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VCS Methodology Element Assessment Report as First Validator

Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles

Report for Ecofrotas

DNV report number: 2011-9228
Revision 01

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VCS METHODOLOGY ELEMENT ASSESSMENT REPORT

Date of first issue: 2 July 2011	Project No.: PRJC-286392-2011-CCS-BRA
Approved by: Miguel Rescalvo Santandreu Regional Manager Americas	Organizational unit: DNV Climate Change and Environmental Services
Client: Ecofrotas	Client ref.: Natalia Pasishnyk

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Name of Methodology: Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles

Version: 01

Assessment Phases:

☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues

Assessment Status

☐ Corrective Actions Requested
☐ Clarifications Requested
☒ Full Approval by DNV
☐ Rejected

In summary, it is DNV's opinion that the proposed VCS methodology element "Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles," as described in version 01 of 11 April 2011, meets all relevant VCS requirements for VCS methodology elements. Therefore, DNV recommends the methodology element for approval and requests that VCSA approve the methodology element.

Note:

DNV reviewed the version 01 of 02 December 2011 of the proposed VCS methodology element and the support tool "Tool to use Real Option Analysis (ROA) in Fuel Switch Projects" (version 01 of 06 November 2011) and the after the methodology element finishes its assessment by the second validator. DNV confirmed that all the conclusions in this report are still valid. DNV thus recommend the methodology element of version 01 of 02 December 2011 and the support tool of version 01 of 06 November 2011 for approval.

Report No.: 2011-9228	Subject Group: Environment
Report title: Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles	
Work carried out by: Kyle Silon, Yuri Poudayel, Weidong Yang, Javier Hernández Hernández, Eduardo Camilo	
Work verified by:	

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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CL	Clarification Request
DNV	Det Norske Veritas
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
ME	Methodology Element
MED	Methodology Element Documentation
NCV	Net Calorific Values
PD	Project Document
ROA	Real Option Analysis
VCS	Verified Carbon Standard
VCSA	VCS Association
VCU	Verified Carbon Unit

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1 ASSESSMENT STATEMENT

DNV Climate Change Services AS (DNV) has performed an assessment of the proposed Verified Carbon Standard (VCS) methodology element, "Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles." The assessment was performed on the basis of VCS criteria for methodology development.

The review of the methodology element documentation and the subsequent follow-up interviews has provided DNV with sufficient evidence to determine the fulfillment of the stated criteria.

The methodology element (ME) was prepared based on the requirements of VCS Version 3 and Methodology Approval Process Version 3.

The methodology element belongs to the sectoral scope of transport.

In summary, it is DNV's opinion that the methodology element "Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles," as described in the Methodology Element Documentation (MED) of version 1.0 of 11 April 2011, meets all relevant VCS requirements for VCS methodology elements. Therefore, DNV recommends that VCSA approve the methodology element.

2 INTRODUCTION

Ecofrotas has commissioned DNV Climate Change Services AS (DNV) as the first validator to perform an assessment of the methodology element "Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles." This report summarizes the findings of the assessment of the methodology element, performed on the basis of VCS criteria for methodology elements. VCS criteria refer to VCS 2007.1 and the subsequent VCS Program Normative Documents /2//3/.

3 METHODOLOGY

The assessment consisted of the following three phases:

1. A desk review of the new methodology.
2. Follow-up interviews.
3. Resolution of outstanding issues and the issuance of the final assessment report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the New Methodology

The documentation that was reviewed during the assessment is shown below:

/1/	Keyassociados and Ecofrotas, Methodology element documentation "Complete substitution of gasoline and its blends by ethanol in commercial fleets of flex-fuel vehicles", version 1.0 of 20 October 2010, version 1.0 of 11 April 2011.
/2/	VCSA, Verified Carbon Standard, version 3.0, 8 March 2011.
/3/	VCSA, Methodology Approval Process, version 3.0, 8 March 2011.
/4/	CDM EB, Combined tool to identify the baseline scenario and demonstrate additionality, version 02.2.
/5/	IPCC, 2006 IPCC Guidelines on National GHG Inventories.

