# VALIDATION REPORT

HYDROLOGIC SOCIAL ENTERPRISE

# RENEWAL OF CREDITING PERIOD

PRODUCTION AND DISSEMINATION OF CERAMIC WATER PURIFIERS BY HYDROLOGIC, IN THE KINGDOM OF CAMBODIA


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Summary:

Bureau Veritas has conducted the validation of the renewal of the crediting period of Production and dissemination of Ceramic Water Purifiers by Hydrologic, in the Kingdom of Cambodia (UNFCCC Registration No 0395), owned by Hydrologic Social Enterprise, which is located House 97A, Street 15BT (Ta Phon), Sansom Kosal 1, Boeung Tumpun, on the basis of UNFCCC/ Gold Standard criteria , as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC and Gold Standard criteria refer to Article 12 of the Kyoto Protocol, the CDM as well as Gold Standard rules and modalities and the subsequent decisions by the Gold standard executive Board, as well as the host country criteria.

The validation scope is defined as an independent and objective review of the project design document, the project's baseline study, monitoring plan and other relevant documents, and consisted of the following three phases: i) desk review of the project design document and additional background documents; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final validation report and opinion. The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas internal procedures.

The first output of the validation process is a list of Clarification Requests and Corrective Actions Requests (CLs and CARs), presented in Appendix A. Taking into account this output, the project proponent revised its project design document.

In summary, it is Bureau Veritas opinion that the project correctly applies the baseline and monitoring methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption – Version 3.0, July 2015" and meets the relevant UNFCCC and Gold Standard requirements for the renewal of the crediting period.

| Report No.: | Subject Group: |
|---|---|
| BV/BRUNEI-VAL/0001/2017 | Gold Standard |

Project title:

Production and dissemination of Ceramic Water Purifiers by Hydrologic, in the Kingdom of Cambodia

Work carried out by:

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# 1. INTRODUCTION

Hydrologic Social Enterprise has commissioned Bureau Veritas to validate its Gold standard registered project towards renewal of Crediting period “Production and dissemination of Ceramic Water Purifiers by Hydrologic, in the Kingdom of Cambodia” (hereafter called “the Project”) at.

This report summarizes the findings of the validation of the Project, performed on the basis of Gold Standard / UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

## 1.1. Objective

The objective of a validation is to provide a through and independent third party assessment of the project design. In particular, the project's baseline, the monitoring plan, and the project’s compliance with relevant Gold Standard / UNFCCC and host country criteria are validated in order to confirm that the project design, as documented, is sound and reasonable, and meets the applicable Gold Standard / CDM requirements and the identified criteria. Validation is a requirement for all Gold Standard projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

## 1.2. Scope

The validation scope is defined as an independent and objective review of the project design document, the project’s baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against the requirements of the Gold Standard , the applicability conditions of the selected methodology and guidance issued by the Gold standard and CDM Board.

The scope of this Validation is defined by the underlying legislation, regulation and guidance given by relevant entities or authorities. In the case of GS project activities, the scope is set by:

- Gold Standard v 2.2requirements
- Gold Standard Toolkit
- Gold Standard Annex Z,
- Clean Development Mechanism Validation And Verification Standard (VVS) published under http://cdm.unfccc.int.
- Baselines and monitoring methodologies (including GHG inventories)
- Environmental issues relevant to the applicable sectoral scope.
- Applicable environmental and social impacts and aspects of GS project activity
- Current technical and operational knowledge of the specific sectoral scope and information on best practice.
- Stakeholder consultation and feedback

As per the requirements of the GS Annex Z the validation is based on:

- The revised PDD and/or revised Gold Standard Annexes highlighting the changes in the project in track-change mode,
- The updated emission reduction calculation spread sheet
- Information collected through performing interviews and during the on-site assessment.

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

## 1.3. Validation Team

The assessment team and internal technical reviewer team consist of the following personnel:

| FUNCTION | NAME | TA 1.1 | TA 3.1 | TASK PERFORMED* |
|---|---|---|---|---|
| **Team Leader** | Mr. Ram M. Desai | ☒ | ☐ | ☒**DR** ☒**SV** ☒**RI** ☐**TR** |
| **Team Member** | | ☐ | ☐ | ☐**DR** ☐**SV** ☐**RI** ☐**TR** |
| **Local Translator** | Mr. Makra | ☐ | ☐ | ☒**DR** ☒**SV** ☐**RI** ☐**TR** |
| **Internal Technical Reviewer (ITR)** | Mr. Sanjay Patankar | ☐ | ☒ | ☐**DR** ☐**SV** ☐**RI** ☒**TR** |
| **Specialist supporting ITR** | | ☐ | ☐ | ☐**DR** ☐**SV** ☐**RI** ☐**TR** |
| **Specialist supporting ITR** | | ☐ | ☐ | ☐**DR** ☐**SV** ☐**RI** ☐**TR** |

*DR = Document Review; SV = Site Visit; RI = Report issuance; TR = Internal Technical Review

# 2. METHODOLOGY

The overall validation, from Contract Review to Validation Report & Opinion, was conducted using Bureau Veritas internal procedures.

In order to ensure transparency, a validation report is customized for the project, according to the Gold Standard Version 2.2, issued by Gold Standard (Ref-07). The validation report shows, in a transparent manner, criteria (requirements), means of validation and the results from validating the identified criteria. The validation report serves the following purposes:

- It organizes, details and clarifies the requirements a Gold Standard project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

## 2.1. Review of Documents

The Project Design Document (PDD) submitted by Hydrologic Social Enterprise and additional background documents related to the project design and baseline were reviewed.

Furthermore, cross checks were made between information provided in the PDD and information from sources other than those used.

To address Bureau Veritas corrective action and clarification requests, Hydrologic Social Enterprise revised the PDD and resubmitted it on 29/11/2017.

The validation conclusions presented in this report relate to the project as described in the PDD version 11.1.

## 2.2. Follow-up Interviews

On 12/10/2017 to 14/10/2017 Bureau Veritas performed a site visit and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Hydrologic Social Enterprise were interviewed (see References). The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

| Interviewed organization | Interview topics |
|---|---|
| Hydrologic Social Enterprise (the Project Owner) | ➢ Status of the project and any modifications with respect to the registered PDD.<br>➢ Applicability of selected methodology<br>➢ National policies and changes<br>➢ Baseline of the project and its updates<br>➢ Emission factors and their updates<br>➢ Emission reductions calculation<br>➢ Monitoring plan<br>➢ Gold Standard Passport<br>➢ DNH Indicators and update |
| Nexus Carbon for Development | ➢ Applicability of selected methodology<br>➢ National policies and changes<br>➢ Baseline of the project and its updates<br>➢ Emission factors and their updates<br>➢ Emission reductions calculation<br>➢ Monitoring plan<br>➢ Gold Standard Passport<br>➢ DNH Indicators and update |
| Local Stake Holders (Includes Legal Entities / DNA officials / NGO and Health practitionars) | ➢ To know the participation in the Local Stake holder Consultation process<br>➢ To understand the Views towards project implementation<br>➢ To understand the issues raised during stake holder consultation<br>➢ To understand whether stake holders are happy with the responses given by PP to queries rasied during Local Stake holder consultation process. |

## 2.3. Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the validation is to resolve issues that require further elaboration, research or expansion prior to Bureau Veritas Certification's positive conclusion on the project design.

