06.1 dated 03/02/2021, meets all relevant VCS and UNFCCC requirements for the renewal of the crediting period.

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1 INTRODUCTION

1.1 Objective

Shenzhen CTI International Certification Co., Ltd (hereafter referred to as CTI) has been commissioned by Climate Bridge (Shanghai) Ltd. to perform a validation of the renewal of crediting period of “65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA” (Ref. No. 653) (hereinafter referred to as the project activity) in P. R. China.

Shenzhen CTI International Certification Co., Ltd as the validation body of the project activity has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in ISO 14065:2007.

The objective of this validation is to ensure that reported information in the Project Description of “65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA” is complete and accurate in accordance with applicable VCS standards and relevant UNFCCC requirements.

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the project description (PD). The PD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002 version 20.0. The validation was based on the requirements in the CDM Validation and Verification standard for project activities version 02.0 and VCS guideline and standard version 4.0.

The validation is not meant to provide any consulting towards the client. However, stated requests for forward actions and/or corrective actions may provide input for improvement of the Project monitoring towards reductions in the GHG emissions.

1.3 Level of Assurance

The validation report is based on the VCS-PD and supporting evidences made available to the validator and information collected through performing interviews and during the on-site assessment.

The validation conclusion is assured a reasonable level of assurance.

1.4 Summary Description of the Project

Project title	65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA
UNFCCC reference number	3045
VCS reference number	653
Project Participants	Gansu Zhangye Dagushan Hydropower Co., Ltd. (Project Owner, host country, P. R. China)
Location of the project	The middle of the upper steam of the Heihe River, within the territory of Su'nan Yugu Autonomous County of Gansu Province, approximately 102 km far from Zhangye City, China The central geographical coordinates of the proposed project is 100°01'29" E, 38°37'21"N.
Project start date	Construction date: 16/11/2007 Operation start date: 22/07/2009, 24/07/2009, and 26/07/2009 respectively for 3 units
First Project Description (PD)	Version 06, dated 31/01/2021
Final Project Description (PD)	Version 06.1, dated 03/02/2021
Applied Methodology/Version	ACM0002, version 20.0, dated 28/11/2019
Scope/Technical Area	1/1.2

The project activity was registered as a CDM project activity on 09/05/2010 and renewed on 04/05/2017 which is available at <https://cdm.unfccc.int/Projects/DB/RWTUV1256040897.46/view?cp=1>. After the registration of CDM, the project has been registered as a VCS project which is available at <https://registry.verra.org/app/projectDetail/VCS/653>.

The purpose of “65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA” (hereafter referred to as the Project) developed by Gansu Zhangye Dagushan Hydropower Co., Ltd. is to generate renewable electricity by utilizing hydro power resource. The Project is a run-of-river hydropower project. The installed capacity of the project activity is 65 MW, consisting of 2 sets of hydropower turbine generators with unit capacity of 26 MW and another set of hydropower turbine generator with unit capacity of 13 MW. Total of 195,150 MWh clean electricity generated by the Project are expected to be delivered to the Northwest Power Grid of China (NWPG) annually. The project is

located in the middle of the upper stream of the Heihe River, within the territory of Su'nan Yugu Autonomous County of Gansu Province, approximately 102 km far from Zhangye City, China. The geographical coordinates of the proposed project is 100° 01'29" E, 38° 37'21"N. The project activity will achieve greenhouse gases (GHGs) emission reductions by avoiding CO₂ emissions from the business-as-usual scenario electricity generation of those fossil fuel-fired power plants connected to the NWPG. The project activity contributes to sustainable development of the local community, the host country and the world.

2 VALIDATION PROCESS

2.1 Method and Criteria

Validation was conducted using CTI's procedures in line with the requirements specified in the VCS Standard version 4.0, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques. No sampling was utilized during the site visit as well as validation for project activity.

CTI completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of (if applicable):

- Project Details;
- Application of Methodology;
- Estimated GHG Emission Reduction and Removals;
- Monitoring;
- Safeguards etc.

CTI validate that the reported information in the Project Description are complete and accurate in question. This involved a site visit and a desk review of the Project Design. This Validation Report describes the findings of this assessment.

2.2 Document Review

Based on the requirements of competency, experience and qualified sectoral scopes, CTI appointed a validation team in accordance with CTI's internal procedures (see Appendix 2 Competence of team members and technical reviewers).

