METHODOLOGY ELEMENT ASSESSMENT REPORT: REDUCTION OF GHG EMISSIONS IN PROPYLENE OXIDE PRODUCTION

Document Prepared By Bureau Veritas Certification Holding SAS

Methodology Element Title	Reduction of GHG Emissions in Propylene Oxide Production	
Version	04	
Methodology Element Category	Methodology	Yes
	Methodology Revision	
	Module	
	Tool	
Sectoral Scope(s)	5	

Report Title	Second Assessment Report of a New Methodology Element: Reduction of GHG emissions in Propylene Oxide production
Report Version	01.1
Assessment Criteria	VCS Standard, Version 3.3 issued on 4 October 2012, Methodology Approval Process, Version 3.4 issued on 4 October 2012 Validation and Verification Manual, Version 3.0 issued on 4 October 2012
Client	South Pole Carbon (Thailand) Co., Ltd.
Pages	58
Date of Issue	29-June-2013
Prepared By	Bureau Veritas Certification Holding SAS

Contact	62/71 Boulevard du Château 92571 Neuilly Sur Seine Cdx – France Telephone: +33 (0)1 55 24 72 06 Email: matthieu.martini@bureauveritas.com Website: www.bureauveritas.com
Approved By	Matthieu Martini
Work Carried Out By	Bhavesh Prajapati – Team Leader Pramod Kamble – Team Member Ramachandra Nesari – Technical Expert

Summary:

Bureau Veritas Certification Holding SAS (BVCH) was retained by VCSA to conduct the 2nd assessment double approval process of new Methodology Element titled "Reduction of GHG emissions in Propylene Oxide production", under double approval process with regard to the relevant requirements for VCS activities. The VCSA and BVCH have entered in to an agreement for this assessment as per the rules of VCSA.

The new Methodology Element provides procedures for monitoring and calculating baseline emissions, project emissions and hence emission reductions associated with the manufacture of propylene oxide through HPPO process against the baseline practice of conventional Chlorohydrin Chlor-Alkali (CH-CA) Process.

The methodology assessment process consists of an independent third party review of the new Methodology Element to confirm that the Methodology Element is consistent with relevant VCS rules and procedures. The second assessment of the new Methodology Element is part of the Double Approval Process to independently and separately validate and is necessary to provide assurance to stakeholders of the quality of the new Methodology Element.

The criteria for the second assessment were VCS Standard, version 3.3, VCS Methodology Approval Process, version 3.4, VCS Validation and Verification Manual, version 3.0 and VCS Program Guide, version 3.4. BVCH relied on its professional judgment in assessing the proposed methodology element and reaching final conclusion. The assessment team of BVCH has also reviewed and assessed the first assessment report of the VVB (RINA) during the second assessment and compared two independent findings before conclusion.

Based on the desk review of the VCS ME published for commenting by the project developer in the VCS website (Methodology version 00 of 05-September-2012), subsequent revised ME version 03 submitted by VCSA for second assessment to BVCH and assessment report of the first VVB, 03 Corrective Action Requests (CARs) and 12 Clarification Requests (CLs) were identified and communicated to the methodology developer in form of Draft Assessment Report version 01 dated 09-April-2013. The methodology developer could sufficiently resolve all the CARs and CLs and submitted a revised Methodology Element "Reduction of GHG emissions in Propylene Oxide production", version 04 dated 01-May-2013 prior to proceeding with the Final Assessment Report. The list of CARs and CLs raised and its resolution is available as part of this report in Table 2 under the section 4 of this report.

In conclusion, it is BVCH's opinion that the Methodology Element "Reduction of GHG emissions in Propylene Oxide production", as described in the ME version 04 of 01-May-2013, meets all relevant VCS requirements as mentioned above. BVCH hereby confirms that the Methodology Element is consistent with relevant VCS rules and procedures.

Table of Contents

Abbreviations

BE	Baseline Emissions
BVCH	Bureau Veritas Certification Holding SAS
CDM	Clean Development Mechanism
CH_4	Methane
CHP	Cumene Hydroperoxide
CHPO	Chlorohydrin Process
CL	Clarification Request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CRT	Coordination and Technical Control Staff
EB	Executive Board
EIA	Environmental Impact assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
HP	Hydrogen Peroxide
HPPO	Hydrogen Peroxide – based PO technology
IPCC	Intergovernmental Panel on Climate Change
ME	Methodology Element
MoV	Mean of Verification
MP	Monitoring Plan
MR	Monitoring Report
MHMCL	MTP-HPPO Manufacturing Co. Ltd.
NGO	Non-governmental Organization
ODA	Official Development Assistance
PD	Project Document
PE	Project Emission
PO	Propylene Oxide
PU and I	Process Utilities and Instrumentation
Ref.	Document Reference
RINA	RINA Services S.p.A. (RINA)
SS(s)	Sectoral Scope(s)
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
VCS	Verified Carbon Standard
VCU	Verified Carbon Units
VVB	Validation and Verification Body

1 INTRODUCTION

VCSA has commissioned BVCH to carry out the second assessment of Verified Carbon Standard (VCS) proposed new Methodology Element (ME) titled "Reduction of GHG emissions in Propylene Oxide production". This report is submitted to VCSA as a deliverable for the second assessment of the VCS double approval process for the proposed new ME. This report provides a description of the process(es) used and followed to conduct the second assessment as a part of the VCS double-approval process and summarizes the findings of the second assessment by BVCH performed on the basis of prescribed VCS criteria. The first assessment of the methodology element was carried out by RINA and has been referred by the BVCH during its second assessment.

1.1 Objective

The objective of the second assessment of new ME is to have an independent evaluation of a methodology element by a Validation and Verification Body against the VCS requirements, on the basis of the first VVB's assessment of the VCS ME published for commenting by the project developer in the VCS website. In particular, the eligibility criteria, baseline approach, additionality, methodology boundary, approach for calculating baseline emissions, methodology emissions and emission reductions, leakage, monitoring, data and parameters, adherence to the Methodology-level principles of the VCS Program are assessed in order to confirm that the ME as documented, is sound and reasonable and meets the identified criteria. Second Assessment of ME is a requirement for all VCS ME and is seen as necessary to provide assurance to stakeholders of the quality of the ME and its intended use by project developers and generation of verified carbon units (VCUs).

1.2 Scope and Criteria

The scope of second assessment of new ME is to review the ME against the VCS criteria. The methodology assessment was conducted using the VCS Standard, v3.3 and the VCS Methodology Approval Process, Version 3.4 as the criteria. BVCH followed guidance in the VCS Program Guide, version 3.4 and applied its professional judgment in assessing the proposed methodology. The assessment team of BVCH has also reviewed and assessed the assessment report of the first VVB (RINA) during the second assessment of the new Methodology Element.

This assessment is not meant to provide any consultancy towards the methodology developers. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the proposed new methodology element.

1.3 Summary Description of the Methodology Element

The ME is applicable to project activities that involve synthesis of propylene oxide (PO) using Hydrogen Peroxide-based PO i.e. (HPPO) Technology which is able to reduce GHG emissions and waste generation during PO synthesis when compared to other processes. The GHG emission reductions are attributable to the usage of lesser GHG intensive reagents and reduced process energy requirements including thermal and electrical energy. In this methodology element, the GHG emissions produced by different chemical manufacturing processes of PO using different reagents are being compared, hence comparison of emissions that occur in the facility and emissions due to reagent production are also taken into consideration (for both baseline and project processes) as per three classes of emissions as explained below:

(a) *Up-stream emissions:* These include emission sources linked to the production of reagents being used in the process of PO production;

(b) *Process emissions:* These represent emission sources located within the project facility and associated to the transformation of reagents into the product at the manufacturing site. Process emissions include energy consumption as well as emissions associated with product and waste treatments;

(c) *Downstream emissions:* As the product is the same in both the baseline and project scenarios, down-stream emissions would be the same in both cases and have therefore not been considered further in the latest version of the methodology element.

Hence, this new methodology element proposes to consider only the up-stream and process emissions mentioned above. The ME provides procedures for establishing the project boundary, determining the baseline scenario, demonstrating additionality, monitoring fuel consumption and other relevant parameters including those which are required to be monitored as per the tools referred by the ME, and finally, quantifying baseline and project emissions and total emission reductions.

2 ASSESSMENT APPROACH

2.1 Method and Criteria

The second assessment of the new methodology element was conducted using BVCH procedures in line with the VCS requirements and by applying standard auditing techniques. The assessment of the methodology was carried out on the basis of VCS standard version 3.3 and the VCS Methodology Approval Process, Version 3.4. Additionally, BVCH followed guidance in the VCS program guide version 3.4 and prepared the final report using standard report template available on VCS website i.e. Methodology Assessment Report Template version 3.0 of 19/10/2011. The BVCH assessment team also considered the documents reviewed by the first VVB and the findings of first VVB's assessment report including their CARs and CLs.

The second assessment of the methodology element consisted of the following phases:

- ✓ Desk review of the revised Methodology Element received from VCSA after first assessment by RINA;
- ✓ Supporting documents submitted by the methodology developer (refer to section 2.2 below);
- ✓ The review of the supporting documents as mentioned in the reference list of assessment report of the first VVB i.e. RINA;
- ✓ The review of assessment report by first VVB;

From the review of ME version 3, validation team of BVCH raised clarification requests and corrective action requests in initial DVR. The resolution of outstanding issues and the issuance of the ME assessment report complete the cycle. The following sections outline each step in more detail.

2.2 Document Review

The assessment team verified the VCS Methodology Element titled "Reduction of GHG emissions in Propylene Oxide production", version 03 of 16/01/2013, The VCS PD version 02 of 16/01/2013 and the Emissions Reductions calculation sheet for the proposed VCS project activity "Reduction of GHG Emissions in Propylene Oxide Production at MTP HPPO Manufacturing Co., Ltd." in Thailand.

The following documents are reviewed and assessed by the assessment team during the assessment process:

/D1/ VCS Methodology Element "Reduction of GHG emissions in Propylene Oxide production", version 04 of 01-May-2013
VCS-Methodology Element "Reduction of GHG emissions in Propylene Oxide production", version 03 of 16-January-2013

/D2/ VCS PD for project activity "Reduction of GHG Emissions in Propylene Oxide Production at MTP HPPO Manufacturing Co., Ltd." in Thailand, version 02 of 16-January-2013

/D3/ Emissions Reductions calculation sheet titled "ER calculation-19122012.xlsx" for the VCS project activity " Reduction of GHG Emissions in Propylene Oxide Production at MTP HPPO Manufacturing Co., Ltd." in Thailand, version 01 of 19-December-2012

/D4/ Methodology Element Assessment Report: Reduction of GHG emissions in Propylene Oxide Production, Version 1.2, prepared by RINA dated 21-February-2013.

/D5/ VCS Standard, VCS version 3, Requirements document, v3.3 of 04/10/2012.

/D6/ VCS Program Guide, VCS version 3 Requirements document , v3.4 of 04/10/2012.

/D7/ VCS Methodology Approval Process, VCS version 3 Procedural document, v3.4 of 04/10/2012.

/D8/ Validation and Verification Manual Version 3.0 dated 04/10/2012, VCS Version 3.

/D9/ VCS Methodology Assessment Report Template version 3.0 of 19/10/2011.

/D10/ List of VVBs as available at web link http://v-c-s.org/verification-validation/find-vvb

/D11/ CDM Executive Board - List of DOEs as available at web link http://cdm.unfccc.int/DOE/list/index.html

/D12/ VCS Methodology Template version 3.2 of 04/10/2012.

/D13/ Nexant Report: Chem Systems Program – Hydrogen Peroxide 07/08-3 of May 2009 submitted on 28-March-2013

/D14/ Nexant Report: Chem Systems Program – Propylene Oxide 07/08-6 of November 2008 submitted on 28-March-2013

/D15/ "Tool for the demonstration and assessment of additionality", Version 07.0.0, dated 23/11/2012 based on UNFCCC – CDM.

/D16/ Methodological tool "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", Version 01, dated 16/05/2008 based on UNFCCC – CDM.

/D17/ Methodological tool "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", Version 02, dated 02/08/2008 based on UNFCCC – CDM.

/D18/ Multilateral Investment Guarantee Agency: Environmental Guidelines for Chlor-Alkali Industry, available at web link http://www.miga.org/documents/ChlorAlkali.pdf in English. Evidence that the membrane cell technology is a preferred baseline as compared to diaphragm cell technology and mercury cell technology

/D19/ Dow Chemical Co., Ltd. Website: Giving location of the MTP HPPO Manufacturing Co., Ltd available at http://www.dow.com/thailand/about/locations.htm

/D20/ VCS web site - http://v-c-s.org/methodologies/reduction-ghg-emissions-propylene-oxide-production giving the details of publication of the proposed ME for Stakeholder's comments.

/D21/ VCS website giving the list of approved methodologies and the methodologies under development available at web link http://v-c-s.org/methodologies/find

/D22/ Gold Standard Foundation: GS website giving the list of approved methodologies and the methodologies under development available at web link http://www.cdmgoldstandard.org/projectcertification/gs-methodologies.

/D23/ CDM website giving the list of approved methodologies and the methodologies under development available at web link http://cdm.unfccc.int/methodologies/index.html.

/D24/ Publicly available information on HPPO process invention by DOW Chemicals and BASF in March 2009 - http://en.wikipedia.org/wiki/Propylene_oxide.

/D25/ PO manufacturing processes and latest innovations in PO manufacturing - http://www.sumitomo-chem.co.jp/english/rd/report/theses/docs/20060100_ely.pdf.