A Corrective Action Request (CAR) is raised, if one of the following situations occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable, verifiable and additional emission reductions;

(b) The applicable Gold Standard / CDM requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

A Clarification Request (CL) is raised, if information is insufficient or not clear enough to determine whether the applicable Gold Standard requirements have been met.

A Forward Action Request (FAR) may also be raised during validation, to identify issues related to project implementation that require review during the first verification of the project activity.

To guarantee the transparency of the validation process, the issues raised, the responses provided by the project participants, the means of validation of such responses and references to any resulting changes in the PDD or supporting annexes are documented in the CAR & CL list in Appendix A.

## 2.4. Internal Technical Review

The validation report underwent an Internal Technical Review (ITR) before requesting registration of the project activity.

The ITR is an independent process performed to examine thoroughly that the process of validation has been carried out in conformance with the requirements of the validation scheme as well as internal Bureau Veritas procedures.

The Team Leader provides a copy of the validation report to the reviewer, including any necessary validation documentation. The reviewer reviews the submitted documentation for conformance with the validation scheme. This will be a comprehensive review of all documentation generated during the validation process.

When performing an Internal Technical Review, the reviewer ensures that:

- The validation activity has been performed by the team by exercising utmost diligence and complete adherence to the Gold Standard rules and requirements.
- The review encompasses all aspects related to the project which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems of the project participant as well as the project activity, review of the stakeholder comments and responses, closure of CARs and CLs during the validation exercise, review of sample documents.

The reviewer may raise Clarification Requests to the validation team and will discuss these matters with the Team Leader.

After the agreement of the responses to the Clarification Requests from the validation team as well as the PP(s), the finalized validation report is accepted for further processing such as uploading via the UNFCCC interface / Gold Standard Registry.

# 3. VALIDATION CONCLUSIONS

In the following sections, the conclusions of the validation are stated.

The findings from the desk review of the revised project design documents and the findings from interviews during the site visit are described in the Validation report Appendix A.

The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Report Appendix A. The validation of the Project resulted in 04CAR(s) and 04CL(s) and 0 FAR.

The CARs and CLs were closed out based on adequate responses from the Project Participant(s) which meet the applicable requirements. They have been reassessed before their formal acceptance and closure.

## 3.1. Project Design

PDD was completed correctly using the latest PDD template and guideline. PP has used current format of PDD available on the UNFCCC Website i.e. Project Design Document Form for CDM Project Activities (F-CDM-PDD), Version 10.1.

PDD is found complete in all respect and as per the latest Guideline for completing the PDD. The Latest Revised PDD submitted by the PP is of Version 11.1 Dated 29/11/2017.

## Approval

As per the Gold Standard requirement here is no need of the Approval from the Local DNA. The Project was validated earlier and is registered with Gold Standard since 2012.

Hence this section is not Applicable for this project.

## Contribution to sustainable development

The Project activity involves Manufacturing and dissemination of Ceramic Water Filter to the rural as well as urban population in the kingdom of Cambodia. In Cambodia availability of clean water for drinking is the prevalent problem. There is no clean water network infrastructure available in the country and that leads to the spread of several water borne dieses in the urban as well as rural area. This was confirmed using third party study i.e. a health survey in 2014 found that 13% of under-5 children had experienced diarrhea in the preceding 2 weeks (National Institute of Public Health and National Institute of Statistics, 2015). Research also finds that diarrheal diseases are the most prevalent cause of death in children under 5 years old in Cambodia.
The Hydrologic Ceramic Water Purifier (CWP) is a point-of-use microbial water treatment system intended for routine use in low-income settings.

The system can filter enough to supply drinking water for a family of five. Studies on similar filters have indicated effective life spans of up to five or seven years

This project directly addresses several of the United Nations Millennium Development Goals (MDGs), including goal 4 and 7, and especially to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation. With the new target under the Sustainable Development Goals (SDG), the project address SDG 3, 6 and 13, especially SDG6.1, to achieve universal and equitable access to safe and affordable drinking water by 2030

It also integrates the principles of sustainable development into country policies and programmes and reverses the loss of environmental resources; reducing child mortality, improving maternal health, combating disease, ensuring environmental sustainability, and developing a global partnership for development.

Validation Team carefully assessed the claims of Sustainable development made by the PP due to implementation of the project. This was evident through Past Verification Records as well as several studies made by the independent organizations in Host Country Cambodia. The Project is found to be supporting the MDG and SDG of United Nations and creating awareness amongst the population towards the access of clean drinking water.

***'Do not harm' assessment***

Detailed of "Do no harm" assessment has been carried out & documented in the GS Passport /P4/ by the project participant. The assessment has been performed in accordance to requirements prescribed in the GS Toolkit 2.2 (Ref-17), Section 2.4.1 & Safeguarding Principles – guiding questions as listed in Annex H.

All supporting information & reference sources stated in the GS Passport in order to support the assessment have been verified by the validation team & confirmed the assessment has been carried out based on accurate information. All identified Eleven Safeguarding Principles were evaluated and assessed as low risk and hence there is no mitigation measures are required. Since registration there is no change to the Safeguarding principles observed.

***Detailed impact assessment - sustainable development matrix***

Detailed impact assessment accordance to GS Toolkit 2.2 (Ref-17) , Section 2.4.2 & Annex I has been applied to establish the sustainable development matrix by the project participant. The validation team had assessed the detailed impact assessment & found out of 12 indicators evaluated by the project participant, 4 indicators were scored as positive and the remaining were scored as "0". There is no single indicators are scored as negative. The validation team found that the scoring is reproducible and the results from the environmental impact assessment and local stakeholder consultation have been considered adequately as the input to the detailed assessment process by the project participant.

***Stake Holder Consultation Process***:

A detailed public stakeholder meeting was carried out in Bannan district meeting hall, Battambang province on 29/08/2017; relevant stake holders were invited through various means i.e. Local News Paper and Email Communication and letters. Verified these communications and found satisfactory.

PP also Showed an email communication for the invitation with the link to provide feedback for the stakeholder. The mail as sent by the CEO of Hydrologic. The recipient list was verified and found correct, most of the participants were found present during the stakeholder meeting.

The Stakeholder Meeting was arranged as an event to facilitate interactive session with all stakeholders participated. Group discussions on Do no Harm and Sustainable development Matrix was arranged in order to make stakeholders understand better about the project activity so that they can contribute relevant feedback on sustainable development.

No objections or negative comments were raised about the project. All the stakeholders were of the opinion that the project activity would be beneficial and would contribute toward the sustainable development.

The entire proceedings of the stakeholder consultation meetings have been verified by the Validation team and found satisfactory

***Stakeholder Feedback Round***

As mentioned above PP conducted stakeholder consultation Meeting on 29/08/2017 and feedback obtained during this session was reviewed and answered appropriately. Furthermore, PP officially

opened the stakeholder Feedback Round from 28/09/2017 to 28/11/2017 by re-inviting all the stakeholders who were previously invited for the consultation meeting via email, letters and phone call. However, no comment has been received (Refer section F of stakeholder consultation report).