Function	Name	Technical competence	Task Performance*
Team Leader	Wang Guolian	1.2	☒ DR ☒ SV ☒ RP ☐ TR
Technical Reviewer	Lin Shunrong	1.2	☒ DR ☐ SV ☐ RP ☒ TR

*DR=Document review; SV=Site visit; RP=Reporting; TR=Technical review

The VCS project design version 06 dated 31/01/2021, version 06.1 dated 03/02/2021 were assessed as part of the validation. In addition, the registered CDM PDD version 05 dated 04/02/2010, revised monitoring plan approved by CDM EB on 03/03/2011 and its Validation Statement of the revised monitoring plan, renewed CDM PDD version 07 dated 19/01/2017

and the CDM validation report for renewal of crediting period version 1.0 dated 20/01/2017 as well as relevant documents, were reviewed. A detailed documents reviewed are listed in Appendix 1 of the report.

2.3 Interviews

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Li Jianmin	Plant Director	Gansu Zhangye Dagushan Hydropower Co., Ltd.	Basic information, technology of the project, etc.;
Mr. Qing Xiaojun	Director of Operation Department	Gansu Zhangye Dagushan Hydropower Co., Ltd.	Monitor Data: meter readings, control and maintenance, QA&QC systems
Mr. Che Tianming	Operation Duty	Gansu Zhangye Dagushan Hydropower Co., Ltd.	Status of the project activity and any modifications with respect to the registered PD.
Mr. Li Hong	Operation Duty	Gansu Zhangye Dagushan Hydropower Co., Ltd.	Applicability to the latest methodology.
Ms. Hu Lijiao	Project Manager	Climate Bridge (Shanghai) Ltd.	National and local policies and changes
			Baseline of the project and its updates
			The lifetime of the project activity
			Emission Factors and their updates
			Monitoring plan and changes.

2.4 Site Inspections

The validation team performed the on-site validation (the middle of the upper steam of the Heihe River, within the territory of Su'nian Yugu Autonomous County of Gansu Province, approximately 102 km far from Zhangye City, China) on 02/02/2021. The interviewed personnel and objective are listed in above table.

2.5 Resolution of Findings

As an outcome of the validation process, the team can raise different types of findings.

Where a non-conformance arises the validation team shall raise a Corrective Action Request (CAR). A CAR is issued, where reported information is not in line with the applicable CDM/VCS requirements.

The validation team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM/VCS requirements have been met.

All CARs and CLs raised during validation shall be resolved prior to submitting a request for registration.

There are no CARs and CLs raised for the project.

2.5.1 Forward Action Requests

As this is the validation for the project for renewal of crediting period, there are no FARs raised in the previous validation and verification process.

3 VALIDATION FINDINGS

3.1 Project Details

The following description of the project as per PD was verified during the on-site visit:

The project activity is a hydro power project located in the middle of the upper stream of the Heihe River, within the territory of Su'nan Yugu Autonomous County of Gansu Province, approximately 102 km far from Zhangye City, China which is to use hydro resource for electricity generation. The installed capacity of the project activity is 65 MW, consisting of 2 sets of hydropower turbine generators with unit capacity of 26 MW and another set of hydropower turbine generator with unit capacity of 13 MW. The average annual power delivered to the grid by the project is expected to be 195,150 MWh. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants Northwest Power Grid of China (NWPG). It's estimated that the project could achieve GHG emission reductions of 108,030 tCO_{2e} annually in the second crediting period.

The project activity was invested and operated by Gansu Zhangye Dagushan Hydropower Co., Ltd. which is the project proponent of project by checking the business license of the project.

By site visit checking the nameplate of the project, following technical parameter of project activity are confirmed:

Equipment	Parameter	Unit	Amount
Turbine	Units(large/small)	-	3 (2*large/1*small)
	Model(large/small)	-	HL(257)-LJ-225 HL(257)-LJ-160
	Rated Head	m	73
	Rated Flow (large/small)	m ³ /s	40/21
	Rated Rotation Speed (large/small)	r/min	300/428.6
	Rated Power (large/small)	MW	27.3/13.6
	Annual operation time	h	3,094
Generator	Model (large/small)	-	SF-J26-20/4800 SF-J13-14/3400
	Rated Power	MW	26/13
	Rated Voltage	kV	10.5
	Rated Rotation Speed	r/min	300/428.6
	Load factor	-	35.3%

	lifetime	year	30
Manufacturer	Hangzhou Resource Power Equipment Co., Ltd.		