/D26/ PO Manufacturing Process - http://www.lyondellbasell.com/Products/ByCategory/basic-chemicals/IntermediateChemicalsAndGlycols/PropyleneOxide/.

/D27/ Detailed manufacturing process of PO using CHPO and HPPO including the chemical reactions and process flow diagrams[1].

2.3 Interviews

The assessment team of BVCH received the Methodology Element Version 3 along with first VVB's Assessment Report from VCSA on 15-March-2013. During the course of second assessment of the methodology element, the assessment team interacted with methodology developer i.e. South Pole Carbon over teleconference to resolve clarifications and issues identified during the document review. The first VVB i.e. RINA had carried out the site visit at the MTP HPPO Manufacturing Co., Ltd. on 06-November-2012 and 07-November-2012, which is located at postal address P.O. Box 71, Banchang Post Office, Rayong Province 21130, Thailand. The assessment team of BVCH (second VVB) is of the opinion that the re-site visit to plant is not required since first VVB had covered the site in detail and provided the names of the personnel interviewed along with the topics of discussion in first assessment report. The first VVB has also included the site specific issues and their resolution in their assessment report reviewed by BVCH. This provides the fair idea about the site specific conditions.

2.4 Use of VCS Approved Expert

The VCS approved expert was not retained for the purposes of this methodology element assessment. In accordance with the VCS Standard, a VCS approved expert is not necessary for

1 http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_0036/0901b80380036c15.pdf?filepath=propyleneoxide/pdfs/noreg/117-01641.pdf&fromPage=GetDoc

non-AFOLU ME assessments where a standardized method is not applied. The proposed new ME is a non-AFOLU ME and hence, a VCS approved expert is not required. However the technical expert, being part of the assessment team is acquainted with Chlorohydrin Chlor-Alkali (CH-CA) process and has a vast experience in relevant industry.

2.5 Resolution of Any Material Discrepancy

The objective of this phase of the assessment of the methodology element is to resolve any outstanding issues which need to be clarified for BVCH's positive conclusion on the structure and content of the methodology element.

In order to ensure transparency, a new VCS Methodology Element Assessment Protocol was customized for the project, according to the VCS Methodology Template (version 3.2), the Methodology Approval Process (version 3.4), VCS Validation and Verification Manual (version 3.0) and VCS Standard (version 3.3) issued by the VCSA under its programme documents of VCS, version 3.0. The protocol shows, in a transparent manner, criteria (requirements), means of validation and the results from assessing the identified criteria. The assessment protocol serves the following purposes:

- ✓ It organizes details and clarifies the requirements a new VCS ME is expected to meet;
- ✓ It ensures a transparent assessment process where the assessment team will document how a particular requirement has been validated and the result of the ME assessment.

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

- ➢ The methodology has mistakes that will influence the ability of the methodology to assess project activity to achieve real, measurable additional emission reductions.
- ➢ The VCS requirements have not been met.
- ➢ There is a risk that the 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 VCS requirements have been met or the ME does not provide explicit explanation on any of the contents therein.

The table-2 of the protocol list down all identified CARs and CLs along with their resolution by the responses from methodology developer and the assessment team. The completed assessment protocol including the CARs and CLs identified are described in the assessment protocol in section 4 of this report.

2.6 Internal Quality Control

The assessment report underwent an Internal Technical Review (ITR) before being submitted to the Methodology Element Developer and VCSA.

The ITR is an independent process performed to examine thoroughly that the process of ME assessment has been carried out in conformance with the requirements of the VCS rules and guidance as well as internal Bureau Veritas Certification procedures.

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

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

The assessment activity has been performed by the team by exercising utmost diligence and complete adherence to the VCS rules and requirements.

The review encompasses all aspects related to the ME which includes project design, baseline, additionality, monitoring plans and emission reduction calculations, internal quality assurance systems, review of the stakeholder comments and responses (if any), closure of CARs and CLs during the assessment of ME.

The reviewer compiles clarification questions for the Team Leader and Assessment Team and discusses these matters with Team Leader.

After the agreement of the responses on the 'Clarification Request' from the Team Leader as well as the Methodology Developer, the finalized assessment report is accepted for further processing such as submission to the Methodology Developer and VCSA.

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

FUNCTION	NAME	TASK PERFORMED*
Team Leader	Mr. Bhavesh Prajapati	☒**DR** ☐**SV** ☐**TR**
Team Member	Mr. Pramod Kamble	☒**DR** ☐**SV** ☐**TR**
Technical Specialist	Mr. Ramchandra Nesari	☒**DR** ☐**SV** ☐**TR**
Internal Technical Reviewer (ITR)	Mr. H B Muralidhar	☐**DR** ☐**SV** ☒**TR**

*: DR – Document Review, SV – Site Visit, TR – Technical Review.

3 ASSESSMENT FINDINGS

3.1 Applicability Conditions

The assessment team reviewed all the applicability conditions laid down in section 4 of the ME. The applicability conditions are considered appropriate to the ME as it is applicable only when established that Chlorohydrin-Chlor-Alkali process is the baseline, which the most conventional PO manufacturing process existing. Further the ME is applicable only to green field projects where PO (Propylene Oxide) is the only output, no co-products are allowed, and no by-products more than 10% as compared to the PO output are allowed. This applicability conditions ensure that any emission reduction that may be occurred in the project scenario are solely attributable to the HPPO manufacturing process and any other retrofitting or modification does not contribute. This is accepted to be appropriate as only then the project applying this methodology would have an output comparable to Chlorohydrin-Chlor-Alkali process.

The methodology is also stated to be applicable to a project being implemented in any part of the world and thus the baseline emissions are calculated based on specific local conditions for the fuel types and resource availability. Since no default values are used and it is left to be determined at project level, the chosen geographical area of applicability of this methodology is acceptable and gives opportunity for comparing alternate technologies available globally.

Further, the methodology refers to various tools of UNFCCC-CDM, and all the applicability conditions of respective tools are also required to be complied by the project activity. The

compliance of the applicability conditions of the tools will also ensure the correct and justified calculations of project emissions (as may be applicable) and hence will result in to accurate calculations of baseline emissions.

The ME details applicability conditions to specify the project activities to which it applies and has established criteria that describe the conditions under which the ME can be applied or cannot be applied. The assessment team has reviewed the first VVB's assessment report, which also confirms that the applicability conditions of the ME are appropriate and well justified. Hence, BVCH confirms that the applicability conditions of the ME are sufficient and complete to establish whether the methodology can be applied to a proposed project activity.

3.2 Project Boundary

The spatial extent of the project boundary encompasses the upstream emissions from reagents, PO manufacturing plant site starting from reagents admission to the treatment of by-products and waste from the processes. The project boundary also encompasses the project electricity system(s) and Heat/steam generation system that the PO plant is connected to. The spatial extent of the project electricity system consists of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints including sources (e.g. national grid, captive power generation, etc). This is similar for the spatial extent of the steam system also which may include (steam generating equipments as sources. The ME has transparently given the schematic diagram of the geographical extent of the baseline scenario and the project scenario.

A table indicating the greenhouse gases included in or excluded from the project boundary along with the justification of doing so is also explicitly provided in section 5 of the ME. The information in the ME is consistent with the third party sources /D13//D14/, review of the VCS-PD /D2/ and emission reduction calculation sheet /D3/ for proposed VCS project activity "Reduction of GHG Emissions in Propylene Oxide Production at MTP HPPO Manufacturing Co., Ltd." in Thailand. As reported by the first VVB in its assessment report /D4/, the consistency in VCS PD and its emission reduction calculations have been confirmed based on the interview of the process plant team during site visit.

The ME clearly explains the criteria and procedures to be followed for describing the project boundary and identifying and assessing GHG sources relevant to the project and baseline scenarios. Justification for GHG sources included or excluded has been provided appropriately. The ME covers GHG sources that are controlled by the project proponent, related to the project or affected by the project (leakage). The GHG sources identified for the project have been compared with those identified in the baseline scenario, to ensure equivalency and consistency. Hence BVCH confirms that the project boundary as detailed in the section 5 of the ME is sufficient to correctly establish the geographical extent of a proposed project activity.

3.3 Procedure for Determining the Baseline Scenario

The proposed new ME uses project method demonstrate the additionality of the project. Hence, in accordance with the VCS rules and guidance, the methodology developer has used a stepwise approach to determine the baseline scenario. It may be noted that this approach is in line with and is synonymous to the approach adopted by many other already approved large-scale CDM methodologies. Hence, BVCH has accepted the approach adopted by the ME developer to determine the baseline scenario.

To determine baseline scenario the ME developer has established following four steps:

Step 1: *Identification of plausible alternative scenarios*
Any globally available alternatives which could deliver equivalent outputs or services that have been implemented previously or are currently being introduced in the relevant country/region are considered plausible alternatives, this includes at least (but not limited to) following alternatives:

Alternative 1(P1):	The project activity without carbon revenues;
Alternative 2(P2):	A plant with comparable capacity using the Chlorohydrin process (Lime or Chlor-Alkali);
Alternative 3(P3):	A plant with comparable capacity using any other commercially available technology.

Step 2: *Consistency with mandatory applicable laws and regulations*
The ME clarifies that the identified alternatives must comply with all applicable mandatory legal and regulatory requirements of the host country (where the project is being implemented) for the project implementation and operation.

Step 3: *Barrier Analysis*
Apply Step 3 in accordance with the latest version of the "Tool for demonstration and assessment of additionality" agreed by the CDM Executive Board, to identify and eliminate scenarios that face prohibitive barriers. This step results into the identification and assessment of the barriers which are faced by the alternatives and hence the possible baseline scenario.

Step 4: *Economic Attractiveness*
As stated by the ME, if more than one alternative remains at the end of Step 3, apply Step 2 of the latest approved version of the "Tool for the demonstration and assessment of Additionality" and compare the economic attractiveness without revenues from carbon credits for all alternatives that are remaining. This includes the assessment of the investment analysis which shall result in to the most plausible baseline scenario which faces the lowest (or does not face) investment barrier as compared to the other alternatives under consideration of Step 4 i.e. Economic Attractiveness.

The Methodology Element has established criteria and procedures for identifying alternatives for baseline scenarios and determining the most plausible baseline scenario, taking into account the identified GHG sources, existing and alternative project technologies providing equivalent output or services to the project, data availability, reliability and limitations and other relevant information concerning present or future conditions, such as legislative, technical, economic, socio-cultural, environmental, geographic, site-specific and temporal assumptions or projections. This has also been confirmed by the first VVB. BVCH confirms that the procedure for determining baseline scenario as detailed in the ME is sufficient to meet the intent and will result in to the real baselines scenario for the proposed project activity.

3.4 Procedure for Demonstrating Additionality

The ME uses Project Method to determine additionality and requires additionality of the project activity to be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, which is available on the UNFCCC CDM website. While demonstrating the additionality of the proposed project activity, the Project Proponent shall consider different project alternatives as per the baseline identification section described above. This meets the requirements as set out in paragraph 4.6.3 to 4.6.5 of the VCS standard version 3.3 /D5/. In case the identification of baseline scenario is conducted using Economic attractiveness, the demonstration of additionality and baseline identification will be in continuation of each other. As the CDM tool for the demonstration of additionality is used by all the

CDM approved methodology, use of the same tool can definitely be considered appropriate in this new ME also. Hence, BVCH confirms that the procedure for determining additionality of the project as detailed in the ME is sufficient to meet the requirement as stated in the VCS standard /D5/.

3.5 Baseline Emissions

Baseline emissions (BEy) is a sum of emissions associated with the baseline reagents ($BE_{Upstream,y}$) for the production of PO, (tCO_2e), which is considered upstream emission due to production of baseline reagents, and; emissions due to energy usage during production process ($BE_{Process,y}$) heat, electricity, etc., for transforming the baseline reagents into the final product (PO) and also for waste and by-products treatment (tCO_2e).

Thus,

$$BEy = BE_{Upstream,y} + BE_{Process,y.}$$

Where $BE_{Upstream,y}$ is calculated as → $BE_{Upstream,y} = be_{Chlor\text{-}Alkali,y} \times POy$

Where:
$be_{Chlor\text{-}Alkali,y}$ is the Quantity of CO_2 emitted from Chlor-Alkali production per unit of PO (tons)
POy is the Quantity of PO produced in year y (tons)

Propylene is a common reagent in both baseline and project scenario, hence not considered, this is consistent with the GHG sources as available in section 3.2 of this report (project boundary). Other reagents used in baseline process are Chlor-Alkali (Chlorine and Sodium Hydroxide). The most common Chlor-Alkali process involves the electrolysis of aqueous sodium chloride (brine) in a membrane cell (owing to lower emissions) /D18/. The process Chlor-Alkali produces both Cl_2 and NaOH. Hence energy consumption per ton/Cl_2 includes Sodium hydroxide produced and used in the baseline process as reagent. It can be noted that the equation 3 in the methodology has been presented in terms of Chlorine and PO. Therefore, the energy consumption too is linked to Chlorine. The justification has been included in the methodology for clarity, thus the equation becomes

$$be_{Chlor\text{-}Alkali,y} = (71/58) \times ec_{Chlor\text{-}Alkali,y} \times EF_{EL,y.}$$

Where:
$ec_{Chlor\text{-}Alkali,y}$ is the Energy consumption per ton of Cl_2 production (MWh/tCl_2) this value is to be determined at the project level, using Independent third party report.