Details of Feedback and response are provided in the Section E.1 of Gold Standard Passport. There were few comments / feedback / Queries raised by the Stakeholders during consultation process, PP has addressed all those comments satisfactory there is no negative comment noted during this round.

During Validation Site visit Validation team specifically interviewed these stakeholders to understand whether the stakeholder consultation process was transparent or not. Following questions were asked to Stake holder through Telephonic interview.

| Sr. No. | Questions Asked |
|---|---|
| 1 | How did you come to know about the LSC Being conducted by hydrologic (Invitation / Advertisement)? |
| 2 | Did you attend the Stakeholder consultation meeting in person? |
| 3 | What is your opinion about Hydrologic Project? Does it help in improving the water quality at House hold level? |
| 4 | Did Hydrologic provided correct answers to all your queries raised during LSC Meeting? |
| 5 | Any Pending Answers / clarifications from Hydrologic to your questions? |

It is concluded that PP has provided sufficient information to Stakeholders through various means and the entire process is done in a transparent manner. Feedbacks obtained are considered and relevant responses are given to relevant stake holders.

***Validation of Gold Standard Passport***

There are no changes to the Gold Standard Passport noted during this validation. The Current Gold Standard Passport submitted by PP is Version 02.0 Dtd. 29/11/2017. The Passport found updated according to the Requirement of Annex Z of Gold Standard and hence found satisfactory.

There were no comments found received from the Stakeholder until 29/11/2017.

## 3.2. Application of latest approved version of a baseline and monitoring methodology

At the time of registration, project participant has used the following methodology:

- Technologies and Practices to Displace Decentralized Thermal Energy Consumption – ,Version 1.0 Dtd. 11/04/2011

The revised PDD applies the latest available version of the same methodology, i.e. “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 3.0– July 2015”. Therefore, it meets the condition that for renewal of crediting period, the methodology shall not change.

PP has described how project meets the applicability conditions of the selected revised methodology in PDD section B.2. During this validation of renewal of crediting period the applicability of the methodology was re-assessed based on the knowledge of the project from the initial validation, subsequent verifications and the confirmation from the Stakeholders engaged in the project activity.. In conclusion, the project activity meets each of the applicability

conditions of the methodology. It also meets all the other stipulations and limitations mentioned in the other sections of the methodology.

The validation team hereby confirms the applicability of the methodology to the project:

(i) This methodology is applicable to programs or activities introducing improved cook-stoves or water treatment technology (e.g. water filters) and practices to households and institutions that result in improved kitchen regimes within a distinct geographical area. – *The project involves Manufacturing and distribution of Ceramic Water Filter to treat the water to make it safe for the drinking purpose and the treatment technology is easy and convenient which reduces the Kitchen Regime as intended by the Methodology. Hence it is confirmed that the methodology condition is met and there is no change since last Validation.*

*(ii)* The technologies each have a continuous useful energy output of less than 150kW per unit (defined as total energy delivered from start to end of operation of a unit divided by time of operation). For technologies or practices that do not deliver thermal energy in the project scenario but only displace thermal energy supplied in the baseline scenario, the 150kW threshold applies to the displaced baseline technology.Total installed thermal energy is 27.37 MW thermal and thus less than the limit of 45 MW thermal. – *Ceramic Filters used by the household does not deliver any energy output, however it displaces the thermal energy supplied in the baseline scenario. PP has done a Baseline survey before the validation of renewal of crediting period and based on the result it is reconfirmed that the three stone stove (open fire) has an output of 7.50kW, a 5L Portable rocket stove with skirt (improved cook stove) has an output of 5.00kW and a large 45L Institutional stove has an output of less than 20kW per unit. All of them are well below the threshold (Ref-6). Hence it is confirmed that the methodology condition is met and there is no change since last Validation.*

*(iii)* The use of the baseline technology as a backup or auxiliary technology in parallel with the improved technology introduced by the project activity is permitted as long as a mechanism is put into place to encourage the removal of the old technology (i.e. discounted price for the improved technology) and the definitive discontinuity of its use.- *The technology used will displace GHG emissions from the use of fuel to boil water but will not replace the cook stoves which will still be used for cooking purposes. The fuel used to boil water will be monitored and the emissions arising from this activity will be included in the emissions reductions calculations as described in the PDD section B.6.1. Hence it is confirmed that the methodology condition is met and there is no change since last Validation.*

(iv) The project proponent must clearly communicate to all project participants the entity that is claiming ownership rights of and selling the emission reductions resulting from the project activity – *PP has communicated to the stakeholders that PP will claim ownership rights at the stakeholder consultation. In addition, PP is including a document in every water filter sold that explains that PP retains the rights of ownership of the GHG reductions. This was confirmed through Site Visit to the Factory where Ceramic filters are manufactured. The Leaflets (Product information and instructions to user, Warrantee card and Stake holder consultation records. The Ceramic Water Filters are manufactured and sold by the PP and hence it is confirmed that the methodological condition is met and there no change since last validation*.

*(v)* Project activities making use of a new biomass feedstock in the project situation (e.g. shift from non-renewable to green charcoal, plant oil or renewable biomass briquettes) must comply with relevant Gold Standard specific requirements for biomass related project activities, as defined in the latest version of the Gold Standard rules. - *The technology does not make use of any fuel and therefore this condition does not apply to this project. This was confirmed during the Validation site visit and from the past verification records. And found correct. And hence it is confirmed that the methodological condition is met and there no change since last validation*.

## Project Boundary

The validation team has validated the project boundary by observing the physical site and equipment used in the process of manufacturing Ceramic Water filters at Hydrologic Factory as well by visiting households where Ceramic Water Filters are used to treat water.

The spatial extent of the project boundary is clearly defined in line with Technologies and Practices to Displace Decentralized Thermal Energy Consumption – July 2015".

PP has explained the Project boundary in PDD section B.3 which is found in accordance with the applied gold standard methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption – July 2015". From the review of Project Boundary from the previous registered PDD and Validation Report it is confirmed that there is no change in the Project boundary noted during this validation for renewal of crediting period. The project boundary encompasses:

1. % Usage of Baseline Fuel used for the boiling of water only.
2. Target Area is entire region of Kingdom of Cambodia (i.e. Host Country)
3. Woody biomass is used in the baseline as a fuel to boil the water, however for conservativeness, PP will not include the emission arising from the transportation and production of baseline fuels Where the final residue of the combustion process will be deposited; and

The greenhouse gases and emission sources included in the project boundary are as follows:

| Scenario | Greenhouse gases | Sources |
|---|---|---|
| Baseline | $CO_2$ | Heat delivery from the stoves to boil the water occurs |
| | $CH_4$ | |
| | $N_2O$ | |
| Project | $CO_2$ | Heat delivery from the stoves to boil the water occurs |
| | $CH_4$ | |
| | $N_2O$ | |

Bureau Veritashereby confirms that the identified boundary and the selected sources and gases are justified for the project activity. The validation team did not identify any emission sources that will be affected by the implementation of the proposed project activity and which are expected to contribute more than 1% of the overall expected average annual emissions reductions, and are not addressed by the selected approved methodology.