By checking the registered VCS PD and site visit interview with project owner, it is confirmed that the project started operation on 22/07/2009, 24/07/2009, and 26/07/2009 respectively for 3 units. According to the requirement of VCS, the project start date was 22/07/2009 which is the commissioning date of the 1st generator. A deviation was identified for the crediting period of the Project. The project is registered under VCS Version 2007.1 and completed validation before 19/03/2020. As per VCS requirement, it remains eligible to apply the crediting period requirements under VCS 2007.1 which shall be a maximum of ten years and may be renewed at most twice. Therefore, the first renewable crediting period of the Project is updated from 22/07/2009 - 08/05/2010 to 22/07/2009 - 21/07/2019, which lasts for 10 years. However, as the project is also registered as a CDM project with a seven year twice renewable project crediting period, it is not eligible for VCU issuance beyond the end of those 21 years (the ending date is 08/05/2031). the validation team confirmed that the second VCS crediting period of the project is from 22/07/2019 to 21/07/2029 last for 10 years in line with the requirement of VCS.

As the installed capacity of the project is 65 MW which falls under large scale project according to the requirement of CDM. Also, due to the annually estimated emission reductions are lower than 300,000 tCO₂, the project falls under project under VCS standard.

The project is located in the middle of the upper stream of the Heihe River, within the territory of Su'nan Yugu Autonomous County of Gansu Province, approximately 102 km far from Zhangye City, China. Through site visit it is confirmed that the central geographical coordinates of the proposed project is 100°01'29" E, 38°37'21"N.

Before the implementation of the project activity, the electricity generated by the project would be supplied by NWPG in the baseline scenario.

By checking laws and regulation, it is confirmed that the project activity is in complicate with all laws and regulations in China.

By checking information on the Internet, the project activity was registered as a CDM project activity on 09/05/2010. It is confirmed that the project activity has been validated by TÜV NORD CERT GmbH based on the CDM PDD version 05 dated 04/02/2010 and reported in the validation report No. QT-EC0417-08 - 08/233 version 1.2, completed on 08/03/2010. The revised monitoring plan was approved by CDM EB on 03/03/2011 which was validated by Germanischer Lloyd Certification. And it is confirmed that the crediting period as a CDM project was renewed on 04/05/2017 with renewed CDM PDD version 07 dated 19/01/2017 and the CDM validation report for renewal of crediting period version 1.0 dated 20/01/2017. All above information is available at

<https://cdm.unfccc.int/Projects/DB/RWTUV1256040897.46/view?cp=1>. By checking statement issued by the project proponent, it is confirmed that in this crediting period, the project would either been issued under CDM, VCS or I-REC. Until now, there are CERs issuance of request under CDM scheme covering from 09/05/2010 to 28/04/2012.

Also, the project has been registered as an I-REC Device in 01/01/2019, with the Device ID-DAGUSHAN under the International REC Standard. There are I-RECs issued under the International REC Standard covering from the period 01/01/2019~29/07/2019, 01/08/2019~31/08/2019, 01/09/2019~18/09/2019, 19/09/2019~19/09/2019, and 01/01/2020~30/04/2020.

The project does not participate in the other emissions trading program by checking public information on Internet and interviewing with project owner. Of course, no rejection from other GHG programs.

As the project is not a grouped project, the eligibility criteria for grouped project is not applicable; No leakage management as not an AFOLU project; No commercially sensitive information confirmed through site visit.

The project activity would contribute sustainable development in the region in following aspects confirmed by site visit:

1. GHG emission reduction

The project activity achieve obvious greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions, as grid-connected fossil fuel-fired power dominates in the Northwest Power Grid of China.

2. Pollutants emission reduction through replacing fossil fuel combustion

The project is to replace grid-connected fossil fuel-fired power plants in the Northwest Power Grid of China, and thus reduce fossil fuel consumption and avoid pollutants emission, such as sulfur dioxide and dust, brought by fossil fuel combustion. Therefore, the project has obvious environmental benefit.

3. Employment opportunities

The project activity creates local employment opportunity during the construction and operation period of the project activity.

Overall, it is confirmed that the PD is accurate, complete, and provides an understanding of the nature of the project.

3.2 Safeguards

3.2.1 No Net Harm

By checking the EIA summary and conclusion provided in the registered PDD, it is confirmed that hydro power is green power and the impact caused by hydro power on the surrounding ecosystem and residents, water, and atmosphere etc. is very little, there would be no net harm caused due to the project activity. Also, the EIA of the project are approved by the government.

Also, no potential environment or social economic matter was found during the site visit. The project is renewable energy project and thus no net harm observed in air or water quality on-site.

3.2.2 Local Stakeholder Consultation

A survey was carried out in October 2006 through the information publication, distributing and collecting responses to questionnaires targeting on local residents, builders and members of the local authorities. The project owner introduced the Project, and then a survey was arranged through a questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request.

The stakeholder survey showed that the project receives strong support from the local community. They all believe the project will promote local economic development and agree with the project development and construction.