$EF_{EL,y}$ is the emission factor for electricity generation in year y (tCO_2/MWh) calculated as per the requirements of the latest CDM "Tool to calculate the emission factor for an electricity system"

71/58 is the Ratio between the molecular weights of Cl_2 and C_3H_6O (mass units/mass units)

Emissions due to energy usage ($BE_{Process,y}$) heat, electricity, etc., for transforming the baseline reagents into the final product (PO) and treatment of waste generated out of the process is calculated as under:

$$BE_{Process,y} = BE_{heat,y} + BE_{Electricity,y} + BE_{Waste,y}$$

Where $BE_{heat,y}$ is calculated to be → $BE_{heat,y} = SSC_{CHPO} \times PO_y \times EF_{Steam,y}$

Where:
$BE_{Heat,y}$ is the Emissions due to thermal energy (heat/steam) for transforming the baseline reagents into the final product (PO) and also for waste treatment (tCO_2)

SSC_{CHPO} is the Specific thermal energy consumption ratio in the PO production through CHPO process (TJ/tonne of PO); this value is to be determined at the project level, using Independent third party report.

$EF_{Steam,y}$ is the Emission factor for thermal energy generation in year y (tCO_2/TJ) is calculated as:

$$EF_{Steam,y} = EF_{CO2,i.y} / \eta_{Boiler,y}$$

Where:
$EF_{CO2,i.y}$ is the Weighted average CO_2 emission factor of fuel type i in year y (tCO_2/TJ) calculated as per the CDM "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

$\eta_{Boiler,y}$ is the Efficiency of the steam generating system calculated as per the CDM "Tool to determine the baseline efficiency of thermal or electric energy generation systems" .

$BE_{elec,y}$ is the Emissions due to electrical energy for transforming the baseline reagents into the final product (PO) and also for waste treatment (tCO_2) calculated as →

$$BE_{elec,,y} = SEC_{CHPO} \times PO_y \times EF_{EI,y}$$

Where:
SEC_{CHPO} is the Specific electrical energy consumption ratio in the PO production through CHPO process (MWh/ton of PO) sourced from Independent third party report

$EF_{EI,y}$ is the Emission factor for electricity generation in year y (tCO_2/MWh) calculated as per the requirements of the latest CDM "Tool to calculate the emission factor for an electricity system"

$BE_{Waste,y}$ is the Emissions due to treatment of waste products (tCO_2), calculated as →

$$BE_{Waste,y} = (44/12) \times (CA_{Waste,\ Baseline}) + FC_{i,Baseline,} \times COEF,i$$

Where
$CA_{Waste,\ Baseline}$ is the carbon amount in the waste stream derived from the carbon amount in the Propylene feed, PO and by-products in the baseline (tonnes). The carbon amount in the waste stream and fuel combusted in the incinerator is presented in terms of PO output. Values are to be justified at project level.

(44/12) is the ratio between the molecular weights of CO_2 and Carbon (mass units/mass units)

$FC_{i,Baseline}$ is the Quantity of fuel type i combusted in the incinerator in the baseline (mass or volume unit/year) sourced from Independent third party report.

COEF,i is the CO_2 emission coefficient of fuel type i (tCO_2/mass or volume unit) calculated as per the requirements of the CDM tool "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

If credible data to estimate the emissions linked to waste and by-products is not available, the project proponents may neglect calculation of baseline emissions due to the same. The assessment team accepted the same as it is conservative. However, monitoring and accounting emissions due to waste treatment in the project activity is mandatory and is included in the monitoring plan of the methodology.

Calculation of baseline emissions is in line with the publicly available technical literature /D13/, /D14/ and /D18/. All the values (parameters to be monitored and not monitored) are to be determined at the project level using approved CDM tools and independent third party reports as referred in the ME. Based on the above description and use of all the reliable data and correct equation with respect to the nature of project activity and identified baseline scenario, BVCH confirms that the procedure for determining baseline emissions in the ME is sufficient and would result in correct and conservative estimates.

3.6 Project Emissions

Project emission is the summation of emissions associated with the production of project reagents for the production of PO, (tCO_2), emissions due to energy usage (heat, electricity etc.) for transforming the project reagents into the final product (PO) and waste treatment (tCO_2).

Hence

$$PE_{,y} = PE_{Upstream,y} + PE_{Process,y}.$$

The reagents used in the project process are Propylene and Hydrogen Peroxide. Propylene is common reagent in both baseline and project scenarios, hence not considered further in emission reduction calculation, which is justifiable. This is conservative as the amount of Propylene required in the baseline CHPO process is slightly higher as compared to the HPPO process /D13/, /D14/. Since the epoxidation reaction is carried out in solvents, the emissions associated with the use (make-up) of solvents are considered. Thus, $PE_{Upstream,y}$ is calculated as →

$$PE_{Upstream,y} = PE_{Upstream,H2O2,y} + PE_{Upstream,\ Solvent,y}$$

$$PE_{Upstream,H2O2,y} = (34/58) \times pe_{HP} \times PO_y$$

Where
(34/58) is the Ratio between the molecular weights of H_2O_2 and C_3H_6O (mass units/mass units)

pe_{HP} is the Quantity of CO_2 that would be emitted per ton of H_2O_2 (tCO_2/ tH_2O_2) sourced from independent third party report, the concentration of H_2O_2 is considered on 100% basis.

POy is the Quantity of PO produced in year y (tons)

$PE_{Upstream,\ Solvent,y}$ is the emissions associated with the use (make-up) of solvent and is calculated as:

$$PE_{Upstream,\ Solvent,y} = pe_{Sol} \times soly \times POy$$

Where
pe_{Sol} is the Quantity of CO_2 that would be emitted per ton of Solvent (tCO_2/ ton of Solvent)

soly is the Quantity of solvent (tons) required per ton of PO, sourced from the design details of the project and for ex-post calculation instead of specific (Soly) the total solvent consumption (Sol,y) is a monitoring parameter.

POy is the Quantity of PO produced (tons)

The process emissions arise due to energy usage (heat, electricity, etc.) for transforming the reagents into the final product, by-products and also for waste treatment, hence calculated as:

$$PE_{Process,y} = PE_{heat,y} + PE_{Electricity,y} + PE_{Waste,y}$$

$PE_{heat,y}$ is calculated to be → $PE_{heat,y} = SSC_{HPPO} \times POy \times EF_{Steam,y}$

Where:

SSC_{HPPO} is the Specific thermal energy consumption ratio in the PO production through HPPO process (TJ/ton of PO), sourced from the design details of the project and for ex-post calculation instead of specific (SSC_{HPPO}) the total steam consumption ($SC_{HPPO,y}$) is a monitoring parameter.

$EF_{Steam,y}$ is the Emission factor for thermal energy generation in year y (tCO_2/TJ) is calculated as in the baseline scenario.

$PE_{elec,y}$ is calculated to be → $PE_{elec,,y} = SEC_{HPPO} \times PO_y \times EF_{El,y}$

Where:

SEC_{HPPO} is the Specific electrical energy consumption ratio in the PO production through HPPO process (MWh/tonne of PO) sourced from the design details of the project and for ex-post calculation instead of specific (SEC_{HPPO}) the total electricity consumption ($EC_{HPPO,y}$) is a monitoring parameter.

$EF_{El,y}$ is the Emission factor for electricity generation in year y (tCO_2/MWh) is calculated as in the baseline scenario.

$PE_{Waste,y}$ is calculated to be → $PE_{Waste,y} = (44/12) \times (CA_{Waste,y}) + FC_{i,y,} \times COEF_{,I,y}$

Where,

$CA_{Waste,y}$ is the Carbon amount in the waste stream derived from the carbon amount in the Propylene feed, Solvent, PO and by-products during year y of the crediting period (tons). Calculation of $CA_{Waste,y}$ is detailed below.

(44/12) is the ratio between the molecular weights of CO_2 and Carbon (mass units/mass units)

FCi,y is the Quantity of fuel type i combusted in the incinerator during the year y (mass or volume unit/year) to be sourced as described in the CDM "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

COEF,i is the CO_2 emission coefficient of fuel type i (tCO_2/mass or volume unit) calculated as per the requirements of the CDM tool "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

The carbon amount in the waste stream shall be calculated as a difference between the carbon amount (CA) in the feed and the carbon amount in product and byproduct. The carbon amount in a product is a function of respective carbon fraction and the quantity this is calculated as:

$$CA_{Waste,y} = CA_{Propylene,y} + CA_{Solvent,y} - (CA_{PO,y} + CA_{Byproduct,y})$$

$$CA_{Waste,y} = (36/42) \times Q_{Propylene,y} + (12/32) \times Sol\ y - (36/58) \times PO_{,y} - (36/76) \times Q_{Byproduct,y}$$

All the values (parameters to be monitored and not monitored) are to be determined at the project level using approved CDM tools, independent third party reports and ex-post monitoring and measurement as referred in the ME. Based on the above description and use of all the reliable data and correct equation with respect to the nature of project activity, BVCH confirms that the procedure for determining project emissions in the ME is sufficient and would result in correct and conservative estimates.

3.7 Leakage

Leakage is not considered in the ME, since upstream emissions due to use of reagents are accounted under project emissions and post production, the product (PO) is comparable to the PO derived out of any other process including Chloro-hydrin process. As reported by the first VVB /D4/ the methodology developer presented that there could be emissions owing to construction of the facility, these emissions are ignored as they are expected to be same for baseline and project. The assessment team of BVCH has accepted as the same is well justified owing to the applicability condition which makes sure the methodology element is only applied to the green field projects. It may also be noted that the difference, if any, would be insignificant against the emission reductions envisaged from the project activity.

3.8 Quantification of Net GHG Emission Reductions and/or Removals

Emission reductions are calculated as the net difference between the baseline emissions (BEy) and the Project emissions (PEy) including Leakage (LEy), hence represented as:

ERy = BEy – PEy – LEy

In case there is a retrofit in the plant, implemented during crediting period, having an effect on the energy (steam and/or electricity) consumption of the project activity, the project proponents shall submit a deviation on how such retrofit is monitored to estimate its effect on emission reduction. Thus the methodology establishes criteria and procedures for quantifying GHG emissions for the selected GHG sources, separately for the project and baseline scenarios. The methodology is also transparent on the criteria and procedures for quantifying net GHG emission, quantified as the difference between the GHG emissions from GHG sources relevant for the project and those relevant for the baseline scenario. BVCH confirms that the procedure for determining emission reductions given in the ME is correct and would result in a conservative estimate.

3.9 Monitoring

The methodology element describes all the data and parameters to be reported, including sources of data and units of measurement. Methodology element ensures that conservative values shall be selected that ensure the quantification does not lead to an overestimation of net GHG emission reductions. Metric tons have been used as the unit of measure and the quantity of GHG has been given in tons of CO_2e. Each of the data and parameter that shall be available at the time of validation and the ex-post monitoring parameters and its compliance to the requirements of VCS rules are discussed in the following section. The methodology developer has referred to the credible and reliable sources of data in addition to standard sources as mentioned in various tools. Hence BVCH confirms that the monitoring procedure as given in the ME is sufficient and would ensure that the quantification does not lead to an overestimation of net GHG emission reductions.

3.10 Data and Parameters

Data and Parameters to made available at the time of validation:

Following are the Data and Parameters to be made available at validation as per Methodology Element:

1. $ec_{Chlor\text{-}Alkali,\ y}$ is the energy consumption per ton of Cl_2 production (MWh/tCl_2). The membrane cell process is the preferred process for new plants /D18/. Thus, it is assumed that production of Chlor-Alkali in the baseline plant is through membrane cell process /D18/.

2. SSC_{CHPO} is the specific thermal energy consumption ratio in the PO production through CHPO process (TJ/ton of PO). Steam consumption is to be converted conservatively into energy terms using enthalpy values and accounting for any condensate return thus considering the net energy consumption in both the scenario.

3. SEC_{CHPO} is the specific electrical energy consumption ratio in the PO production through CHPO process (MWh/ton of PO).

4. pe_{HP} is the quantity of CO_2 that would be emitted per ton of H_2O_2 ($tCO_2/\ tH_2O_2$).

5. pe_{Sol} is the quantity of CO_2 that would be emitted per ton of Methanol (tCO_2/ ton of Methanol Solvent).

6. $CA_{Waste,\ Baseline}$ is the carbon amount in the waste stream combusted in the incinerator in the baseline per ton of PO (tC/ ton of PO).

7. $fci_{,Baseline}$ is the quantity of fuel type i combusted in the incinerator in the baseline per ton of PO (mass or volume unit in baseline per ton of PO).

All the above values are required to be sourced from independent third party report from industry wide recognized technology analysis consultants.

Data and Parameters to be monitored:

1. POy is the final quantity of PO produced in year y (tons) to be sourced from plant records measured with Flow-rate meters, mass meters and cross-checked with stock verification records. The data shall be continuously monitored and aggregate recording at least monthly, to calculate emission reduction. Meters should be calibrated regularly according to manufacturer's guidelines or national standards.

2. Soly is the Quantity of make-up methanol solvent used in year y (tons) to be sourced from plant records measured with Flow-rate meters, mass meters and cross-checked with stock verification records. The data shall be continuously monitored and aggregate recording at least monthly, to calculate emission reduction. Meters should be calibrated regularly according to manufacturer's guidelines or national standards.

3. $EF_{EL,y}$ is the Emission factor for electricity generation in year y (tCO_2/MWh), to be calculated using procedures in the latest approved version of the 'Tool to calculate the emission factor for an electricity system'.