## 3.3. Validity of the original baseline or its update

As per the Gold Standard Procedure for Renewal of Crediting Period (Annex Z) it is required to validate the validity of the original baseline or its update using methodological tool "Assessment of the validity of the current/original baseline and update of the baseline at the renewal of the crediting period" Version 03.0.1 (Annex 47 EB 66), an assessment of the continued validity of the baseline is performed in steps as follows:

### 3.3.1 Step 1: Assessment of the validity of the current baseline for the next crediting period

The procedures for renewal of the crediting period of a registered Gold Standard project activity, approved by the CDM Executive Board, require assessing the impact of new relevant national and/or sectoral polices and circumstances on the baseline. The validity of the current baseline is assessed using the following Sub-steps.

3.3.2. Step 1.1: Assessment of the compliance of the current baseline with relevant mandatory national and/or sectoral policies (Annex 47, EB 66)

The current baseline remains the same as it was in the registered PDD. There has been no significant change in the relevant national and or secotral policies since the date of earlier registered PDD till now.

The validation team confirms that project activity is not bound by any national or state government mandatory policy and is a voluntary activity of the project participant.

The validation team hereby concludes that the selected baseline scenario is in compliance with the relevant mandatory national and / or sectoral policies for the project activity.

3.3.3 Step 1.2 Assessment of the impact of the circumstances (Annex 47, EB 66)

The policies and circumstances applicable at the time of requesting renewal of the crediting period have remained the same as they were at the time of the registration of the project activity. The baseline scenario identified at the initial validation of the project activity was the baseline scenario is the existing kitchen practice of treating water for drinking by boiling it on stoves using high emission fuels including non-renewable biomass and fossil fuels such as LPG, Kerosene.

And hence there is no need of any investment, this has been confirmed during the Validation Site visit based on the Baseline Survey performed by PP during July 2017, Stakeholder interview, and previous verification reports.

During onsite validation, Validation Team also verified the suppress Demand which may impact on the baseline due to changing circumstances. It was noted that the PP has taken an account of Suppressed demand situation and it is found monitored during Baseline survey conducted in the month of July 2017.

Based on the suppressed demand assessment, it was noted that the parameter $C_j$ is revised in accordance with the data collected during baseline survey. The value applied at the time of initial validation was 2.6% and it is changed to 25.97%. Furthermore, Xboil factor, a new parameter introducing in TPDDTEC 3.0 for premised that are under suppressed demand situation, was introduced and it was found correctly calculated (Xboil= 5.75%) ***/Ref-4/*** based on baseline survey data and Xboil definition.

That means more portion of population would have access to safe drinking water than the initial baseline. This is found transparently presented and because of this change emission reduction calculation is impacted conservatively.

Relevant parameters are calculated using the Baseline data in a transparent manner. Hence it is concluded that Suppressed demand has been taken into consideration and applied correctly.

The validation team hereby concludes that the selected baseline at the time of the registration of the PDD is still valid and applicable at the time of the renewal of the crediting period.

3.3.4 Step 1.3 Assessment of 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 (Annex 47, EB 66)

As per registered PDD, and as described in Annex 3 of the methodology, the baseline scenario is the existing kitchen practice of treating water for drinking by boiling it on stoves using high emission fuels including non-renewable biomass and fossil fuels such as LPG, Kerosene. And this is confirmed during Validation Site visit and through previous verification records. PP has done Baseline survey during 16th July – 28th July 2017. This survey was done by an independent agency Angkor Research. The report submitted by Angkor Research was verified during this validation and found that the outcomes are transparently provided in detailed report and PP has utilized data obtained through this research to arrive at Emission Calculations.

There is no change in the Baseline situation including the Hydrologic Factory where PP is manufacturing Ceramic Filters.

3.3.5 Step 1.4: Assessment of the validity of the data and parameters (Annex 47, EB 66)
Based on the review of Revised PDD and registered PDD it was noted that there few parameters which are changed either due to changes in the baseline situation (i.e. Fuel Usage) and based on the application of latest revise Methodology. However it is noted that there is no significant impact to the baseline seen due to the change in the values of following parameters.

| Parameter | At Validation | At Renewal of Crediting period | Unit | Conclusion |
|---|---|---|---|---|
| ***Ex-Ante Parameters*** | | | | |
| $F_{nrb,bl,y}$ **Non-renewability of woody biomass fuel in year y in baseline scenario** | 0.7328 | 0.77 | Fraction | Default Value as per CDM-SSCWG43 A04 (Information Note-Default values of fraction of non-renewable biomass for Cambodia, version 01.0). CDM-EB-77 (Meeting report CDM Executive Board seventy-seventh meeting, version 01.0) Para 58, page 14). – This is used to calculate baseline emission and the current applied default value is more conservative and found satisfactory. |
| $C_j$ **Portion of users of the project technology j who in the baseline were already consuming safe water without boiling it** | 2.60% | 25.97% | Fraction | This value is based on the result of recent Baseline survey PP has conducted engaging third party / independent agency Angkor Research and it is found that the latest value applied is conservative while calculating Baseline emissions. Hence accepted. |
| $EF_{b,wood,nonCO2}$ / $EF_{p,wood,nonCO2}$ **Non-CO2 emission factor arising from use of fuels in baseline/project scenario** | 7.54 | 8.69 | tCO2e/TJ | It is calculated based on the latest GWP values for Methane & $N_2O$ obtained from IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 2, Stationary Combustion, Table 2.5. Found correct and satisfactory. This value shall be used for the Calculation of Baseline emissions and project emissions. |
| $EF_{b,charcoal,non-CO2}$ / $EF_{p,charcoal,non-CO2}$ **Non-CO2 emission factor arising from use of fuels in baseline scenario** | 4.51 | 5.30 | tCO2e/TJ | It is calculated based on the latest GWP values for Methane & $N_2O$ obtained from IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 2, Stationary Combustion, Table 2.5. Found |

| | | | | |
|---|---|---|---|---|
| | | | | correct and satisfactory. This value shall be used for the Calculation of Baseline emissions and project emissions. |
| $EF_{b,LPG,CO2}$ / $EF_{p,LPG,CO2}$ | NIL | 63.10 | tCO2e/TJ | Newly Added Parameter for Baseline Fuel. Based on the current changes and availability of LPG in some areas |
| $EF_{b,LPG,non-CO2}$ / $EF_{p,LPG,non-CO2}$ | NIL | 0.1548 | tCO2e/TJ | Newly Added Parameter for Baseline Fuel. Based on the current changes and availability of LPG in some areas |
| $NCV_{b,LPG}$ / $NCV_{p,LPG}$ | NIL | 0.047 | TJ/ton | Newly Added Parameter for Baseline Fuel. Based on the current changes and availability of LPG in some areas |
| ***Ex-Post Parameters*** | | | | |
| $Q_{p,y}$ | 1.46 | 1.63 | Litres per person per day | This value is based on the data from the last WCFT conducted in 2016. It will be updated before 1st verification of CP2 |
| $Q_{p,cleanboil,y}$ | 0.01 | 0.05 | Litres per person per day | This value is based on the data from the last WCFT conducted in 2016. It will be updated before 1st verification of CP2 |
| $N_{p,y}$ | 2,197 | 1,875.74 | Person.days | This value is based on the data from the last WCFT conducted in 2016. It will be updated before 1st verification of CP2 |
| **Hygiene Campaigns** | - | Yes | Annual Hygiene Campaign | This is the newly included parameter in the monitoring plan. The details of the methods for campaign is provided in the PDD section B.7.2. |

**Conclusion on step 1**

Validation team herewith confirms that the current baseline is still valid as per the latest methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" Version 3.0– July 2015"

3.3.6. Step 2: Update the current baseline and the data and parameters (Annex 47, EB 66)

3.3.7. Step 2.1: Update the current baseline

Not applicable, since the original baseline scenario where thermal energy is generated using fossil fuel and drawing electricity from local grid is still valid.