Communications with Local stakeholders was being carried out at periodic intervals. There are no negative comments received for the project.

All such conclusion has been verified through site visit and check registered PD.

3.2.3 Environmental Impact

By checking the EIA summary and conclusion provided in the registered PDD, it is confirmed that hydro power is green power and the impact caused by hydro power on the surrounding ecosystem and residents, water, and atmosphere etc. is very little, there would be no net harm caused due to the project activity. Also, the EIA of the project are approved by the government.

Also, no potential environment or social economic matter was found during the site visit. The project is renewable energy project and thus no net harm observed in air or water quality on-site.

3.2.4 Public Comments

No public comments were received.

3.2.5 AFOLU-Specific Safeguards

Not applicable as non-AFOLU project.

3.3 Application of Methodology

3.3.1 Title and Reference

The approved methodology applied in the project activity is ACM0002 - “Grid-connected electricity generation from renewable sources” (version 20.0)

Related tools are:

Tool to calculate the emission factor for an electricity system (version 07.0)

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).

3.3.2 Applicability

The criteria and assessment of ACM0002 (version 20.0) are in the following table:

Criteria	Analysis	Assessment team’s opinion
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	The project is a greenfield NWPG-connected renewable power generation project.	By site visit and checking FSR, it is confirmed that the project is a Greenfield power plant.
The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit,	The project is a new hydro power project.	By site visit and checking FSR, it is confirmed that the project is a Greenfield power plant.

solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.		
In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m²; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m²; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m², all of the following conditions shall apply: (i) The power density calculated using the	The project activity results in a new single reservoir and the power density, calculated using equation (7), is greater than 4 W/m²	By site visit and checking FSR, it is confirmed that the project is a hydro power project results in a new single reservoir. The power density is greater than ,4 W/m².

total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m²; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.		
In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.	The project is a hydro power project, not an integrated hydro power plant. Therefore, this is not applicable	By site visit and checking FSR, it is confirmed that the project is a hydro power project, not an integrated hydro power project, this is not applicable.

The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	The project does not involve switching from fossil fuel to renewable energy. The project is not biomass fired power plant.	By site visit and checking FSR, it is confirmed that the project is a Greenfield power plant, does not involved in switching from fossil fuel to renewable energy and biomass fired power plant.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	The project is not retrofit, rehabilitation, replacement, or capacity addition project. Therefore, this item is not applicable.	By site visit and checking FSR, it is confirmed that the project is a Greenfield power plant.

According to the table above, the validation team confirm the project meets all the applicable criteria of ACM0002 version 20.0

Also, for related tools, the validation team confirm all applicable criteria have been met confirmed by site visit and checking FSR.

3.3.3 Project Boundary

Project boundary has been ascertained and confirmed during the site visit using ACM0002 version 20.0 – “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”.

Hence the project boundary includes the renewable energy power generation, sub-stations, grid and all power plants connected to grid. The project activity will evacuate power to the grid. The boundary also extends to the project power plant and all power plants connected physically to the electricity system that the VCS project power plant is connected to.

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity Owner or project activity Implementer does not have any control on it. Thus, for project activity, net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

The sources and GHG gases involved for proposed Project activity are as below

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	No	No other emissions are emitted from the project
Project	Greenfield hydro power Project Activity.	CO ₂	No	Main emission source
		CH ₄	No	The project is run-of-river hydropower plant, and the power density is greater than 10 W/m ² . Therefore, the project activity does not emit CH ₄ .
		N ₂ O	No	Minor emission source
		Other	No	Minor emission source

3.3.4 Baseline Scenario

The baseline scenario of the project activity is that the 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 into the grid. According to the methodology ACM0002 version 20.0, the baseline emissions are the electricity produced by the project activity multiplied by the emission factor of NWPG.

For the second crediting period, the continued validity of the original baseline has been assessed in the updated PD. CTI confirms that there have been no changes in the relevant national and/or sectoral regulations on building a hydro power project for exporting electricity to power grid since the previous crediting period. On the other hand, the baseline scenario for building a hydro power project for exporting electricity to power grid was still valid according to methodology ACM0002 version 20.0.

The information presented in the updated PD has been validated by an initial document review of all data. Further confirmation has been made based on the review of information from similar projects and/or technologies. The sources referenced in the PD have been quoted correctly. The information was verified against credible sources, such as: China Energy Statistical Yearbook 2013-2018.