4. $EF_{CO2,\ i,\ y}$ is the weighted average CO_2 emission factor of fuel type i in year (tCO_2/TJ) to be calculated using procedures in the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

5. $\eta_{Boiler,y}$ is the efficiency of the steam generating system to be determined as described in the "Tool to determine the baseline efficiency of thermal or electric energy generation systems".

6. $SC_{HPPO,\ y}$ is the total thermal (steam) energy consumption in the PO production through HPPO process in year y to be sourced from plant records. This parameter should be determined as the difference of the enthalpy of the process heat (steam) supplied to PO

production process in the project method, minus the enthalpy of the feed-water, the boiler blow-down and any condensate return. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure. The data shall be continuously monitored and aggregate recording at least monthly, to calculate emission reduction. Meters should be calibrated regularly according to manufacturer's guidelines or national standards.

7. $EC_{HPPO,\ y}$ is the electrical energy consumption in the PO production through HPPO process in year y (MWh) to be sourced from plant records. Electrical consumption is to be monitored continuously aggregate recording at least monthly. The average specific electrical energy consumption to be calculated based on PO production. Meters should be calibrated regularly according to manufacturer's guidelines or national standards.

8. $Q_{Propylene,y}$ is the quantity of propylene used in year y (tons) sourced from plant records measured with Flow-rate meters, mass meters and cross-checked with stock verification records. The data shall be continuously monitored and aggregate recording at least monthly, to calculate emission reduction. Meters should be calibrated regularly according to manufacturer's guidelines or national standards.

9. $Q_{By\text{-}product,y}$ is the quantity of by-product produced in year y (tons) sourced from plant records measured with Flow-rate meters, mass meters and cross-checked with stock verification records. The data shall be continuously monitored and aggregate recording at least monthly, to calculate emission reduction. Meters should be calibrated regularly according to manufacturer's guidelines or national standards.

10. $FC_{i,y}$ is the quantity of fuel type i combusted in the incinerator during the year y (mass or volume unit/year). To be determined as described in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

11. $COEF_{i,y}$ is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit). To be determined as described in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

The ME has identified all the data and parameters necessary and is consistent with the procedures and calculations as available in the ME to determine emission reductions. ME has also established criteria and procedures for monitoring, which includes, the purpose of monitoring, monitoring procedures, including measurement and calculation approaches, procedures for managing data quality including cross checking and monitoring frequency and measurement procedures, data uncertainty, etc. Hence, BVCH confirms that all the data and parameter to be made available at validation and the data and parameters to be monitored have been sufficiently captured in the ME and consistent with applicable VCS rules.

3.11 Use of Tools/Modules

For additionality demonstration and for elimination of alternatives not feasible, this methodology refers to the latest approved version of the CDM "Tool for the demonstration and assessment of additionality"

For parts of baseline and project emission calculations this methodology refers to elements of the latest approved version of the following CDM tools:

- ✓ Tool to calculate baseline, project and/or leakage emissions from electricity consumption;

- ✓ Tool to determine the baseline efficiency of thermal or electric energy generation systems;
- ✓ Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion.

The ME does not refer to any module.

BVCH confirms that as detailed in section 3.3, 3.4 and 3.10 of this report, the tools referred above are used appropriately within the methodology element.

3.12 Adherence to the Project Principles of the VCS Program

BVCH confirms that the proposed ME is developed in accordance with the requirements of VCS and adequately addresses the principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness and will ensure that GHG related information related to a project applying this ME is a true and fair account. This has been reflected in the assessment protocol in section 4 of this report, which considers the Methodology Approval Process, VCS Standard, New Methodology Element template, VCS Validation and Verification Manual, etc.

3.13 Relationship to Approved or Pending Methodologies

BVCH verified VCS, CDM and GS websites /D21/-/D23/, currently there is no approved or pending methodology under the VCS Program or an approved GHG program that could reasonably be revised to meet the objective of the proposed methodology. The methods of estimation of baseline emissions, project emissions and emission reductions used in the ME are similar to a few approved CDM methodologies, however totally unrelated. Hence BVCH confirms requirement of the proposed ME to meet the objective.

3.14 Stakeholder Comments

In accordance with the VCS requirement, the methodology was open for public comment from 3-October- 2012 until 1- November -2012. No stakeholder comments were received for the proposed ME /D20/.

4 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

NEW VCS METHODOLOGY ELEMENT ASSESSMENT PROTOCOL (2nd VVB Assessment)

Table 1 Methodology Assessment requirements based on Methodology Approval Process (version 3.4) (MAP), VCS Validation and Verification Manual (version 3.0) (VVM) and VCS Standard (version 3.3) (VCS STD)

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
A. Methodology Element Development					
(a) Has the ME been prepared using latest version of the VCS Methodology Template?	MAP VVM	3.2.1 5.1	The Methodology Developer has described the ME using latest version of VCS Methodology Template i.e. version 3.2 provided by VCSA. Refer to the section B of the protocol below.	OK	OK
(b) Has the VCSA conducted Global (Public) Stakeholder Consultation of the ME for 30-days after VCSA's initial review and prior to first VVB's assessment?	MAP VVM	3.3 5.1.1	Yes. The VCSA conducted Global (Public) Stakeholder Consultation of the ME for 30 days and methodology was made available for public comment from 03 October 2012 until 01 November 2012.	OK	OK
(c) Have there been comments from the Global Stakeholders? If yes; are the comments provided to methodology developer by the VCSA?	MAP	3.3.6	There are no comments from Global Stakeholders as confirmed from VCSA site.	OK	OK
(d) Has the developer taken in to accounts of such comments and demonstrated the same to each of the VVB?	MAP	3.3.6	Please refer above comment. No stakeholders comment received during publication of ME on VCSA site.	OK	OK
(e) Has the first assessment of the ME conducted by first VVB and the first assessment report and latest version of ME are posted on VCS web site by the VCSA to provide transparency in the development process?	MAP	3.4	The first assessment of the ME is conducted by first VVB i.e. RINA S.p.A and first draft assessment report and initial version of ME are posted on VCS website by VCSA. However; to provide transparency in the ME development process, latest version of ME is not	**CAR-1**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			posted on VCSA website.		
B. Description of Methodology Element					
(a) Does the ME provide complete and correct information on the title page?	VCS Meth. Temp.	-	Yes. The ME provides complete information on the title page. However, the sectoral scope mentioned in the latest version of ME is 5 whereas the VCSA web site mentions both 1 and 5 (http://v-c-s.org/methodologies/reduction-ghg-emissions-propylene-oxide-production). The first VVB also raised a clarification on the sectoral scopes. The sectoral scope 1 has been removed from the revised ME which is correct and hence accepted.	OK	OK
(b) Does ME include description on the sources including key documents, methodologies and/or projects upon which the ME is proposed? Are any tools or modules identified which the ME will refer to?	VCS Meth. Temp.	1.0	ME provide the description of sources and proposed technology on which methodology is developed. The methodology is proposed for project activity carried out by MTP HPPO Manufacturing Co. Ltd. wherein project involves constructing a production facility for Propylene Oxide using new process called Hydrogen Peroxide-based Propylene Oxide (HPPO) Technology instead of conventional Chlorohydrin-chlro-alkali process. ME also defines the list of tools which will be referred for additionality demonstration and those required for calculation of project, baseline and leakage emissions.	OK	OK
(c) Does the ME provide summary description which includes main methodology steps?	VCS Meth. Temp.	2.0	ME provides the summary description of the new methodology including the main methodology steps viz; applicability conditions, project boundary, baseline scenario identification, additionality demonstration, quantification of net	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			GHG emissions and removals and monitoring. The GHG emission reductions are owing to usage of lesser GHG intensive reagents and reduced process energy requirements compared to baseline cholrohydrin-chlor-alkali process (CHPO). ME developer has restricted the methodology to Greenfield facility only and where the baseline is identified as production of PO via Chlorohydrin-chlor-alkali process (CHPO).		
(d) Does the summary description provide use of project, performance or activity method for determining additionality, and a project or performance method for determining the crediting baseline?	VCS Meth. Temp.	2.0	The summary description provides use of Project Method for determining additionality and crediting baseline.	OK	OK
(e) Are the key definitions of key terms and acronyms provided in the ME that are used in the ME description?	VCS Meth. Temp.	3.0	Yes. The key definitions of key terms and acronyms that are used in the ME description are provided in section 3 of the revised ME.	OK	OK
(f) Are the applicability conditions identified which shall be applied / complied by the project activities to define the projects' eligibility?	VCS Meth. Temp.	4.0	Yes. The applicability conditions are identified in section 4 of revised ME. They shall be used by proposed project activities to demonstrate their eligibility to apply the new ME.	OK	OK
(g) Does the description of ME provide clear identification of the project boundary and identification of GHG sources, sinks and reservoirs included or excluded from the project boundary?	VCS Meth. Temp.	5.0	Description of ME provides clear identification of the project boundary and identification of GHG sources. The ME defines the generalized project boundary. Also the project boundary is defined for the baseline scenario i.e. chlorohydrin-chlor-alkali process. It is also shown for the HPPO process in diagrammatic form. The table of consideration of GHG gases for baseline and project emission calculation provides the details about the consideration of GHG gases for each step of the process.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(h) Is the description of criteria and procedures to identify the baseline scenario provided in the ME?	VCS Meth. Temp.	6.0	Yes. The ME section 6 provides the description of criteria and procedures to identify the baseline scenario.	OK	OK
(i) Does the ME describe the procedure to demonstrate additionality including relevant tools to be applied?	VCS Meth. Temp.	7.0	Yes. The ME directs to use the latest version of "Tool for assessment and demonstration of additionality" approved by CDM executive board because as per VCS rules any approved GHG programme guidelines and tools can be applied and the CDM is approved by VCSA.	OK	OK
(j) Are the procedures for quantification of the emission reductions and removals provided in ME?	VCS Meth. Temp.	8.0	The ME section 8 provides the procedure for quantification of GHG emission reductions.	OK	OK
1. Are the criteria and procedures to derive/ calculate Baseline Emissions and/or removals for selected (within project boundary) GHG sources, sinks and/or reservoirs described?	VCS Meth. Temp.	8.1	The baseline emission calculation procedure is provided in revised ME wherein the baseline is confirmed to be PO production through CHPO route only. The baseline emissions associated with chlor-alkali production are estimated i.e. emissions due to electricity consumption during chlor-alkali manufacturing process. The emissions due to the heat/steam and electricity consumption for PO production process are considered and formulae are provided to calculate emissions due to thermal and electricity consumption by process. Further the baseline emissions are considered for waste treatment or incineration. In this case emissions due to firing of fuel for incineration are considered along with emissions due to burning of carbon amount in waste stream. All criteria's and requirements have been specified.	OK	OK
2. Does the ME provide clear and relevant	VCS	8.1	Please clarify following observations	**CL-1**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
equations to quantify the GHG Baseline Emissions?	Meth. Temp.		1) Why the emissions associated with production of propylene (C_3H_6) that would be consumed in baseline scenario and project activity scenario are not considered, since the yield of both process may be different; and hence the quantity of (C_3H_6) required to manufacture fixed amount of PO may also be different. Also propylene grade whether polymer or commercial is considered in methodology. 2) Clarify if there are any GHG emissions from the production of chlor-alkali and production of PO in baseline and project activity respectively. 3) It is required to confirm if there are no other process emissions in production of PO as evident from the reaction equations. Hence, only emissions due to energy usage are considered to calculate baseline emissions. 4) Please clarify how the specific steam consumption "SSC_{CHPO}" would be calculated or derived? Is the thermal energy of returned stream in boiler is considered in estimating the same. 5) Is the waste generation in the process can be used as fuel in steam generator for meeting thermal energy requirements. If so then, the provision is not made to account for this heat in calculation of "$EF_{Steam,y}$" .		
3. Are the criteria and procedures to quantify Project Emissions and/or removals for selected (within project boundary) GHG sources, sinks and/or reservoirs?	VCS Meth. Temp.	8.2	The criteria and procedures to quantify the project emissions for PO production through HPPO route are specified in ME. The ME considers the project emissions due to production of reagents (other	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			than C_3H_6) used in the process i.e. H_2O_2. Further the emissions due to production of solvent used in the process are considered as make up of solvent is required during the process. The process emissions are considered which incorporates the emissions associated with production of steam/heat and electricity required for the process. The project emission due to treatment of waste or incineration is calculated from quantity of fossil fuel used and CO_2 emission coefficient of the fuel. The emission due to incineration of carbon amount in waste stream is also considered as a project emissions.		
4. Does the ME provide clear and relevant equations to quantify the GHG Project Emissions?	VCS Meth. Temp.	8.2	Refer CL-1 raised above. In addition to that The revised ME does not clarify the rational for considering the same emission factor for thermal energy generation for baseline and project emissions.	**CL-2**	OK
5. Are the criteria and procedures to quantify Leakage Emissions and/or removals for selected GHG sources, sinks and/or reservoirs?	VCS Meth. Temp.	8.3	In baseline chlor-alkali i.e. (Chlorine and NaOH) can be generated by using NaCl (electrolysis of brine solutions). Otherwise NaCl has to be disposed off and this is contrary to assumptions made for applicability of methodology. In Project plant, H_2O_2 may be required to be outsourced and so also Methanol. Hence project activity may contain the leakage due to transportation. Please clarify.	**CL-3**	OK
6. Does the ME provide clear and relevant equations to quantify the GHG Leakage Emissions?	VCS Meth. Temp.	8.3	No leakage emissions are considered for this ME. However refer to CL-3 above; subsequently if required provide the appropriate and relevant equations to determine leakage emissions.	-	-