3.3.8. Step 2.2: Update the data and parameters

The parameters described under step 1.4 above which were determined at the start of the crediting period and not monitored during the crediting period have been updated in accordance to the latest versions of Technologies and Practices to Displace Decentralized Thermal Energy Consumption – Version 3, July 2015".

# 4.0. Estimation of GHG Emissions

**Baseline Emission**

Baseline Emissions for the project activity is calculated using Baseline Water boiling Test conducted by the PP before 1st Verification of Monitoring period 1. The Data collected during this test conducted on 08/06/2012 is used to arrive at the Baseline Emission. This was presented during validation of Crediting Period in the form of Water Boiling Test Protocol /Ref-6/. The Water boiling test was conducted as per the Methodological Guidance i.e. *"The baseline water boiling test (BWBT) is conducted to calculate the quantity of fuel required to purify by boiling one litre of water for 10 minutes using technologies and fuels representative of the baseline scenario ($W_{b,y}$). The BWBT should be conducted using the 90/30 rule for selection of samples[53], accounting for variability in the types of prevalent baseline technologies."*

From the Baseline Survey report conducted in the month of July 2017 it was revealed that there is no major change in the boiling technology except increase in the LPG usage. Since PP has used data for other boiling technology from the last conducted Water Boiling Test, the data for LPG usage is not available for the water boiling, PP has used formula presented in CDM approved Methodology AMS III.AV version 5.0 to estimate the specific energy consumption required to boil one litre of water and then calculate the quantity of LPG (in tonnes) required to treat one litre of water. The calculation for the usage of LPG for boiling water is presented transparently in HSE_CP2_ER_Cal_20171023 (Ref-3).

Baseline is calculated as per the formula provided in the Gold Standard Methodology applicable for this project

For the baseline emission determination, this has been provided in detail in the PDD Section B.6.1, as
summarized as follows:
$B_{b,y}$ = Number of person-days * Baseline Fuel used to Treat Water (T/L) * Total Safe Water consumed in project scenario (L/p/d)

$B_{b,y} = (1-X_{boil})*(1-C_j) * N_{j,y} * W_{b,y} * (Q_{p,y} + Q_{p,rawboil,y})$
This formula is further developed for various fuels used for boiling water in the Baseline scenario and it is presented as below

Bb,y,biomass = (1 – Cj) * Nj,y * (Wb,y,biomass) * (Qj,y + Qj,rawboil,y)
Bb,y,charcoal = (1 – Cj) * Nj,y * (Wb,y,charcoal) * (Qj,y + Qj,rawboil,y)
Bb,y,LPG = (1 – Cj) * Nj,y * (Wb,y,LPG) * (Qj,y + Qj,rawboil,y)

The fraction of the users which in the baseline is consuming safe water without boiling it (**C**j) has been determined conservatively based on the Baseline Survey done in July 2017 by an independent agency i.e. Angkor Research and found satisfactory. The value determined during baseline survey is used in the calculation to estimate the emission reduction. This is found conservative and accepted by the validation team. Baseline emissions thus calculated for various baseline fuels is presented in the PDD Section B.6.3. and the calculated values are given as below.

$B_{b.y.wood}$ = 0.668
$B_{b.y.charcoal}$ = 0.033
$B_{b.y.LPG}$ = 0.013

**Project emissions**
Project Emissions are accounted for the fuel used during project activity for the boiling of water. It is calculated using following formula. PP has presented this transparently in PDD section B.6.1. The Parameter $W_{p,y}$ is determined based on the Baseline survey report (Ref-20)

$B_{p,j}$ = Number of person.days * Project Fuel used to boil water (T/L) * Total volume of water boiled in project scenario (L/p/d)

$B_{p,y} = (1-C_j) * N_{p,y} * W_{p,y} * (Q_{p,rawboil,y} + Q_{p,cleanboil,y})$

Project emissions thus calculated for various fuels used during project scenario for boiling water is presented in the PDD Section B.6.3. and the calculated values are given as below.

$B_{p.y.wood}$ = 0.357
$B_{p.y.charcoal}$ = 0.018
$B_{p.y.LPG}$ = 0.007

**Leakage Emission ($LE_y$)**
PP has assessed various sources which may contribute the Leakage emissions and identified 6 possible sources as provided in the PDD Section B.6.1 out these six identified sources only one is the credible source i.e. Fire wood consumption in the kilns for baking ceramic water filters.
The Calculation of Leakage emission is done using following formula.

$L_{p.y} = Q_{wood.m3.p.y} * C_{content} * R_{ratio} * f_{NRB,p.y} * P_{unit.p.y}$

Ex ante value applied by PP in the PDD section B.6.3 is

**$LE_y$** = 0.010

**Emission reductions ($ER_y$)**

Emission reductions are calculated using following formulae

$BE_{b,y} = B_{b,y} * ((\int_{NRB,b,y} * EF_{b,fuel,CO2}) + EF_{b,fuel,nonCO2}) * NCV_{b,fuel}$

$PE_{p,y} = B_{p,y} * ((\int_{NRB,p,y} * EF_{p,fuel,CO2}) + EF_{p,fuelnonCO2}) * NCV_{p,fuel}$
Emission Reduction thus calculate per Filter is presented in the PDD as

$ER_y$ = 0.583$tCO2_e$ per water filter per year

In summary, there is significant change in the annual average emission reduction per filter since last registration is noted and it is from 0.95 $tCO_2e$ per filter to 0.583 $tCO_2e$ per filter. The change in emission reduction is due to changes in $C_j$ and $X_{boil}$ parameters based on the Baseline Survey Report done in the month July 2017 (Ref-20)

The validation team has verified the spreadsheet for the calculation of the emission reductions provided by the project participant and is able to confirm the estimated emission reductions is correctly calculated.

## 5.0 Monitoring Plan

The Project uses Gold Standard Approved methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 3.0– July 2015”. As per the Methodology PP has identified relevant parameters which are monitored ex-ante and ex-post

are correctly defined in the PDD sections B.6.2, B.7.1 and B.7.2. These parameters are found relevant to the project activity and hence acceptable.

There are few ex-ante and Ex-Post parameters are changed and changes in these parameters were reviewed carefully to assess the impact on the baseline and found that these parameters are conservative and has not impacted on the baseline adversely. Please refer section 3.3.5 of this validation report for detailed validation conclusion.

Validation Team hereby confirms that the monitoring plan complies with the requirements of the methodology, the monitoring arrangements described in the monitoring plan are feasible within the project design and the project participants are able to implement the described monitoring plan.