The steps from 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 as

per VCS standard version 4.0 were applied to assess the continued validity of the baseline and/or to update the baseline at the renewal of a crediting period:

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

VCS standard version 4.0 requires assessing the impact of new relevant national and/or sectoral policies and circumstances on the baseline. The validity of the current baseline is assessed using the following Sub-steps:

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

In China, the Renewable Energy Law has been put into effect since 2006, which encourages the development of renewable energy projects. And the regulatory frameworks - agenda for the Host Country's 13th Five-Year Plan (2016-2020) was issued on in March 2016. However, although renewable energy projects have been developed rapidly in recently years, grid connected power generation in China is still dominated by fossil-fuel power plants. There are no new relevant national and/or sectoral policies and/or circumstances in the electricity generation sector applicable to the project activity, in comparison to the time of the submission of the project activity for validation, which would affect the compliance of the current baseline scenario. Hence in the absence of the project activity electricity would still have been generated in the existing fossil fuel power plants or by the addition of new fossil fuel power plants connected to the NWPG.

CTI confirms that no relevant mandatory national and/or sectoral policies applicable to the project activity came into effect after the submission of the project activity for validation.

Step 1.2: Assess the impact of circumstances

For the project activity, the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. The main investment environment or market characteristics especially the feed-in tariff, the policy in terms of market access permit have no significant change. The current practice for the baseline emissions is still the GHG emitted by NWPG: the equivalent electricity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources within the NWPG.

By verifying China Energy Statistical Yearbook 2014-2019. It is confirmed that thermal power (which coal is the fuel) still domain the power supply in NWPG which is the same situation when project activity was under validation. Therefore, the main market characteristics have no change.

As the project is under normal operation which is in line with the original design thereby the condition used to determine baseline emissions in the previous crediting is still valid.

The conditions used to determine the baseline emissions in the previous crediting period are not valid: the emission factor calculation of NWPG in the first crediting period is basing on the data of 2004-2006. Before the time of requesting renewal of the crediting period, the China DNA have issued the latest “2019 Baseline Emission Factors for Regional Power Grids in China” on 29/12/2020, so the emission factor of NWPG and all values need to be updated for the second crediting period.

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

The current baseline scenario is the continuation of the current practice. In the absence of the project, the electricity would have been supplied by NWPG, and it will not request an investment by the project proponent or third party. So, this step is not applicable.

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

The NWPG emission factor calculated ex-ante for the 2nd crediting period needs to be updated, as per the “Tool to calculate the emission factor for an electricity system” version 07.0.

This parameter is properly described in the 3.3.6 of following report.

Conclusion on step 1:

CTI confirms that the current baseline is still valid as per methodology ACM0002 version 20.0. However, the grid emission factor needs to be updated for the subsequent crediting period.

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

Step 2.1: Update the current baseline

As the baseline scenario of the project activity is still sustained in this crediting period, no update would be required.

Step 2.2: Update the data and parameters

The NWPG emission factor will be updated as described in 3.3.6 of this report.

3.3.5 Additionality

Not applicable for the renewal of crediting period.

3.3.6 Quantification of GHG Emission Reductions and Removals

The calculation of the emissions reductions exactly follows the procedures described in the methodology ACM0002 version 20.0 and relevant tool, e.g. the “Tool to calculate the emission factor for an electricity system” version 07.0.

CTI has assessed the calculation of project emissions, baseline emissions, leakage emissions and emission reductions. Corresponding calculations have been carried out based on calculation spreadsheet. The consistency of the parameters and equations presented in PD, as well as calculation spreadsheet etc., has been compared with the information and requirements presented in the methodology and respective tools.

The assumptions and data used to determine the emission reductions are listed in the PD and all the sources have been checked. Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PD. The values presented in the PD are considered reasonably based on the documentation and references reviewed and the results of the interviews.

The estimation of the emission reductions are considered correct as the calculations have been reproduced by the validation team with the attainment of the same results.

CTI confirms methodology ACM0002 version 20.0 and relevant tool, e.g. the “Tool to calculate the emission factor for an electricity system” version 07.0 have been correctly applied to calculate baseline emissions, project emissions, leakage and net GHG emission reductions and removals.

Detailed information on the verification of the parameters used in the equations is found below. The algorithms for the determination of the baseline and project are discussed in the following sections.

The emission reductions are calculated by the difference between baseline emissions (BE_y), project emissions (PE_y) and leakage.

(1) Baseline emissions

As per the methodology ACM0002 version 20.0 that 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 baseline emissions are calculated by the 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) ($EG_{PJ,y}$) multiplied by the Combined margin CO₂ emission factor for grid connected power generation in year y ($EF_{grid,CM,y}$).

Because the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, the $EG_{PJ,y}$ equals to the Quantity of net electricity generation supplied by

the project plant/unit to the grid in year y (MWh) ($EG_{\text{facility},y}$). According to ACM0002, version 20.0, Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh) ($EG_{\text{facility},y}$) is determined according to Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0.