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
7. Are the criteria and procedures to quantify Net GHG Emissions reduction and/or removals for selected GHG provided as a function of Baseline, Project and Leakage Emissions using following equation: $ER_y = BE_y - PE_y - LE_y$	VCS Meth. Temp.	8.4	Yes. The emission reductions are to be calculated using the following equation. $ER_y = BE_y - PE_y - LE_y$	OK	OK
(k) Is the description in Monitoring has been provided?	VCS Meth. Temp.	9.0	Yes. It is provided in section 9 of ME.	OK	OK
1. Does ME provide details on the Data and Parameters available at the validation and which are not monitored?	VCS Meth. Temp.	9.1	Yes. ME provides the details on the Data and Parameters available at the validation stage which are not required to be monitored.	OK	OK
2. Are above mentioned Data and Parameters not monitored provided in a tabular format as per the template of VCS methodology?	VCS Meth. Temp.	9.1	The above data and parameters available at validation stage are provided in tabular format. However, in some of the parameters the justification of choice of data or description of measurement methods and procedures are not described/mentioned. Please clarify.	**CL-4**	OK
3. Does the ME establish any default factor which may change significantly over the time? If yes; has it been noted separately in "Any Comment" by the methodology developer?	VCS Meth. Temp.	9.1	Not Applicable	OK	OK
4. Does ME provide details on the Data and Parameters to be monitored using tabular format as per the template of VCS methodology?	VCS Meth. Temp.	9.2	Yes. The ME provides the details on Data and Parameters to be monitored using the tabular format as per the template of VCS methodology.	OK	OK
5. Does ME describe the criteria and procedures for obtaining, recording, compiling and analyzing data and information important for quantifying and	VCS Meth. Temp.	9.3	Yes. ME describes the criteria and procedures for obtaining, recording, compiling and analyzing data and information important for quantifying and	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
reporting GHG emissions and/or removals relevant for the project and baseline scenario?			reporting GHG emissions for the project and baseline scenario.		
(l) Are any information including any relevant references and any other information relevant to the methodology described in the ME?	VCS Meth. Temp.	10.0	Yes	OK	OK
C. Methodology Element Assessment					
C.1 General Requirements of ME					
(a) Does the ME include a comparative assessment of the project and its alternatives in order to identify the baseline scenario including comparative assessment of the implementation barrier and net benefits faced by the project and its alternatives?	VCS STD	4.1.2	The documents including draft PDD, emission reduction calculations (spreadsheets), additionality, etc. are required to be submitted in order to make comparative assessment of the project and its alternatives for baselines scenario and additionality demonstration.	**CAR-2**	OK
(b) Are all the assumptions, parameters and procedures that have significant uncertainty and a description to address such uncertainty provided explicitly in the ME?	VCS STD	4.1.4	Yes. All the assumptions, parameters and procedures are provided in the ME. However there are no such parameters that have significant uncertainty.	OK	OK
(c) Are there any existing methodology that could be reasonably be revised to meet the objective of the proposed methodology?	VCS STD	4.1.5	It is required to explain using existing most appropriate methodology of similar sector under other GHG program that could not be reasonable be revised to meet the objective of proposed ME.	**CL-5**	OK
(d) Does the ME mandate use of any specific model to simulate processes that generate GHG emissions?	VCS STD	4.1.6	The ME does not mandate use of any specific model to simulate processes that generate GHG emissions.	OK	OK
(e) If yes to above; does the model comply the requirements laid down in para 4.1.5.(1)-(6) of VCS Standard, version 3.3?	VCS STD	4.1.6	Not Applicable	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(f) Does the ME use default factors and standards to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality?	VCS STD	4.1.7	ME uses the respective molecular weights of various reagents and constituents included in the baseline and project scenario to determine the GHG emission data. However, the ME does not use default factors to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality	OK	OK
(g) If yes to above; 1. Do the data used to establish default factor comply with the requirement of para 4.5.6 of VCS Standard, version 3.3 and hence include economic and engineering analyses and models, peer-reviewed scientific literature, case studies, empirical data, and common practice data to establish the data? 2. Does the ME describe in detail the study or other method used to establish default factor? 3. Are the default factors identified which may become out of date and hence are subjected to periodic re-assessment?	VCS STD	4.1.7 (1) 4.5.6 4.1.7 (2) 4.1.7 (3)	Not Applicable	OK	OK
(h) Does the ME use standardized method (Performance or Activity) or a project method to determine additionality or crediting baseline and state that which type of method is used for each of them?	VCS STD	4.1.9	ME use the project method that uses project specific approach for determination of additionality and/or crediting baseline.	OK	OK
C.2 Applicability Conditions					
(a) Does the methodology define and use the applicability conditions to specify the project activities to which they will be applicable? Whether the ME provides a clear and defined specification and/or list of project activities	VCS STD	4.3.1	Yes. The methodology defines and uses the applicability conditions to specify the project activities to which they will be applicable. It has been stated in applicability condition that		

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
eligible under the methodology?	VVM	5.2.1	Chlorohydrin-chlor-alkali (CH-CA) process must be identified baseline. However, it is to be clarified if this should be Integrated Chlorohydrin-chlor-alkali process, where NaCl is generated as byproduct and is utilized to produce Chlorine and NaOH, which is used in CH-CA PO process and not the process where NaCl is generated as a byproduct and requires disposal. Also; why the other processes including co-oxidation of organic matter cannot be considered as baseline scenario. It is also required to be clarified as how the significant amounts of co-products generation affect the baseline identification?	**CL-6**	OK
(b) Do applicability conditions of the ME include any criteria and procedures that are addressed in the other section of ME? Do applicability conditions of the ME create limiting conditions that restrict its use to a single or proprietary technology or approach?	VVM	5.2.1	As required by the VVM para 5.2.1, the ME should not create limiting conditions that restrict its use to a single or proprietary technology or approach. In the proposed new ME, the conditions are limiting the baseline scenario as well as project scenario to a single technology/process. Please clarify with respect to CH-CA (as baseline) and HPPP (as project) scenario.	**CL-7**	OK
(c) Are the criteria that describe the conditions under which the methodology can (and cannot, if appropriate) be applied to the proposed project activities established in ME?	VCS STD	4.3.1	Yes. The criteria are established that helps in application of methodology to the proposed project activities. However, the first VVB has raised CL-3 towards applicability conditions of the ME and the ME has undergone acceptable revisions / corrections to make it most relevant and appropriate.	OK	OK
(d) Does the ME refer to the applicability conditions of any tools or modules referred by the ME and hence compliance of its applicability?	VCS STD	4.3.1	Yes. The applicability conditions of any referred tools are also applicable as stated in the revised ME.	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(e) Does ME clarify explicitly for the inclusion or exclusion of the facilities with respect to its size or capacity and date of construction? (Standardized Method)	VCS STD	4.3.2	No. This method is not used.	OK	OK
(f) Does the ME prescribe the performance benchmark matrix for limiting the applicability of the methodology to the project activities? (Performance Method)	VCS STD	4.3.3	No. This method is not used.	OK	OK
(g) If the ME uses Performance Method to demonstrate additionality, do the applicability conditions ensure that the project implements technologies and/or measures that cause substantial performance improvement relative to the crediting baseline and what is achievable within the sector and the methodology shall explicitly specify such technologies and/or measures?	VCS STD	4.3.4	Not Applicable	OK	OK
(h) Does the ME specify the scope of validity and geographic scope of the methodology?	VCS STD	4.3.5 4.3.6 4.3.9	ME specifies the geographic scope of methodology. The ME will be applicable to project activities all over the world. There was CL-4 raised during first VVB assessment and it has been clarified that the baseline emissions with respect to applicable geographic region will be calculated as per specific local conditions accounting for the fuel types and resource availability. This also ensures conservative assumptions for fixing the baseline parameters.	OK	OK
(i) Do the applicability conditions defined in the ME specify the project activity and they therefore serve as the specification of the positive list with respect to the demonstration of additionality?	VCS STD	4.3.7	The ME does not define or specify any positive list with respect to the additionality demonstration.	OK	OK
(j) Does the ME clearly specify the project activity in terms of a technology and/or	VCS	4.3.8	Yes, the ME clearly specifies the project activity in terms of a technology and/or measure and its	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
measure and its context of application? Is a technology and/or measure encompasses the plant, equipment, process, management and conservation measure or other practice that directly or indirectly generates GHG emission reductions and/or removals?	STD		context of application. The ME is applicable to Greenfield project activities involving the production of PO on commercial level and having no co or by-products (lesser than 10% of PO productions in mass terms). This is done intentionally as at one time the distinction between co product and by product is practically very difficult. This has been assessed in the first VVB assessment and hence accepted. The emissions associated with PO productions are considered on upstream level as well as process manufacturing level. Also the baseline is defined well and it has to be the generation of PO by CHPO process.		
C.3 Project Boundary					
(a) Does the ME establish criteria and procedure to identify project boundary and the GHG sources, sinks and reservoirs which are most relevant and adequately justified for its inclusion and exclusion for both baseline and project scenario?	VCS STD VVM	4.4.1 5.2.2	ME establishes criteria and procedures to identify project boundary and list down the GHG considered for estimation of baseline and project emissions which are most relevant and adequately justified.	OK	OK
(b) Are the GHG sources, sinks and reservoirs identified by the ME for both project and baseline scenario equivalent and consistent? Are the GHG sources, sinks and reservoirs included in the project boundary minimally controlled by the project proponent and related to the projects?	VCS STD VVM	4.4.2 4.4.3 5.2.2	1. The description provided in the project boundary does not clarify whether the national grid of the host country is included with the project boundary. Also, the schematic definition of the project boundary in baseline and project scenario is not consistent with the description of the project boundary. 2. The description of project boundary does not clarify if the process (baseline) indicated is CH-CA or CH-lime for the purpose of ME. 3. It has been stated that the emissions associated with C_3H_6 has not been accounted	**CAR-3**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
			in baseline and project as its usage would be essentially the same in both the scenario. It is required to substantiate as the consumption of C3H6 may be different depending on the yield of the production process. 4. Project emissions due to GHGs like CH_4 and N_2O are neglected on the ground of conservativeness. However, non consideration of these GHG in project emissions cannot be considered as conservative.		
C.4 Procedure for determining the Baseline scenario					
(a) Does the ME provide criteria and procedure for identifying the baseline scenarios and to determine the most plausible scenario?	VCS STD	4.5.1	Yes. ME provide criteria and procedure for identifying the baseline scenarios and to determine the most plausible scenario	OK	OK
(b) How the criteria for baseline determination provided in the ME take in to account the followings:					
1. The identified GHG sources, sinks and reservoirs;	VCS STD	4.5.1	The alternatives to the project activity are identified which deliver equivalent output or services that have been implemented previously or are currently being introduced in the relevant country/regions. The GHG sources, sinks and reservoirs associated with the baseline scenario will be taken in to account in emission reductions calculations.	OK	OK
2. Existing and alternative project types, activities and technologies providing equivalent type (quality) and level of activity (quantity) of products or services as the project activity;	VCS STD VVM	4.5.1 5.2.3	Yes, the alternative project types, activities and technologies providing equivalent type (quality) and level of activity (quantity) of products or services as the project activity are taken into account in step 1 of the baseline identification.	OK	OK
3. Data availability, reliability and limitations;	VCS	4.5.1	The steps / procedure prescribed for the identification of baseline scenario does not clarify	**CL-8**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
	STD		how they take data availability, reliability and limitations in to consideration while identifying the baseline scenario.		
4. Other relevant information concerning present or future conditions, such as legislative, technical, economic, socio-cultural, environmental, geographic, site-specific and temporal assumptions or projections	VCS STD VVM	4.5.1 5.2.3	Refer to CL-7 above.	-	-
(c) Is the procedure for identification of baseline scenario combined with the procedure for demonstration of additionality?	VVM	5.2.3	No. Both the procedures are separate. The additionality is to be demonstrated by using the latest version of Tool for assessment and demonstration of additionality as per CDM EB guidance.	OK	OK
C.5 Procedure for demonstrating additionality					
(a) Does the ME apply/provide either of the following two approaches to demonstrate the additionality? 1. Project Method 2. Standardized Method (Performance and Activity)	VVM VCS STD	5.2.4 4.6.2	Yes. The ME proposes to use "Project Method" approach for the demonstration of the additionality.	OK	OK
(b) Does the ME meet the either of the followings in procedure for demonstration of additionality: 1. Refer and require the use of an appropriate additionality tool that has been approved under the VCS or an approved GHG program; 2. Develop a full and detailed procedure for demonstrating and assessing additionality directly within the methodology; 3. Develop a full and detailed procedure for	VCS STD	4.6.2	The ME proposes to use "Project Method" approach for the demonstration of the additionality. 1. The ME refers to the Tool for the assessment and demonstration of additionality as per CDM, which is approved GHG programme. 2. Clarify why can't ME include the additionality demonstration using both VCS (Project, performance or activity method) and CDM tool? 3. The ME refers to the additionality tool of CDM	**CL-9**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
demonstrating and assessing additionality in a separate tool, which is to be approved via the methodology approval process, and refer and require the use of such new tool in the methodology.			and does not provide any separate tool which requires approval from VCS.		
(c) If the ME provides Project Method approach; are the following steps clarified transparently for demonstration of additionality; 1. Step 1: Regulatory Surplus 2. Step 2: Implementation Barrier 3. Step 3: Common Practice Analysis	VCS STD	4.6.3 4.6.4 4.6.5	The ME does not provide steps as per Project Method explained in the VCS standard but refers to the additionality tool of the CDM and hence all the steps of CDM additionality tool are to be followed.	OK	OK
(d) For the purpose of demonstration of implementation barrier, is the assessment of following barriers explained in ME; 1. Investment Barrier 2. Technological Barrier 3. Institutional Barrier	VVM VCS STD	5.2.4.1 4.6.4	The ME does not provide steps as per Project Method explained in the VCS standard but refers to the additionality tool of the CDM and hence all the steps of CDM additionality tool are to be followed.	OK	OK
(e) If the ME provides Performance Method approach; are the following steps clarified transparently for demonstration of additionality; 1. Step 1: Regulatory Surplus 2. Step 2: Performance Benchmark	VVM VCS STD	5.2.4.2 4.6.6 4.6.7	The ME does not employ performance method to demonstrate additionality.	OK	OK
(f) If the ME provides Activity Method approach; are the following steps clarified transparently for demonstration of additionality; 1. Step 1: Regulatory Surplus 2. Step 2: Positive List	VVM VCS STD	5.2.4.2 4.6.8 4.6.9	The ME does not employ activity method to demonstrate additionality	OK	OK
C.6 Quantification of Net GHG emission reduction and/or removals					
(a) Does the ME provide clear explanation on establishment of criteria and procedures for	VCS	4.7.1	Yes. ME provides the clear explanation on establishment of criteria and procedures for	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
quantifying GHG emissions and/or removals, and/or carbon stocks, for the selected GHG sources, sinks and/or reservoirs, separately baseline emissions, project emissions and leakage emissions; if any?	STD		quantifying GHG emissions and/or removals. The ME provides the procedures for calculation of baseline and project emissions separately. The leakage emissions stated to be not applicable.		
(b) Are the net GHG emission reductions quantification provided as the difference between the GHG emissions and/or removals, and/or as the difference between carbon stocks, from GHG sources, sinks and reservoirs relevant for the project and those relevant for the baseline scenario?	VCS STD	4.7.2	Yes. GHG emissions reductions are difference between baseline and project emissions.	OK	OK
C.6.a Baseline Emissions					
(a) Does the ME provide transparent and explicit procedure to calculate baseline emissions including steps and equations to be used?	VVM	5.2.5	Yes. The ME provides transparent and explicit procedure to calculate baseline emissions including steps and equations to be used. Baseline emissions (BEy) is a sum of Emissions associated with the baseline reagents ($BE_{Upstream,y}$) for the production of PO, (tCO_2), this is considered upstream emission due to production of baseline reagents, and; Emissions due to energy usage ($BE_{Process,y}$) heat, electricity, etc., for transforming the baseline reagents into the final product (PO) and also for waste and by-products treatment (tCO_2) considered as baseline emissions due to production on site.	OK	OK
(b) Are all the components of the baseline emissions provided in the ME appropriate to the type of project activities to which the ME will be applicable?	VVM	5.2.5	Refer CL-1 at B (j).2 above.	-	-
(c) Are the parameters used in steps and equations to determine baseline emissions are appropriate to the ME and the applicable	VVM	5.2.5	Yes. The parameters used in steps and equations to determine baseline emissions are appropriate to	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
project activities?			the ME and the applicable project activities. The first VVB assessment has raised CL-7 towards inadequacies observed in equations of Baseline Emissions. The CL-7 has been closed based on revised ME and responses.		
(d) Does the ME rely upon assumptions, parameters and/or procedures with significant uncertainty and whether the ME has appropriate procedures to address such uncertainty for the determination of baseline emissions?	VVM	5.2.5	Refer to above comment.	OK	OK
(e) Does ME clarify and explicitly explain to attend the uncertainty where indirect methods such as models, default factors and proxies are used to estimate baseline emissions, and where direct measurements are not be feasible either due to the nature of the project activity or due to the complexity and cost involved in field-based measurements?	VVM	5.2.5	Yes. ME guides to use the independent third party reports which are industry wide recognized for estimation of information about some of the parameters during estimation of baseline emissions.	OK	OK
(f) If ME pursue model based approach to estimate baseline emissions, is the model based on the publicly available, reputable and recognized sources?	VVM	5.2.5	No. The ME does not pursue model based approach to estimate baseline emissions.	OK	OK
C.6.b Project Emissions					
(a) Does the ME provide transparent and explicit procedure to calculate project emissions including steps and equations to be used?	VVM	5.2.5	Yes. The ME provides transparent and explicit procedure to calculate project emissions including steps and equations to be used. The project emissions are determined as a sum of emissions associated with the project reagents for the production of PO, (tCO_2) and emissions due to energy usage (heat, electricity, etc.) for transforming the project reagents into the final product (PO) and also for waste treatment (tCO_2).	OK	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(b) Are all the components of the project emissions provided in the ME appropriate to the type of project activities to which the ME will be applicable?	VVM	5.2.5	Refer CL-1 at B.(j).2 and CAR-3 above. Also, the first VVB raised CAR-1 towards justification of the eliminating CH_4 and N_2O though the same is not conservative approach. The first VVB also has raised CAR for the possible use of solvent (methanol) and GHG emission attributable to use of methanol. This has been included in the revised ME.	-	-
(c) Are the parameters used in steps and equations to determine project emissions are appropriate to the ME and the applicable project activities?	VVM	5.2.5	Yes. The parameters used in steps and equations to determine project emissions are appropriate to the ME and the applicable project activities. During the first VVB assessment, raised CARs and confirms the correctness of the all the parameters used in equations.	OK	OK
(d) Does the ME rely upon assumptions, parameters and/or procedures with significant uncertainty and whether the ME has appropriate procedures to address such uncertainty for the determination of project emissions?	VVM	5.2.5	There are assumptions and parameters involved on which ME rely but are not with any significant uncertainty.	OK	OK
(e) Does ME clarify and explicitly explain to attend the uncertainty where indirect methods such as models, default factors and proxies are used to estimate project emissions, and where direct measurements are not be feasible either due to the nature of the project activity or due to the complexity and cost involved in field-based measurements?	VVM	5.2.5	Not applicable	OK	OK
(f) If ME pursue model based approach to estimate project emissions, is the model based on the publicly available, reputable and recognized sources?	VVM	5.2.5	No. The ME does not pursue model based approach to estimate project emissions.	OK	OK
C.6.c Leakage Emissions					