## Sustainability Monitoring Plan

The validation team has verified that the Monitoring Plan is in accordance with the applied Gold Standard Gold Standard Methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 3.0– July 2015. The Validation team has checked all the parameters presented in the monitoring plan against the requirements of the methodology and no deviations relevant for the project activity have been found in the plan. The monitoring procedures have been reviewed by the validation team through document review and interviews with the relevant personnel. All parameters that are deemed necessary for the estimation of emission reductions have been included in the PDD.

The parameters to be monitored as indicated in the revised GS-PDD as well as in GS Passport Dtd 29/11/2017, Version: 02.0 to further confirm that the project is contributing positively to sustainable development are as follows:

- Water Quality and Quantity
- Livelihood of the Poor
- Quantitative employment and income generation
- Air quality

## 6.0 VALIDATION OPINION

Bureau Veritas has performed a validation of the Production and dissemination of Ceramic Water Purifiers by Hydrologic, in the Kingdom of Cambodia, The validation was performed on the basis of procedures for renewal of the crediting period of a registered Gold Standard project activity and included as assessment of:

a. An impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant CDM EB & Gold standard guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period;

b. The correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

c. Validity of the monitoring plan with respect to the applied methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” Version 3.0– July 2015”. The validation team concludes that the procedure for requesting renewal of the crediting period has been correctly applied by the project participant. Data and parameters to be determined ex-ante are updated and are valid for the calculation of emission reductions that are expected to result during the operation of the project activity in the new crediting period.

The emissions resulting from the baseline have also been correctly assessed as per the requirements of the methodology that is applicable to the project activity. The project participant intimated the Gold Standard secretariat regarding the renewal of the crediting period along with the information on the DOE and the revised PDD before expiry of the first crediting period. The validation team of the DOE therefore requests the Gold Standard to accord its approval to the renewal of the crediting period for the subject project activity.

# 7.0 REFERENCES

**Category 1 Documents:**

Documents provided by project participants that relate directly to the GHG components of the project.

/1/ Registered PDD version.

/2/ PDD version 11.1 dated 09/11/2017

/3/ Emission reduction calculation spreadsheet.( HSE_CP2_ER_Cal_20171023)

/4/ Cj & Ex Boil Calculation Spread Sheet (HSE_CP2_Cj&Xboil_20171023)

/5/ Baseline Stove Fuel Mix Simplification Spread sheet (HSE_CP2_BaselineStove_FuelMix_Simplification_20171002)

/6/ Hydrologic Social Enterprise (2012) Annex IV – WBT, Water Boiling Test Result

/7/ Hydrologic, Nexus (2016), *WCFT, Water Consumption field test*. Pg. 4

/8/ Previous Validation Report – Report No. 01 997 9105066507, Version No. 05, Dtd. 20-09-2012

/9/ Previous Gold Standard Passport

/10/ Latest Gold Standard Passport, Version 02.0, Dtd. 29/11/2017

/11/ Previous Verification Reports – MP 05

/12/ Gold Standard Review Comments for Previous Validation and Verifications

**Category 2 Documents:**

Background documents related to the design and/or methodologies employed in the design or other reference documents used for cross-check.

/13/ Procedures for renewal of the crediting period of a registered gold Standard Project – GS Annex Z

/14/ Assessment of the validity of the original/current baseline and to update the baseline at the renewal of the crediting period, version 03.0.1, dated 02/03/2012, EB 66 Annex 47.

/15/ Clean development mechanism validation and verification standard

/16/ Gold Standard Tool Kit Version 2.2

/17/ Gold Standard Version 2.2

/18/ The Gold Standard (2015) *Technologies and Practices to Displace Decentralized Thermal Energy Consumption.* [Online] Available from: https://globalgoals.goldstandard.org/uncategorized/401-13-tpddtec-gold-standardtechnologies-and-practices-to-displace-decentralized-thermal-energy-consumption, [Last Accessed 21st September2017].

/19/ Angkor Research and Consulting (2017)*"Baseline Survey Report on Ceramic Water Purifier by Hydrologic in the Kingdom of Cambodia"*.

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/23/ WEPA (Water Environment Partnership in Asia) (2003) *National Policy on Water Supply and Sanitation*.
[Online] Available from: http://www.wepa-db.net/policies/law/cambodia/05.htm [Last Accessed 28th November 2011].

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Available from:
http://www.wepadb.net/policies/law/cambodia/07.htm [Last Accessed 28th November 2011].

/25/ MacCarty, N., et al. (2010) "Fuel use and emissions performance of fifty cooking stoves in the laboratory and related benchmarks of performance", Aprovecho Research Center, Energy for Sustainable Development, The Journal of the International Energy Initiative, Volume 14, Number 3, September 2010, p. 170, Table 1

/26/ CDM-SSCWG43-A04 (Information Note-Default values of fraction of non-renewable biomass for Cambodia,
version 01.0) CDM-EB-77 (Meeting report CDM Executive Board seventy-seventh meeting, version 01.0) Para 58, page 14).

/27/ PATH & IMS (2010) *Accelerating Trial and Adoption of POU HWTS Among the Middle to Low Income*
*Population. Market Research Report Cambodia*. Pg. 68.

/28/ WHO (World Health Organization) (2005) *Nutrients in Drinking Water. Water Sanitation and Health Protection and the Human Environment.* Pg. 34. [Online] Available from: http://www.who.int/water_sanitation_health/dwq/nutrientsindw.pdf [Last Accessed 28th November 2011].

/29/ UN (United Nations) (2010) *General Assembly Adopts resolution recognizing Access to Clean Water, Sanitation as Human Right, by recorded vote of 122 in Favour, None Against, 41 Abstentions*. GA/10967. Sixty-fourth General Assembly Plenary 108th Meeting (AM). Pg. 1. [Online] Available from:
http://www.un.org/News/Press/docs/2010/ga10967.doc.htm [Accessed 28th November 2011].

/30/ National Institute of Statistics and Directorate General for Health, 2015, Cambodia Demographic and Health
Survey 2014

/31/ United Nation. General Assembly 2015, Resolution adopted by the General Assembly on 25 September 2015,
*Transforming our world: the 2030 Agenda for sustainable development*, viewed 21 Sept 2017,
http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E.

/32/ Campbell (2005) *Study on Life Span of Ceramic Filter - Colloidal Silver Pot Shaped (CSP) Model*. Potters for
Peace. Managua.

/33/ Lantagne D. 2001. *Investigation of the Potters for Peace Colloidal Silver-Impregnated Ceramic Filter: Intrinsic Effectiveness and Field Performance in Rural Nicaragua*. Alethia Environmental, Allston MA

/34/ Brown J. Sobsey M. and Proum S. 2007. *Improving Household Drinking Water Quality: Use of Ceramic Water Filters in Cambodia.* WSP Field Note. World Bank Water and Sanitation Program. Phnom Penh p27

/35/ Roberts M. 2003. *Ceramic Water Purifier – Cambodia Field Tests*, IDE Cambodia, Phnom Penh, pp 4-6

/36/ Bloem S.C. 2008. *Silver Impregnated Ceramic Water Filter - Flowrate versus the removal efficiency of*
*pathogens*. Delft University of Technology, Faculty of Applied Sciences, Delft, Netherlands

/37/ Aprovecho Research Center (2007) *Laboratory Testing of Rocket Stoves of Various Capacities as Compared to the Three Stone Fire*. Graph titled *Firepower, Various Stove Capacities* Pg. 5. [Online] Available from:
www.aprovecho.org/**lab**/pubs/rl/emissions-eval/doc/71/raw [Last Accessed 28th November 2011].