3.2 Follow-up Interviews

	Date	**Name**	**Organization**	**Topic**
/6/	February – April 2011	Natalia Pasishnyk	Keyassociados	1. Methodology element's eligibility criteria. 2. Baseline approach and additionality. 3. Project boundary. 4. Emissions, including leakage. 5. Monitoring, data and parameters.
/7/	February – April 2011	Rodrigo Somogyi	Ecofrotas	
/8/	February – April 2011	Daniel Ribeiro Menna	Ecofrotas	

3.3 Resolution of Outstanding Issues

The objective of this phase of the assessment was to resolve any outstanding issues that needed to be clarified prior to DNV's positive conclusion on the methodology element. The assessment findings relate to the methodology element as documented and described in the initial MED /1/.

In order to ensure transparency, the issues raised and the ME developer's response are documented in Appendix A.

Findings established during the assessment can either be seen as a non-fulfillment of VCS criteria or where a risk to the fulfillment of ME objectives has been identified. Corrective Action Requests (CARs) are issued where:

- Mistakes have been made that have a direct influence on the methodology application.
- VCS-specific requirements have not been met.

A Clarification Request (CL) may be used where additional information is needed to fully clarify an issue.

Table 1 - Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests	Summary of methodology element developer response	Assessment conclusion
If the conclusions from the draft assessment are either a CAR or a CL, these should be listed in this section.	The responses given by the methodology element developer during the communications with the assessment team should be summarized in this section.	This section should summarize the assessment team's responses and final conclusions.

3.4 Internal Quality Control

The assessment report underwent a technical review before DNV approved the methodology element. The technical review was performed by a qualified technical reviewer in accordance with DNV's qualification scheme.

3.5 Assessment Team

Listed below are the members of the assessment team, their roles, and the nature of their involvement.

Role/Qualification	***Last Name***	***First Name***	***Type of involvement***					
			Desk review	Interviews	Reporting	Supervision of work	Technical review	Expert input
Project Manager	Silon	Kyle		√		√		
Project Manager	Poudayel	Yuri		√		√		
VCS Validator	Yang	Weidong	√	√	√			
Sector Expert (transport)	Hernández Hernández	Javier						√
Sector Expert (finance)	Camilo	Eduardo						√
Technical Reviewer	Warmerdam	John					√	

4 ASSESSMENT FINDINGS

The findings of the assessment are stated in the following sections. The final assessment findings relate to the methodology element as documented and described in the revised MED.

4.1 Applicability Conditions

The eligibility criteria for the methodology element are clearly defined in the MED. DNV was able to confirm that the eligibility criteria were appropriate and that adequate requirements for the project technology, resulting changes due to project activities, existing operation conditions prior to project activities, avoidance of potential double counting and legal requirement are all defined clearly and properly. The eligibility criteria were defined as shown below /1/:

- Applicable to project activities that aim at complete substitution of fossil fuels or blends of gasoline by ethanol in commercial fleets.
- Applicable to commercial fleets that consist exclusively of flex-fuel vehicles.
- In the baseline scenario, the vehicles use gasoline or a blend of any proportion of ethanol and gasoline (0-100%).
- In the project scenario, the vehicles use exclusively ethanol; up to 3% of gasoline can be used in the start-up mechanism as required by the flex-fuel motor technology.
- Consumption of ethanol by each vehicle of the commercial fleet within the project boundary is monitored constantly. In case of indirect monitoring, the system shall guarantee that in at least 95% of cases (transactions), the fuel used in the project activity is ethanol.
- Gasoline, ethanol and their blends comply with national regulations and ethanol is produced from renewable resources.
- No legal requirement exists to use exclusively ethanol fuel in commercial fleets in the relevant national market and, if such a requirement exists, it is not effectively enforced.
- If the project proponent is not the owner of the commercial fleet vehicles (e.g. the project proponent is a fleet manager with many clients, each client being the owner of its respective commercial fleet vehicles), a contract between the project proponent and each fleet owner shall be implemented that establishes clear ownership of the emission reductions;
- According to the CDM baseline and monitoring methodologies related to the biofuel production (i.e. AMS.III-T, AMS.III-AK, and AMS.III-AQ discussed above), “the retailer, the final users, and the producer are bound by a contract that states that the final consumers and retailers shall not claim emission reductions resulting from its consumption.” Therefore, to avoid the possibility of double-counting, the contract referenced in the previous item shall include a clause stating that the commercial fleet owner must not participate in any other emission reductions project associated with a biofuel producer or retailer (in order to prevent the fleet’s fuel consumption from being claimed more than once). Only the commercial fleet owner or manager can claim emissions reductions under this methodology