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
(a) Does the ME specify clearly the procedures for estimating the leakage emissions in the project activity to which the ME is applied?	VVM	5.2.6	The leakage is not considered in the ME as the upstream emissions due to use of reagents are accounted under project emissions and post production product as such (PO) is comparable to the PO derived out of any other process including Chloro-hydrin Chlor Alkali (CH-CA) i.e. baseline process. Hence treated as an appropriate approach.	OK	OK
(b) If leakages (GHG emissions outside the project activity) are defined, are they attributable to the project activity to which the ME is applied?	VVM	5.2.6	Refer above comment	-	-
(c) Does the ME account for potential upstream and downstream emission sources associated with the project activity which are outside the project boundary?	VVM	5.2.6	Refer above comment	-	-
C.7 Monitoring					
(a) Does the ME explains and provide all the data and parameters including those which are available at validation and which are monitored ex post?	VVM VCS STD	5.2.7 4.8.1	Yes. ME explain and provides all the data and parameters including those which are available at validation and which are monitored ex post.	OK	OK
C.7.a Data and Parameters available at the validation					
(a) Does the ME provide list of all the relevant data and parameters to be available at the time of validation?	VVM VCS STD	5.2.7 4.8.1	Yes. ME provides list of all the relevant data and parameters to be available at the time of validation. A clarification has been raised during first assessment which has led to the correction and revision of ME resulting in to inclusion of all the relevant data and parameters to be available at the validation.	OK	OK
(b) Does the ME transparently explain the importance and means of documenting the	VVM	5.2.7	It may be noted that the ME is not clear as which	**CL-10**	OK

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
data and parameters to be available at the validation?			are the parameters that can be fixed ex ante. Hence, the parameters listed in section 9.1 of ME required to be explained if they will be fixed ex ante or monitored ex post (to be separated as may be required) along with parameters listed in section 9.1 of ME.		
(c) Does the ME refer to the default factors and standards for determination of such data and parameters? If yes; are such data referred from publicly available, reputable and recognized source (e.g. IPCC or published government data), peer reviewed, and appropriate for the given source, sink or reservoir?	VVM	5.2.7	ME does not specifically guide to use the default factors from publically available data source e.g. IPCC or published government data. Please clarify.	**CL-11**	OK
(d) In case of determination of values of such data, does the ME clearly explain the procedures/steps/appropriate sources to be used and referred?	VVM	5.2.7	Refer above CL	-	-
C.7.b Data and Parameters monitored					
(e) Does the ME provide list of all the relevant data and parameters to be monitored ex post?	VVM VCS STD	5.2.7 4.8.1	Yes. ME provides the list of all relevant data and parameters to be monitored ex-post in section 9.2 of the ME.	OK	OK
(f) Does the ME transparently explain the importance and means of documenting the data and parameters to be monitored?	VVM	5.2.7	Yes. The required details on the means of documentation have been provided transparently.	OK	OK
(g) Does the ME establish criteria and procedures for monitoring which covers; 1. Purpose of Monitoring 2. Monitoring procedures, including estimation, modeling, measurement or calculation approaches 3. Procedures for managing data quality	VCS STD	4.8.4	The purpose of the monitoring has been provided in section 9.3 of the ME. Monitoring procedures, including estimation, modeling, measurement or calculation approaches, management of data quality and monitoring frequency, etc. have been provided in tabular format in section 9.2 and 9.3 of the ME.	OK	OK

	CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
	4. Monitoring frequency and measurement procedures					
(h)	In case of determination of values of such data, does the ME clearly explain the procedures/steps/appropriate sources to be used and referred?	VVM	5.2.7	Refer CL above at C.7.a (c)	-	-
(i)	Does the ME provide most appropriate and relevant measurement methods for data and parameters to be monitored?	VVM	5.2.7	The ME provides the most appropriate and relevant measurement methods for data and parameters to be monitored.	OK	OK
(j)	In case of the ME uses a less accurate method for monitoring a particular GHG source or sink, whether appropriate procedures are in place to ensure that the estimates are conservative?	VVM	5.2.7	As per ME all the GHG sources will be adequately monitored.	OK	OK
(k)	Does the ME provide clear and transparent description on the appropriateness monitoring and quality assurance procedures?	VVM	5.2.7	ME provide clear and transparent description on the appropriateness monitoring and quality assurance procedures	OK	OK
(l)	Does the ME clarify to user on how to address any data uncertainty that may arise during ex post monitoring? When highly uncertain data and information are relied upon, does the ME clarify to select conservative values to ensure that the quantification does not lead to an overestimation of net GHG emission reductions or removals?	VVM VCS STD	5.2.7 4.8.2	ME does not clarify to user on how to address any data uncertainty that may arise during ex post monitoring.	**CL-12**	OK
C.8	**Adherence to the Project Principles of the VCS program**					
(a)	Does the ME adhere to the VCS Program principles set out in the VCS Standard?	MAP VCS	5.1.2 (9)	Refer to Section A, B and C of the protocol above	-	-

CHECKLIST QUESTION	Ref.	§	COMMENTS	Draft Concl	Final Concl
	STD	4.0			
C.9 Relationship to approved or pending methodologies					
(a) Can any existing methodology could reasonably be revised to serve the same purpose as the proposed ME?	MAP	5.1.2 (12)	It has been stated in the ME that there are currently no existing methodology that could reasonably be revised to serve the same purpose as the proposed ME.	OK	OK
(b) Has it been demonstrated by the ME developer that no approved or pending methodology under the VCS Program or an approved GHG program could reasonably be revised to meet the objective of the proposed methodology?	MAP	5.2.1	It is required to explain using existing most appropriate methodology of similar sector under other GHG program that could not be reasonable be revised to meet the objective of proposed ME (Refer to CL-5 above in C.1 (c)).	-	-

Table 2 Resolution of Corrective Action / Clarification / Forward Action Requests

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
CAR-1 The first assessment of the ME is conducted by first VVB i.e. RINA and first draft assessment report and initial version of ME are posted on VCS website by VCSA. However to provide transparency in the ME development process, latest version of ME is required to be posted on VCS website.	A.3.4.	The posting of the ME version after 1st VVB assessment is under the control of VCSA. We would request VCSA to upload the same on their website.	Validation team has checked the VCS website and it is verified that the revised version of ME is uploaded by VCSA post validation from first VVB upon request by the ME developer. Hence CAR-1 is **closed.**
CAR-2 The documents including draft PDD, emission reduction calculations (spreadsheets), additionality, etc. are required to be submitted in order to make comparative assessment of the project and its alternatives for baselines scenario and additionality demonstration.		The draft PD and ER sheet can be submitted once the confidentiality agreement is signed.	The Draft PD and ER sheet is submitted by ME developer upon signing of the confidentiality agreement for review of assessment team. The review of draft VCS PD confirms the application of ME in transparent manner for assessment of baseline scenario and demonstration of additionality. Therefore CAR-2 is **closed.**
CAR-3 1. The description provided in the project boundary does not clarify whether the national grid of the host country is included within the project boundary. Also, the schematic definition of the project boundary in baseline and project scenario is not consistent with the description of the project boundary.		1. The project boundary has been clearly described in the methodology and the same is also in-line with many other approved CDM methodologies. The following is clearly stated in the ME: 'The project boundary encompasses also the project's electricity system(s) and the heat/steam generation system that the PO plant is connected to. The spatial extent of the project electricity system consists of the power plants that are physically connected through transmission and distribution lines to	1. The project boundary is now clear as the national electricity grid system is included within the project boundary. The emission factor will be calculated by using the approved emission factor tool from approved GHG program. PP has also provided the GHG sources in the table which also includes CO_2 Emissions associated with steam and electricity requirements of the process. **Hence accepted.**