The Combined margin CO_2 emission factor for grid connected power generation in year y ($EF_{\text{grid,CM},y}$) is calculated in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the steps prescribed in the “Tool to calculate the emission factor for an electricity system”, version 07.0.

The PD version 06.1 completed on 03/02/2021 using the data for calculation of the grid emission factor at the time the PD was received for validation. The latest data available was from China Electric Power Yearbook 2016 - 2018, China Energy Statistical Yearbook 2016 - 2018. The calculation is in accordance with the calculation process of the combined margin emission factor published by the Chinese DNA: 2019 Baseline Emission Factors for Regional Power Grids in China published by the DNA of China on 29/12/2020.

The NWPG is selected as the electricity system of the project activity. Simple OM method (method a) is applied for calculating OM emission factor because according to the data from China Electric Power Yearbook 2014-2018, the low-cost/must-run resources in the latest five years (2013-2017) constitute less than 50% of the total grid generation. Ex-ante option with a 3-year generation-weighted average is chosen to account for $EF_{\text{grid,OMsimple},y}$. Option B of simple OM is selected for the calculation 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 A was denied because necessary data for Option A is not available). As a result, $EF_{\text{grid,OMsimple},y}$ is calculated to be 0.8922 tCO₂e/MWh as a generation weighted average for the year 2015-2017.

Based on the most recent years energy balance of the NWPG, calculating the proportions of CO₂ emissions from the coal-fired, oil-fired and gas-fired power plants in total CO₂ emissions of thermal power plants and taking them as weight of each type of plant in the calculations;

Based on the most advanced commercialized technologies which applied by the coal-fired, oil-fired and gas-fired power plants, calculating the emission factor of thermal power plants in NWPG. This approach is more conservative as it assumes all recently built plants have the fuel efficiency as that of the most advanced commercialized technologies;

Calculating the $EF_{\text{grid,BM},y}$ through multiplying the emission factor of thermal power plants by the percentage share of thermal power plants installed capacity addition within all recently built installed capacity. The proper year is selected so that it is the closest time when the last 20% of installed capacity was built.

As a result, the $EF_{grid,BM,y}$ is calculated to be 0.4407 tCO₂e/MWh.

Based on the weight w_{OM} and w_{BM} of 0.25:0.75 by default for the second crediting period, the combined margin emission factor is calculated to be 0.5536 tCO₂e/MWh.

The annual net electricity supplied to the grid is 195,150 MWh which is in line with the original design of the project. It's confirmed that the estimation of the figure is reasonable. Thereby, the baseline emissions could be calculated to be 195,150 MWh * 0.5536 tCO₂e/MWh = 108,030 tCO₂e. The validation team confirmed that the remission reductions calculation is corrected in the PD.

The values of the main parameters for calculating combined emission factor ($EF_{grid,CM,y}$) are crosschecked by The validation team and the data sources are listed in below table:

Data and Parameters	Description	Data source
$EF_{grid,OM,y}$	CO ₂ emission factor of operation margin of NWPG in 2019	2019 Baseline Emission Factors for Regional Power Grids in China
$EF_{grid,BM,y}$	CO ₂ emission factor of Built margin of NWPG in 2019.	2019 Baseline Emission Factors for Regional Power Grids in China

CTI confirms that all data sources and assumptions are appropriate, and calculations are correct, applicable to the proposed VCS project activity and will result in a conservative estimate of the emission reductions.

(2) Project emissions

The project is a run-of-river hydropower project and the power density of project is higher than 10W/m². Therefore, the project emission is considered as zero based on ACM0002, Version 20.0. Following parameter are used and checked by the validation team and confirmed to be correct.

Data and Parameters	Description	Data source
CapBL	Installed capacity of the hydro power plant before the implementation of the project activity.	The project is a new hydropower plant, this value is zero.
ABL	Area of the reservoir measured in the surface of the water, before the implementation of the	The project is a new hydropower plant, this value is

	project activity, when the reservoir is full (m ²).	zero.
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The power density is calculated as: $(Cap_{PJ} - Cap_{BL}) / (A_{PJ} - A_{BL}) = (65,000,000 - 0) / (147,300 - 0) = 441 \text{ W/m}^2$, greater than 10 W/m^2 , Therefore, the project emission is zero based on ACM0002, version 20.0. That is, $PE_y = 0 \text{ tCO}_2\text{e}$.

(3) Leakage

According to the methodology, the project activity leakage do not take into account, then no leakage according to ACM0002.