/38/ Hydrologic (2016) *Laboratory tests of bacteria removal using ceramic water filters manufactured by Hydrologic in Cambodia*

**Persons interviewed:**

Persons interviewed during the validation or persons that contributed with other information that are not included in the documents listed above.

| | | |
|---|---|---|
| /1/ | Ms. Maiwenn Altermatt | CEO, Hydrologic Social Enterprise |
| /2/ | Mr. Bora | Manager, Hydrologic Social Enterprise |
| /3/ | Ms. Tida | Manager, HR & Administration |
| /4/ | Mr. Vong | Factory Manager |
| /5/ | Mr. Gavin | Consultant, Austrailian Govt Dept. |
| /6/ | Mr. Vibol | Nexus For Carbon Ltd. |
| /7/ | Mr. Kimreon | Pot Maker – Hydrologic Factory |
| /8/ | Mr. Thol Kosat | Pot Maker – Hydrologic Factory |
| /9/ | Ms. Hong Sopheap | Pot Maker – Hydrologic Factory |
| /10/ | Mr. Nget Lat | Village Leader and End User (Village Ampil Phaem) |
| /11/ | Mr. Bun Oat | End user of CWF (Village Ampil Phaem) |
| /12/ | Ms. Raksmey | Non User (Bottled Water) (Village Ampil Phaem) |
| /13/ | Ms. Tou Ch Sam | End User of CWF(Village Ampil Phaem) |
| /14/ | Mr. Sam Soeun | Village Leader and End User (Village Spay Pork) |
| /15/ | Ms. Lay Voen | User of Other Technology (Village Spay Pork) |
| /16/ | Ms. Chiv Thurn | User of other technology (Village Spay Pork) |
| /17/ | Ms. Tom Chrep | Non User of CWF (Direct Rain water consumption) |
| /18/ | Ms. Vean Seak | Non User of CWF (Boils Water) (Village Spay Pork) |
| /19/ | Mr. Ngek Sun | Non User of CWF (Boil Stream Water) (Village Spay Pork) |
| /20/ | Mr. Hem Pring | Non User of CWF (Boil Rain Water) (Village Spay Pork) |
| /21/ | Ms. Kem Tho | Non User (Bottled Water) (Village Spay Pork) |
| /22/ | Ms. Khout | Non User of CWF (Drink Rain Water directly) (Village Spay Pork) |
| /23/ | Mr. Horn Samol | End User of CWF(Village Spay Pork) |
| /24/ | Mr. Chan Rota | Non User of CWF (Boiling Water) (Village Spay Pork) |
| /25/ | Mr. Vay Kuoy | Pro. Dept of Rural Development – Participant of LSC |
| /26/ | Mr. Ting Sopeap | Pro. Dept of Woman Affairs – Participant of LSC |
| /27/ | Dr. Seng Roatha | Pro. Dept Of Health– Participant of LSC |
| /28/ | Mr. Hong Veang Viroth | Banan District Office– Participant of LSC |
| /29/ | Mr. Chum Nhor | Governer of Banan District Office– Participant of LSC |
| /30/ | Mr. Ngong Chhunly | Commune Chief, Bay Bamram– Participant of LSC |
| /31/ | Mr. Chhuom Sanit | Commune Chief Kantueu 2– Participant of LSC |
| /32/ | Mr. Um Sam An | Health Center– Participant of LSC |
| /33/ | Mr. Sophal Leang | Chief Office GHG Inventory & Mitigation – DNA Cambodia– Participant of LSC |

## 8.0 CURRICULA VITAE OF THE DOE'S VALIDATION TEAM MEMBERS

| | | |
|---|---|---|
| Mr. Ram M. Desai | Bureau Veritas Certification, Brunei | ***Team Leader, Climate Change Lead Verifier,***<br>*Environmental Engineer with over all 13 years of experience in various industries related to Water & Waste water engineering design, installation & Commissioning, Integrated Facility Management for Environmental Services operations in various industries i.e Automotive, Pharmaceutical , IT & Electronics (With Clean Room).*<br>*Management System Implementation and Maintenance, Green Building concept implementation, Lean Management Implementation, Water & Waste Water engineering Design & project Management, Project Environmental Compliance etc for a construction company.*<br>*He is the lead auditor for Environment management system, Quality management system and Occupational health and safety management system and his auditing experience spans for 3 year with BVCI & BVCS. He has undergone intensive training on Clean Development Mechanism and was trained as Lead Verifier for CDM in the year 2005 and working as a lead Verifier for validation and verification of CDM/VCS projects* |

| | | |
|---|---|---|
| Mr. Sanjay Patankar | Bureau Veritas Certification, India | ***Technical Reviewer, Climate Change Lead Verifier.***<br>***Educational qualifications: B.E. (Mech.) M.E. (Mech.)***<br>*He has over 20 years of experience in engineering manufacturing industry covering various functions like enterprise management, product design, engineering, tool & die design, improvements in the production shop, quality assurance & control and systems planning and implementation, including ISO 9001 based quality management systems. He is working for the last 4 years in Bureau Veritas(India) Pvt. Ltd. as Lead Verifier for CDM and also Lead Auditor for ISO 9001, 14001 and OHSAS 18001 standards/specifications. Has undergone training related to Clean Development Mechanism and is currently involved in validation and verification of CDM project activities* |

## APPENDIX A: PRODUCTION AND DISSEMINATION OF CERAMIC WATER PURIFIERS BY HYDROLOGIC IN THE KINGDOM OF CAMBODIA GOLD STANDARD PROJECT VALIDATION OF RENEWAL OF CREDITING PERIOD – CAR & CL LIST AND RESPONSES.