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
		the project activity and that can be dispatched without significant transmission constraints'. The GHG sources in the table thereafter include CO_2 Emissions associated with steam and electricity requirements of the process. **2nd response** The diagrams have been revised to include sources of steam and electricity.	
2. The description of project boundary does not clarify if the process (baseline) indicated is CH-CA or CH-lime for the purpose of ME.		2. The description of the project boundary in the schematic as well as table thereafter clearly indicates Chlor-alkali. The GHG sources in the table includes the following explanation: 'Emissions associated with the production of baseline reagents - The emissions associated with Cl_2 and NaOH (Chlor-Alkali) production has been accounted as these are generally not found naturally and are produced in an industrial facility…'. Moreover usage of Lime results in higher effluent treatment cost (please refer Nexant report HPPO, page 36, section 2.3). Please also refer to the response in the 1st VVB assessment report against CL-2, point 2.	2. As clarified by the ME developer, the though the CH-CA is not clear above the table, the same has been clearly written in the table of GHG exclusion/inclusion in baseline and project scenario. Further, as referred from the Nexant Report for the non-integrated chlorohydrin plant (CH-lime) the effluent treatment cost is higher as compared to the CH-CA process. Hence, the CH-CA is the most appropriate baseline scenario as stated and included in the project boundary of ME. Further the assessment team also reviewed the CL-2 raised by first VVB which also confirms the appropriateness of the baseline scenario based on the supporting evidences submitted by ME developer in form of Nexant Report and SRI Report. **Hence, this point is closed.**
3. It has been stated the emissions		3. It can be noted that the baseline and	3. The assessment team accepted the

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
associated with the C_3H_6 has not been accounted in baseline as its usage would be essentially same as the project scenario. It is required to substantiate as the consumption of C_3H_6 may be different depending on the yield of the production process.		project are being compared for the same quantum of PO. For every mole of PO a mole of Propylene will be required. Any yield loss is likely to result as by-product or waste and gets accounted. Moreover usage of Propylene is marginally lower in HPPO process as compared to Chlorohydrin process thereby making the ME conservative. Please also refer to the response regarding the same in the 1st VVB assessment report against CAR-2, point 1.	response of project participant as one mole of propylene is required to produce one mole of PO as per reaction in HPPO process is conservatively considered though propylene consumption is slightly higher in CHPO process. This is also evident from the supporting document (Nexant Report) submitted by the ME developer. The ME developer is also accounting all the emissions due to waste generation in calculation of emission reduction. The assessment team has also reviewed the 1st VVB assessment report. It has also confirmed the same during closure of CAR 2. **Hence, this point is closed.**
4. Project emissions due to GHGs like CH_4 and N_2O are neglected on the ground of conservativeness. However, non consideration of these GHG in project emissions cannot be considered as conservative.		4. The emissions due to GHGs like CH_4 and N_2O have been neglected for simplification and at the same time it is conservative when baseline is compared to project. Say for example in case of fossil fuel combustion either for producing heat or electricity the quantum of the aforesaid GHGs will be more for baseline as compared to project. However since this value is significantly lower as compared to CO_2 emissions so for simplification has not been considered. This is an accepted approach as also seen in many other approved CDM methodologies. Please also refer to the response regarding the same in the 1st VVB	4. As explained by the ME developer and reported in the 1st VVB's assessment report, the project activity is aimed to reduce the energy consumptions during manufacturing processes. The reduction in energy (electricity/ steam / heat) leads to direct reduction in emission of CO_2 GHG. Hence, though, the other GHGs like CH_4 and N_2O are involved in the both baseline and project scenario, they are much lower in quantity, the same can be neglected for simplification as reviewed from the IPCC. This may not have any materiality impact on the net emission reductions. The similar approach has been adopted in other CDM approved

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
		assessment report against CAR-1, point 1.	methodologies (ACM002, AM0018, etc) also and **hence, are accepted by the assessment team.**
CL-1 Please clarify following observations 1. Why the emissions associated with production of propylene (C_3H_6) that would be consumed in baseline scenario and project activity scenario are not considered, since the yield of both process may be different; and hence the quantity of (C_3H_6) required to manufacture fixed amount of PO may also be different. Also propylene grade whether polymer or commercial is considered in methodology. 2. Clarify if there are any GHG emissions from the production of chlor-alkali and production of PO in baseline and project activity respectively.		1. Please refer to response above against point-3. The difference between chemical grade and polymer grade Propylene is on account of purity (http://www.icis.com/chemicals/propylene/price-reporting-methodology/). This eventually impacts the pricing. The ME is neutral regarding the grade of Propylene. **2nd response** Since the intent is manufacturing of PO so both in baseline and project high purity propylene is used. 2. The GHG emissions on account of baseline reagents include the production of Chlor-alkali and project reagents includes the production of H_2O_2 and methanol respectively.	1. As stated by the ME developer, the ME assumes and remain neutral with respect to the grade of the propylene and hence the not considering emissions associated with the propylene production in both the scenario is reasonable and appropriate. Further, in both the scenario the quality of the PO is assumed to be consistent and hence the grade of the Propylene can be considered neutral. **This point is closed.** 2. As clarified by the ME developer, the baseline reagents include mainly chlor-alkali and project reagents include H_2O_2 and methanol. The emissions associated with Chlor-alkali production in baseline scenario and H_2O_2 and methanol production in project scenario are included as evident from the GHG table in "Project Boundary" section of the ME, section 5. The same has also been assessed by the 1st VVB during its assessment and confirmed after raising CAR 1 for the inclusion of methanol. **Hence, this point is closed by assessment team.**

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
3. It is required to confirm if there are no other process emissions in production of PO as evident from the reaction equations. Hence, only emissions due to energy usage are considered to calculate baseline emissions.		3. The baseline emissions consist of embodied emissions in form of baseline reagents; process emissions due to energy usage (heat/electricity) and waste treatment.	3. The assessment team reviewed the HPPO process chemistry and it is verified that no further emissions are there from HPPO process which are significant and not considered in ME development. The emissions on account of baseline reagents; process emissions due to energy usage (heat/electricity) and waste treatment are already considered in the section 8 of the ME i.e. quantification of GHG emission reduction and removals. **This point has been closed by the assessment team.**
4. Please clarify how the specific steam consumption "SSC_{CHPO}" would be calculated or derived? Is the thermal energy of returned stream in boiler is considered in estimating the same.		4. It has been stated in section 9.1 of the methodology that the parameter SSC_{CHPO} corresponds to Specific thermal energy consumption ratio in the PO production through CHPO process expressed in terms of TJ/ton of PO and will be sourced from Independent third party report from industry wide recognized technology analysis consultants. It has also been indicated that steam consumption would be converted conservatively into energy terms using enthalpy values and accounting for any condensate return. **2nd response** The sections 8.1 and 9.1 have been made consistent with regards to the said parameters.	4. The ME explains the use of SSC_{CHPO} for the purpose of baseline emission calculation on account of consumption of steam/heat. However, the corresponding monitoring parameter as stated in the 9.2 is SC_{CHPO} is a total thermal energy being monitored and shall be used to derive SSC_{CHPO}. The ME has been consistently described with respect to this parameter for the determination of SSC_{CHPO}. **This point is closed.**

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
5. Is the waste generation in the process can be used as fuel in steam generator for meeting thermal energy requirements. If so then, the provision is not made to account for this heat in calculation of "$EF_{Steam,y}$" .		5. In case waste generation in the process is used as fuel for steam generation then the associated CO_2 emission factor will obviously be zero. **2nd response** Please refer to equation 6 as type 'i' refers to fuel type which shall be zero in case of waste energy usage.	5. As clarified by the methodology developer the equation to calculate emissions associated with the thermal energy generation mentions fuel type as "i", which means any fuel can be used. In case of use of waste energy use the emission factor would be considered as zero. Based on this clarification, **this point is closed.**
CL-2 Refer CL-1 raised above. In addition to that The revised ME does not clarify the rational for considering the same emission factor for thermal energy generation for baseline and project emissions.		As the project is a Greenfield project so the choice of fuel/source for thermal energy generation in baseline as well as project scenario is expected to be the same thereby resulting in same emission factor.	As clarified by the ME developer, the project activity always being the green field project (as per one of the applicability conditions), the choice of fuel for thermal energy generation in both the scenario be the same and it well justified. Hence, with this consideration, the emission factor of the fuel of project scenario would be used to determine both baseline and project emissions. This is also more appropriate as given the same fuel source; the difference in energy (thermal for this matter) consumption will be accounted for the emission reduction. **Hence, the clarification has been accepted by the assessment team and CL-2 is closed.**
CL-3 In baseline chlor-alkali i.e. (Chlorine and NaOH) can be generated by using NaCl (electrolysis of brine solutions). Otherwise NaCl has to be disposed off and this is contrary to assumptions made for applicability of methodology. In Project plant, H_2O_2 may be required to be outsourced and so also Methanol. Hence project activity may contain the leakage due to transportation. Please clarify.		The ME conservatively does not account for transportation of Chlor-Alkali in case of a Chlorohydrin plant non-integrated Chloro-alkali. In case of HPPO plant, the H_2O_2 plant is adjacently located as transportation of large quantities of H_2O_2 is techno-economically not viable. Please also refer to the detailed response regarding the same in the 1st VVB assessment report against CAR-2, point-3. Further regarding methanol, as it would	As the estimated quantity of H_2O_2 is not commercially viable for transportation and hence the H_2O_2 plant will be adjacent to the project activity so the leakage due to transportation has not been accounted. This clarification has been accepted by the assessment team. Further, the transportation of estimated quantity of H_2O_2 is also prohibitory and hence excluding the leakage emissions on account of transportation of H_2O_2 is well

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
		only be make-up quantity and is expected to be very minimal therefore has been neglected for simplification.	justified. The assessment team also reviewed the assessment report of the first VVB wherein it has raised CAR 2, which clarifies that the emissions due to transportation of the H_2O_2 is correct and appropriate with respect to the type of project activity. **Hence, CL-3 is closed.**
CL-4 The data and parameters available at validation stage are provided in tabular format. However, in some of the parameters the justification of choice of data or description of measurement methods and procedures are not described/mentioned. Please clarify.		The justification of choice of data or description of measurement methods and procedures has been described wherever possible. The parameters to be monitored as per the applied tool will depend upon the respective options chosen at project level. Thus only the tools have been mentioned rather than replicating the whole list from the applied tool. This is an accepted approach as can be seen from other approved CDM methodologies (e.g., ACM0002). Please also refer to 1st VVB assessment report, CL8, point 6. **2nd response** Please refer to section 8.1 of the ME wherein the following clauses are included: Independent third party reports - Such data corresponding to secondary sources must be from a recognized, credible source and must be reviewed by an appropriately qualified, independent organization or appropriate peer review group, or be published by a government agency.	The clarification request is raised with respect to some parameters in section 9.1, where the data source is third party independent report. The ME developer has clarified that the independent 3rd party reports as sources are included after the first assessment of the ME by the first VVB. The assessment team has reviewed the web hosted ME and the revised ME after first assessment and confirms that the same has been added during assessment and has been accepted. As the same is also in accordance with already approved CDM methodologies, and sources being most relevant and most reliable, **the CL 4 is closed.**
CL-5 It is required to explain using existing most appropriate methodology of similar sector under other GHG program that could not be reasonably be revised to		The existing CDM and VCS methodologies have been checked and none have been found to fully address the GHG emissions and emission reduction calculations associated with the project	The assessment team verified the GHG approved program like CDM and VCS to check for any other similar methodology under development or approved and could not find the same. The 1st VVB has also

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
meet the objective of proposed ME.		activity. Please refer to the 1st VVB assessment report, CL2, point 4.	confirmed the same and hence accepted the response of ME developer. **The CL-5 is closed.**
CL-6 It has been stated in applicability condition that Chlorohydrin-chlor-alkali (CH-CA) process must be identified as baseline. However, it is to be clarified if this should be Integrated Chlorohydrin-chlor-alkali process, where NaCl is generated as byproduct and is utilized to produce Chlorine and NaOH, which is used in CH-CA PO process and not the process where NaCl is generated as a byproduct and requires disposal. Also; why the other processes including co-oxidation of organic matter cannot be considered as baseline scenario. It is also required to be clarified as how the significant amounts of co-products generation affect the baseline identification?		There would not be much impact whether the baseline plant is integrated or the Chlor-alkali is separate. On the contrary for the later scenario the baseline would not be conservative. As in case of Chlorohydrin plant non-integrated with Chlor-alkali there will be additional transportation emissions. Moreover regarding NaCl, it would be a chicken and egg situation. The other process cannot be included owing to the other co-products. It is to be noted that the baseline alternatives must be able to deliver equivalent outputs or services. The other (co-) products will impact the baseline setting. PO is the only output intended. It is similar to saying that for a power (only) generation plant we take cogeneration plants also as alternative. Please also refer to 1st VVB assessment report CL3, point-1. **2nd response** As the upstream emissions on account of Chlor-alkali are accounted separately so integrated or non-integrated does not make a difference.	The assessment team accepts the response of ME developer, as consideration of CHPO process with integrated chlor-alkali plant will be resulting in conservative emissions reductions. In case of non integrated chlor-alkali plant NaCl generated in the process will have emissions due to disposal/transportation and hence will not be conservative. The other process to manufacture PO results in other by/side products apart from PO. Hence as per the consideration of only PO production process, this alternative cannot be considered further for baseline scenario identification, to which the assessment team agrees. This has also been assessed and reported by the first VVB consistently. **Hence CL-6 is closed.**
CL-7 As required by the VVM para 5.2.1, the ME should not create limiting conditions that restrict its use to a single or proprietary technology or approach. In the proposed new ME, the conditions are		Although the ME appears to be limiting in terms of technology/process however it is owing to the PO industry itself wherein there is limited technology/process available. Moreover, it can be noted that there can be variations within the process	As clarified by the ME developer, the limiting conditions are due to operational features/processes of the PO industry itself and the available technology / processes are limited. The assessment team also reviewed the Nexant Report