(4) Emission reductions

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average ex-ante estimation of emission reduction conservatively calculated to be 108,030 tCO₂e per year for the selected 10 years crediting period. Total emission reductions during the second crediting period are estimated to be 1,080,300 tCO₂e.

3.3.7 Methodology Deviations

There are no methodology deviations for the project.

3.3.8 Monitoring Plan

The project applies methodology ACM0002 version 20.0. The monitoring plan in the VCS PD (version 06.1 dated 03/02/2021) was consistent with the revised monitoring plan approved by CDM EB and satisfied with ACM0002 version 20.0 requirements.

Parameters	Description	Measurement method and QA/QC procedures	Assessment conclusion
EG _{facility,y}	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	The parameter would be measured through main meters including M1, M2, M5, M7, M9, and backup meters including M3, M4, M6, M8 and M10. following formula is used to calculate EG_{facility,y}: $EG_{facility,y} = (EG_{M1} + EG_{M2}) * (EG_{M7} + EG_{M9}) / (EG_{M5} + EG_{M7} + EG_{M9})$ The parameter EG_{facility,y} will be continuous measured and monthly recorded.	Consistent with methodology

Cap _{PJ}	Installed capacity of the hydropower plant after the implementation of the project activity.	The parameter will be determined based on manufacturer's specifications or nameplate of the equipment.	Consistent with methodology
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.	The parameter will be measured from topographical surveys, maps, satellite pictures, etc. As per the FSR, the submersed area is 147,300 m ² , which was ex-ante used to calculate the power density.	Consistent with methodology

Based on the on-site visit, it is confirmed by the validation team that the power generated by the project is transmitted to Heihe Substation (330kV) together with the power generated by Erlongshan Hydropower Plant (hereinafter "EHP"), and then to Gansu Power Grid and finally to NWPG. 10 set of electricity meters, main meters including M1, M2, M5, M7, M9, and backup meters including M3, M4, M6, M8, M10 are used to continuously measure the quantity of net electricity generation supplied by the project plant/unit to the grid in year y. Meter M1, M2, M3, M4, M7, M8, M9, M10 are bi-directional and meter M5 and M6 are single-directional. The accuracy of main meters and backup meters was 0.2s.

Meter M1 and M2 were installed at the Heihe Substation (330kV) of the Grid Company which measures the net electricity generation supplied to the grid by the project and EHP. Meter M3 and M4 are the backup meter of M1 and M2, which were installed at the exit of booster station of the project. As per the Power Purchasing Agreement (PPA), once M1 and M2 have a breakdown, the electricity will be measured by M3 and M4. The line loss will be negotiated by project owner and the grid company.

Meter M5 is installed at the inlet of booster station of the project on the transmission line from EHP to the project. M6 is installed in the booster station of EHP. The meter reading of M5 was used to record the net electricity generation supplied by EHP. M6 is the backup meter for M5.

Meter M7 and M9 were installed at the powerhouse of the project, which measure the electricity exported from the two main transformers of the project activity. Meter M8 and M10, which also installed at the powerhouse of the project are the backup meters of M7 and M9.

The calibration of meters would be conducted annually based on the requirement of local and national standard. The quantity of net electricity generation supplied by the project plant/unit to the grid in year y would be calculated as:

$$EG_{\text{facility},y} = (EG_{M1} + EG_{M2}) * (EG_{M7} + EG_{M9}) / (EG_{M5} + EG_{M7} + EG_{M9})$$

CTI confirms that the monitoring plan contains all necessary parameters which have been clearly described in PD and that the means of monitoring described in the plan complies with the requirements of the methodology.

An organizational structure is provided in PD. The functions such as data collection, aggregation, verification, calculation, archiving, as well as the maintenance of equipment etc. have been defined. Quality assurance and quality control procedures for recording, maintaining and data archiving etc. will be ensured according to VCS and CDM EB rules. The calibration of the meter will be implemented as per national standard. An emergency treatment process has been defined in PD when the meter is in malfunction. Data management and quality control system are quoted in PD. The monitoring staffs will be trained based on the training program described in PD.

3.4 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 VALIDATION CONCLUSION

CTI has performed a validation of renewal of crediting period of the “65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA” (Ref. No. 653). The validation was performed on the basis of the updated sections of the PD relating to the baseline, estimated emission reductions and the monitoring plan using the most recent version of baseline and monitoring methodology applicable for the project activity. The final validation opinion was finalized in accordance with the VCS standard version 4.0, CDM VVS for project activities version 02.0 and the CDM PS for project activities version 02.0 including the assessment of:

- (a) The impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant guidance from the Board with regard to renewal of the crediting period of the registered VCS project activity at the time of requesting renewal of crediting period of the project activity;
- (b) The correctness of the application of the approved methodology and, where applicable, the approved standardized baseline for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period of the registered VCS project activity.