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 1 and 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| ***CORRECTIV ACTION REQUEST (CAR)*** | | | |
| CAR – 01<br>In PDD Version 1.0, to demonstrate additionality PP has used the old Tool Version 6.0, however as per GS requirement it is to ensure that Additionality of the project shall be demonstrated using latest updated Tool with UNFCCC, and the current latest Tool for Combined Baseline and additionality demonstration is of version 7.0. | PDD Section B.5 | PP has revised the demonstration of additionality section by using the latest version of a combined tool to identify the baseline scenario and demonstrate additionality version 07.0*. PDD section B.5 page 38-43 has been revised. | Reviewed the Revised corrected PDD and found that the Additionality description is ow in line with the Latest tool for combined Baseline and Additionality demonstration Version 7.0. The Corrections are found satisfactory and hence the CAR is closed |

* Combined tool to identify the baseline scenario and demonstrate additionality version 07.0: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf

| | | | |
|---|---|---|---|
| CAR – 02<br>Cj is calculated using the Baseline study however there is no clarity how PP has used the Outcome of Third party study on safe pipe water supply published by Royal university of Phnom Penh in 2016. | PDD Section B.4 And Cj Calculation Spreadsheet. | PP has revised Cj by using a third-party study conducted in 2015 by Chea Eliyan[†], Roya University of Phnom Penh. Under this study, it was reported that water quality of 54.69% of surveyed HHs connected to piped water system passed WHO water quality standard (<1CFU of E.Coli/100ml). As a result, 54.69% of HHs connected to piped water system are taken into account Cj calculation. After the revision, Cj is estimated to be 25.97% (see HSE_CP2_Cj&Xboil_20171023). | Verified the Revised PDD Section B.4 and Cj Calculation Spread sheet and found satisfactory. Revised Cj calculated is found conservative and reflects the outcome of the third party study correctly and hence the CAR is closed. |

[†] A third-party study, please refer to file name: Chea(2015)_piped_water_quality_study

| | | | |
|---|---|---|---|
| CAR -03<br>Appendix 7 of PDD is not complete with all changes included in the PDD since Registration / last Design change. | Appendix 7 of PDD | The appendix 7 of PDD has been updated to accommodate the changes including:<br>**Designed change PDD version 10.0**<br>- Change1: PDD is updated from small-scale to large scale project in 2013 because its emission reduction exceeded the small-scale limit of 180GWh of energy saved per annum. The effective design change date was on 01/05/2013. For the details of the changes, please refer to Hydrologic (2014) Design Change Memo_2014-03-19 and DC_GS1020_Design Change Review_final 2014-03-27 files.<br><br>**Renewal crediting period PDD version 11.1**<br>The proposed changes for this version of PDD can be summarized in the following:<br>- Change 1: The starting date for new crediting period will be from 1 Dec 2017 to 30 Nov 2024<br>- Change 2: The methodology applied is Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC) version 3.0 instead of previous version (version 1.0)<br>- Change 3: Cj was changed from 2.6% in CP1 to 25.97% in CP2,<br>- Change 4: Xboil factor is introduced with TPDDTEC version 3.0 but there was no Xboil factor in TPDDTEC version 1.0.<br>- Change 5: For type of stove used in the baseline, beside traditional and improved cook stove, LPG stove is added based on the new baseline survey results.<br>- Change 6: Wood to charcoal factor is introduced to calculate emission from charcoal. This was not included in the previous version of PDD.<br>calculate emission from charcoal. This was not included, previously. | Reviewed the revised corrected PDD Appendix 7 and found correct . The CAR is closed. |

| | | | |
|---|---|---|---|
| CAR -04<br>In PDD Section B.6.2 and B.7.1 PP has presented Ex Ante and Ex Post Monitoring parameter in the tabular format, however necessary information i.e. QA/QC Procedures / Purpose of Data and Additional comments field are left blank (no information is provided) | Section B.6.2 and B.7.1 of PDD | PP has updated section B.6.2 and B.7.1 of PDD. | Reviewed the Corrected PDD and found that PP has corrected Section B.6.2 and B.7.1 to include relevant information. The corrections are found satisfactory and hence the CAR is Closed. |
| ***CLARIFICATIONS (CL)*** | | | |
| CL-01<br>PP has estimated sale of 325,000 CWF units during 2nd crediting period in revised PDD section A.1 and in the ER spread sheet. While reviewing the calculation in ER spreadsheet it was noted that that PP has used the sale of April 2017 to estimate the total sale of CWF for entire crediting period, however it is not clear how this is conservative. Please explain the rational behind using only one month sale volume for estimating total sale for entire crediting period. | PDD Section A.1 & ER Spreadsheet | The sale forecast has been revised by using the linear regression function based on the previous sale data. To be as precise as possible to the present sale, the sale data from Jan 2013 to April 2017 were used to estimate the future sale till Nov 2024. With this new projection, the second crediting period (1st Dec 2017- 30th Nov 2024) sale was estimated to be 350,325 CWPs. For the details, please refer to PDD section A.1 and Tab Sale_Forecasted of HSE_CP2_ER_Cal_20171023. | Verified the Revised PDD and the Calculation Spreadshet for estimation of the Sales Forecast. The approach adopted by the PP to Forecast sales on the basis of past sales data using linear regression method found correct and hence the CL is closed. |
| CL 02<br>In Section B.4 of PDD under Fixed Baseline PP has claimed that the Piped Water supply to house hold in some rural and urban areas (Wherever infrastructure is made available by the Cambodian government / NGO's) is not safe for direct consumption / drinking. However, this statement is not found backed up with relevant 3rd party study / reports. Please clarify how PP substantiates this claim? | PDD Section B.4 | PP has revised PDD section B.4 related to quality of piped water supply by using a third-party study conducted in 2015 by Chea Eliyan, Royal University of Phnom Penh. Under this study, it was reported that water quality of 54.69% of HHs connected to piped water system passed WHO water quality standard (<1CFU of E.Coli/100ml). Therefore, only 54.69% of HHs connected to piped water system is having safe water for drinking. | The Response to CAR and correction to PDD section B.4 found satisfactory and hence the CL is Closed. |

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| CL 03<br>During site visit to house hold to understand whether the baseline is still the same it was noted that several houses in one of the sampled village found using another type of Filter distributed by World Vision (NGO). Please clarify whether the estimated value of 5.75% against Parameter Xboil is also covering such non GHG technologies and how this value is credible enough to ensure that there is no suppressed demand? | PDD Section B.4 | The Xboil was calculated based on the baseline survey result. To estimate Xboil, the suppressed demand question has been asked: *"If your household does not treat water for drinking, would you treat it given the proper resources?" if "Yes", "how would you treat it?"*<br>Based on these two questions, all the responses who stated they would use other methods beside boiling to treat water for drinking were considered in this Xboil (5.75%). Moreover, the other type of CWPs were generally distributed to villagers with subsidized price under the support from NGO. This is not a long-term activity since it is run based on donation. As a result, the suppress demand for other type of CWPs usage is likely to be shrunk in the future.<br>Therefore, this Xboil (5.75%) is credible and conservative because it was estimated based on the current suppressed demand (updated baseline survey) while in the future, the trend of suppressed demand for other type of CWPs is likely to decrease. | The Response to CL Found Correct and hence the CL is Closed. |

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| CL 04<br>In "Appendix 1: Contact information of project participants", of PDD it is mentioned that Mr. Roberts Michael is the focal person / as authorized representative of the PP for this Gold Standard Project please confirm through an official letter that the person and his ID Proofs valid and he is continued to be the focal person for this project. | Appendix 1 of PDD | An official letter[‡] from Hydrologic to confirm that Mr. Michael Scott Roberts, chairman of the Board of director of Hydrologic, continue to be a focal person for this carbon project is attached. Furthermore, in the Hydrologic's patent tax for 2017[§], Mr. Michael Scott Roberts is also a representative of Hydrologic. | Verified submitted Document i.e. Hydrologics Patent Tax for 2017 and found that Mr. Michael Scott Rpoberts is the Chairman. The Evidence submitted is the government document and hence found reliable. Based on the Response and the Evidence submitted the CL is closed. |

[‡] HSE_Focal_Person_Carbon_Project
[§] HSE_Patent_2017