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
limiting the baseline scenario as well as project scenario to a single technology/process. Please clarify with respect to CH-CA as baseline scenario and HPPO as project scenario.		itself. Further, the limiting conditions also result in conservative baseline setting. For any change in the project setting there is always a possibility of revision or deviation. **2nd response** Any different process will require different set of equations thus condition 4 cannot be changed. Further please refer to the Nexant report.	and confirms that different process will require different equations. The assessment team is in agreement that the limiting conditions have resulted into the conservative estimation of the baseline emissions with a revision or deviation in future with a scope of improvement. **Hence, CL-7 is closed.**
CL-8 The steps / procedure prescribed for the identification of baseline scenario does not clarify how they take data availability, reliability and limitations in to consideration while identifying the baseline scenario.		The methodology does not prescribe any particular source or guideline for the third party. However for further clarity it has been included that the independent 3rd party should be an industry wide recognized technology analysis consultant. It will have to be assessed by the VVB at the time of project validation. Please refer to 1st VVB assessment report, CL 8, point-5.	The ME developer has made the provision in ME to check the credibility of data source used for estimation of baseline emission factors and further to arrive at baseline scenario by sourcing the data from independent 3rd party industry wide recognized technology analysis consultant. The report can be validated by the VVB at the time of the validation for its suitability, credibility and appropriateness for the candidate project under validation. Hence validation team confirms that the process establish to identify baseline scenario in ME is complete. The first VVB has also assessed the fact and confirmed the same by raising a clarification request. **The CL-8 is closed.**
CL-9 Clarify why can't ME include the additionality demonstration using both VCS (Project, performance or activity method) and CDM tool?		In the context of this ME which involves a new technology the project method is found to be more appropriate instead of the performance or activity method.	The assessment team accepts the option chosen by the ME developer to demonstrate additionality at project level, since the PO production technology is very specific in nature. **Hence, the CL-9 is closed.**
CL-10 It may be noted that the ME is not clear as		As section 9.1 represents data and parameters available at validation so it is	In real case project validation, the section of data and parameters available at the

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
which are the parameters that can be fixed ex ante. Hence, the parameters listed in section 9.1 of ME required to be explained if they will be fixed ex ante or monitored ex post (to be separated as may be required) along with parameters listed in section 9.1 of ME.		evident that the parameters in this section will be fixed ex-ante. Parameters which need to be monitored ex-post are indicated in section 9.2. The only exception will be in the case of options provided by the tools being applied. **2nd response** All the required parameters as per the applicable tools have been included in section 9.2.	time of validation may include values of some of the parameters that are to be monitored and but also available on estimated basis for the purpose of validation of estimation of baseline and project emissions. Based on the response provided by the ME developer, it is accepted that all the parameters listed in section 9.1 of the ME, will be fixed an-ante and those which are to be monitored are provided in section 9.2 of the ME. **Hence, CL-10 is closed.**
CL-11 ME does not specifically guide to use the default factors from publically available data source e.g. IPCC or published government data. Please clarify.		In the ME only the tools have been mentioned rather than replicating the same. This is an accepted approach as can be seen from other approved CDM methodologies (e.g., ACM0002). Please also refer to 1st VVB assessment report, CL8, point 6.	The project activity applying the proposed ME will follow the CDM approved tools which are prescribed by this ME and hence subsequently will use the national government approved data or IPCC data as may be called for. This has also been assessed and reported by the first VVB in consistency with the 2nd assessment. **Hence, the CL-11 is closed.**
CL-12 ME does not clarify to user on how to address any data uncertainty that may arise during ex post monitoring.		As the parameters are linked to the production process so the issue of data uncertainty is very limited. Moreover the cross-check measures are also indicated in the ME. **2nd response** Apart from the parameters such as emission factors which are linked to the respective tools, the other parameters (for e.g., POy, Soly etc.) are related to activity data. These activity data are linked to economic activity linked to price incentives and fiscal requirements leading to accurate accounting and thereby lower uncertainties. Please refer to section 6.2.4	The methodology developer has described the cross checking in the section 9.2 of the ME. Further, as clarified the monitoring parameters are linked to the economic activity i.e. production of PO and hence, the data uncertainty would be very low. However; in case of data uncertainty the cross checking data can be considered. **The CL-12 is closed.**

Draft report clarifications and corrective action requests by verification team	Ref. to checklist question in table 1	Summary of project participant response	Verification team conclusion
		of 'IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories'.	

5 ASSESSMENT CONCLUSION

BVCH has performed the second assessment of the proposed Methodology Element "Reduction of GHG emissions in Propylene Oxide production", with regard to the relevant requirements for VCS. The Methodology Element provides procedures for monitoring and calculating emission reductions associated with the manufacture of propylene oxide through HPPO process against the baseline practice of conventional Chlorohydrin Process. The proposed methodology belongs to Sectoral Scope 5 – Chemical Industries.

The methodology assessment was conducted using the VCS Standard, version 3.3, VCS Methodology Approval Process, version 3.4 and VCS Validation and Verification Manual, version 3.0 as the criteria. The BVCH followed guidance in the VCS Program Guide, version 3.4 and applied its professional judgment in assessing the proposed methodology. The reviews of the proposed Methodology element and the subsequent first assessment report have provided BVCH with sufficient evidence to determine the fulfillment of the stated criteria.

By description of the proposed Methodology element, the ME is applicable to project activities that involve synthesis of propylene oxide using Hydrogen Peroxide-based Propylene Oxide (HPPO) Technology which is able to reduce GHG emissions and waste generation during PO synthesis when compared to other processes. The GHG emission reductions are owing to usage of lesser GHG intensive reagents and reduced process energy requirements. Hence would result in reduction of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

The ME uses Project Method to demonstrate additionality and crediting baseline. The methodology element clearly establishes criteria and procedures for quantifying GHG emissions for the selected GHG sources, separately for the project and baseline scenarios. The methodology is also transparent on the criteria and procedures for quantifying net GHG emission, quantified as the difference between the GHG emissions from GHG sources relevant for the project and those relevant for the baseline scenario. BVCH verified VCS, CDM and GS websites, currently there is no approved or pending methodology under the VCS Program or an approved GHG program that could reasonably be revised to meet the objective of the proposed methodology.

In conclusion, it is BVCH's opinion that the proposed Methodology Element "Reduction of GHG emissions in Propylene Oxide production", as described in the ME, version 04 of 01-May-2013, meets all relevant VCS requirements. BVCH thus confirms that the Methodology Element is consistent with relevant VCS rules and procedures.

6 REPORT RECONCILIATION

BVCH received and reviewed the first VVB's final new methodology assessment report titled "First Methodology Element assessment report: Reduction of GHG emissions in Propylene Oxide production" version 1.3 dated 27 June 2013 after reconciliation of second assessment submitted to VCSA. As stated by first VVB, RINA, the editorial corrections done in the New ME after the second VVB assessment are appropriate and hence the final assessment report of the first VVB does not require reconciliation with the assessment report of the second VVB. Having reviewed the final first assessment report, BVCH confirms that no changes are required in the second assessment report with respect to the reconciliation with first assessment report. Only information updated in the second assessment report are version of the second assessment report and date of issuance.

7 EVIDENCE OF FULFILMENT OF VVB ELIGIBILITY REQUIREMENTS

BVCH is a DOE accredited by UNFCCC, reference number E-0009 /D11/ and a VVB with VVB ID 008 /D10/ accredited for sectoral scope 5. The eligibility of BVCH is demonstrated as per eligibility requirements provided in Table-1 of section 4.1 of Methodology Approval Process Version 3.4. The proposed methodology element falls under Non-AFOLU methodology elements. Hence as per the 1st requirement BVCH is eligible to perform assessment for the proposed ME which falls under sectoral scope 5.

As per 2nd requirement, it is required to demonstrate the completion of 10 project validations or methodology element assessment under the methodology approval process in the sectoral scope group applicable to the methodology element. The sectoral scope groups are determined in accordance with the ANSI project level groups to which the VCS sectoral scopes are mapped. The proposed ME falls under sectoral scope 5 and it is mapped under ANSI Sectoral Scope-2 i.e. GHG emission reductions for industrial processes (non-combustion, chemical reaction, fugitive and other) as per following VCS link http://v-c-s.org/scopes-mapped-to-ANSI

BVCH has 28 projects registered under ANSI Sectoral Scope 2 i.e. GHG emission reductions for industrial processes (Registered under CDM, which is approved GHG program). The ANSI scope 2 is mapped with following VCS sectoral scopes:

4 → Manufacturing industries	9 → Metal Production	11 → Fugitive emissions from industrial gases
5 → Chemical Industry	10 → Fugitive emissions from fuels	12 → Solvent use

List of projects completed by BVCH under above mentioned VCS (CDM) sectoral scopes and ANSI Scope 2.

Sr. No.	Project ID	Date of Registration	Title of the Project Activity
1	8983	24 Dec 12	Jiangxi Waste Energy based Captive Power Plants Project in Pinggang
2	9080	24 Dec 12	Xinjiang Huoerguosi gas pipeline compressor station waste heat recovery and utilization for power generation project
3	9119	23 Dec 12	"Flare gas recovery unit 105" project in MAA refinery, KNPC
4	8598	07 Dec 12	Nanba Associated Gas Processing Plant and the Auxiliary Engineering
5	6808	29 Nov 12	Recovery and Utilization of Associated Gas at Tugu Barat Plant
6	5138	29 Nov 12	Reduction of methane emissions in the gas distribution network of Armenia Republic

7	6730	26 Nov 12	Waste Heat Recovery CDM Project at Attock Cement Pakistan Ltd.
8	8053	07 Nov 12	Sichuan Golden-Elephant Sincerity Line 4 N2O Abatement Project
9	8052	07 Nov 12	Sichuan Golden-Elephant Sincerity Line 3 N2O Abatement Project
10	7913	02 Nov 12	Jinsheng Huyang Line 2 N2O Abatement Project
11	7917	02 Nov 12	Jinsheng Huyang Line 3 N2O Abatement Project
12	7912	02 Nov 12	Jinsheng Huyang Line 1 N2O Abatement Project
13	7900	01 Nov 12	Shanxi Hongxiang Coal Mine Methane Power Generation Project
14	7631	22 Oct 12	Junma N2O Abatement Project from Nitric Acid Production
15	7252	12 Sep 12	N2O reduction project at Fertial's nitric acid plant No. 2 at Annaba, Algeria
16	7251	11 Sep 12	N2O reduction project at Fertial's nitric acid plant No. 1 at Annaba, Algeria
17	5369	12 Jul 12	Hebei Huafeng Coking Gas Recovery for Power Generation Project
18	6006	28 Jun 12	Installation of Natural gas based combined cooling heating and power (CCHP) systems in DLF Silokhera in Gurgaon, India
19	6306	30 May 12	N2O reduction project at the nitric acid plant of Global Ispat Koksna Industrija d.o.o. Lukavac ("Gikil"), Bosnia.
20	5824	06 Mar 12	Utilization of LCV (Low Calorific Value) waste gas for energy generation project at Chanderiya, Rajasthan
21	5489	28 Dec 11	Yunnan Kunsteel Coking Co., Ltd. CDQ Project
22	4098	25 May 11	Shanxi Herui Coal Mine Methane Power Generation Project

23	3706	17 Jan 11	Emissions reduction through partial substitution of fossil fuels with renewable plantation biomass and biomass residues in CEMEX Assiut Cement Plant
24	4262	23 Dec 10	Energia Verde Carbonization Project - Mitigation of Methane Emissions in the Charcoal Production of Grupo Queiroz Galvão, Maranhão, Brazil
25	3712	10 Nov 10	CCIL - Waste Gas based Electricity Generation Project
26	3213	09 Nov 10	Gul Ahmed Combined Cycle Gas Turbine Project
27	2818	19 Sep 10	Pingdingshan Coal (Group) Company Chaochuan Mine 6*2MW Coke Oven Gas Cogeneration Project
28	2095	19 Nov 09	Henan Nanyang Zhenping Cement Waste Heat Recovery and Utilization for Power Generation Project

As demonstrated in the table above, BVCH fulfills the eligibility requirement as set out in Methodology Approval Process version 3.4.

8 SIGNATURE

Signed for and on behalf of:

Name of entity: *Bureau Veritas Certification Holding SAS*

Signature: 

Name of signatory: *Matthieu Martini*

Date: *29/06/2013*

Name of entity: *Bureau Veritas Certification India Pvt. Ltd.*

Signature: 

Name of signatory: *Sanjay Patankar*

Date: *29/06/2013*