The review of the project design documentation and the subsequent follow-up interviews have provided CTI with sufficient evidence to determine the validity of the original baseline. The project correctly applies the latest baseline and monitoring methodology ACM0002, “Grid-connected electricity generation from renewable sources” version 20.0. CTI is able to confirm:

- (a) The updated PD complies with the valid version of the applicable PD form and instructions therein for filling out the PD;
- (b) Information transferred to the later valid version of the PD form is materially the same as that in the registered PD;
- (c) The baseline and monitoring methodology was applied in accordance with the applicable requirements in the VCS standard and Project Standard;
- (d) The baseline, the estimated GHG emission reductions, and the monitoring plan in the updated PD comply with the applicable requirements in the VCS standard and Project Standard, and the valid version of the methodology that is applicable to the registered VCS project activity;
- (e) The next crediting period of the registered VCS project activity commences on the day immediately after the expiration of the current crediting period;
- (f) The names of project participants in the updated PD are consistent with the names of the project participants in the registered PD.

CTI also confirms that there have been no proposed methodology deviations for the second crediting period when submitting this report.

Given that the project is implemented as designed and the underlying assumptions do not change, the project is likely to achieve the estimated amount of annual emission reductions of 108,030 tCO₂e and a total estimated emission reduction of 1,080,300 tCO₂e over the 2nd crediting period as specified within the final PD.

In summary, it is CTI's opinion that the project activity "65MW DAGUSHAN HYDROPOWER PROJECT IN CHINA" (Ref. No. 653) in P. R. China, as described in the PD, version 06.1 dated 03/02/2021, meets all relevant VCS and UNFCCC requirements for the renewal of the crediting period.

APPENDIX 1: REFERENCE LIST

1. VCS PD, version 06, dated 31/01/2021; version 06.1 dated 03/02/2021
2. ER calculation spreadsheet
3. CDM PDD, version 05 dated 04/02/2010
CDM PDD, version 07 dated 19/01/2017
4. The revised monitoring plan approved by CDM EB on 03/03/2011
5. The Validation Statement of the revised monitoring plan
6. Power Purchase Agreement signed between the project owner and local grid company
7. CDM Validation Report, version 1.2, dated 08/03/2010
CDM Validation Report, version 1.0 dated 20/01/2017
8. VCS Monitoring Report, version 03 dated 13/11/2020
9. VCS Verification Report, dated 13/11/2020
10. VCS standard version 4.0, dated on 09/03/2020
11. Approved methodology ACM0002, version 20.0, dated 28/11/2019
12. Tool to calculate the emission factor for an electricity system, version 07.0
13. Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0
14. Assessment of the validity of the original/current baseline and to update the baseline at the renewal of a crediting period, version 03.0.1
15. CDM Validation and Verification Standard for project activities version 02.0
16. CDM Project Standard for project activities version 02.0
17. CDM project cycle procedure for project activities version 02.0
18. Business license
19. Statement issued by the project proponent
20. Nameplate of the equipment
21. FSR

- 22. China Energy Statistical Yearbook 2013-2018
- 23. 2019 Baseline Emission Factors for Regional Power Grids in China dated 29/12/2020
- 24. China Electric Power Yearbook 2014-2018
- 25. 2006 IPCC Guidelines for National Greenhouse Gas Inventories

APPENDIX 2: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

Ms. Guolian WANG

Satisfies the requirements of competence management system of CTI, and is hereby appointed as:

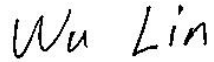
Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 3: Energy demand	TA 3.1: Energy demand
SS 5: Chemical industry	TA 5.1: Chemical industry
	TA 5.2: Caprolactam, nitric and adipic acid
SS 11: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1: Emissions of fluorinated gases
	TA 11.2: Refrigerant gas production
SS 12: Solvents use	TA 12.1: Chemical industry
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Wu LIN

A handwritten signature in black ink that reads 'Wu Lin' in a cursive, slightly slanted script.

Technical Competent Manager

Shenzhen, 07/04/2020

Ms. Shunrong Lin

Satisfies the requirements of competence management system of CTI, and is hereby appointed as:

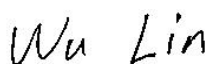
Qualification					
GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 14: Afforestation and reforestation	TA 14.1: Afforestation and reforestation
SS 15: Agriculture	TA 15.1: Agriculture

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Wu LIN



Technical Competent Manager

Shenzhen, 01/01/2021