4.2 Project Boundary

The project's physical boundary is clearly and properly defined as the flex-fuel vehicles from the project's commercial fleets, as well as all the gas stations used by the project's commercial fleets. The sources and types of gases included are also clearly and properly defined in the MED /1/; the justification to include or exclude certain type of gases is reasonable.

4.3 Procedure for Determining the Baseline Scenario

The procedures for determining the baseline scenario were properly defined, as summarized below:

- Stratify the project area into various project regions (strata).
  Requirements and guidance were provided in the MED on how to conduct the stratification. Two approaches, hierarchical methods and distance measure, are described. DNV could confirm that stratification of the project area properly took into account the fact that different regions included in the project boundary may have different baseline scenarios. In addition, the requirements and guidance related to the stratification are clear and proper, and allow project participants to correctly conduct stratification.

- Baseline scenarios are to be determined for every commercial fleet with regard to the determined project regions, following steps defined in the "*Combined tool to identify the baseline scenario and demonstrate additionality*" /4/. The steps are described below:
  - Identification of alternative scenarios to the proposed VCS project activity that is consistent with current laws and regulations.
    Typical scenarios were defined in the MED, including the continuation of the current practice and the project scenario without a carbon credits incentive.
  - A barrier analysis was conducted to eliminate alternatives to the project activity that face prohibitive barriers.
    Use of the "Step 2 - Barrier analysis" of the "*Combined tool to identify the baseline scenario and demonstrate additionality*" is required for the barrier analysis. In addition, the MED provided specific guidance for economic barriers, that is, Guidelines to use Real Option Analysis (ROA) in Fuel Switch Projects. The guidelines were attached to the MED, with references, to help apply the guidelines.
  - If there is more than one alternative scenario remaining, the alternative with the lowest emissions (i.e., the most conservative) shall be selected as the baseline scenario.

4.4 Procedure for Demonstrating Additionality

The MED required that additionality be demonstrated by applying the latest version of the combined tool to identify the baseline scenario and demonstrate additionality /4/. Specifically, the MED required that the *Tool to use Real Option Analysis (ROA) in Fuel Switch Projects* must be used when an economic barrier approach is chosen in the barrier analysis. DNV could confirm

that the justification to use ROA for the project applying the MED is acceptable as below, and hence the ROA is a proper approach to be used in the additionality assessment.

- Flex-fuel vehicles provide the owners with the flexibility to choose fuels at each refueling. The owners are to choose fuels based one the current price of fuels.
- A choice to adopt just one fuel in a flex-fuel vehicles faces an economic barrier if the adopted fuel is temporarily or permanently more expensive.
- The lost option to choose cheaper fuel has its specific value, which can be determined according to the ROA approach, not by traditional valuation methods such as discounted cash flow.

It is DNV's opinion that this approach to demonstrate additionality is correct.

4.5 Emissions Reductions

DNV checked all of the assumptions for baseline emissions, project emissions, and leakage and was able to confirm that they are acceptable. All the equations and parameters for calculating baseline emissions, project emissions, and leakage can also be confirmed as being proper.

4.5.1 Baseline Emissions

The baseline emissions consist of emissions from fossil fuel combustion by the commercial fleet that would have occurred in the baseline scenario. Steps to determine the baseline emissions are described below:

- The emissions from fossil fuel (gasoline) combustion were determined by multiplying the gasoline consumption in the baseline scenario with the corresponding emission factor of gasoline.
- The gasoline combustion in the baseline scenario was calculated by multiplying the ethanol consumption in the project scenario with two factors: the baseline fuel consumption pattern and the conversion factor between gasoline and ethanol. The conversion factor converts the ethanol consumed in the project scenario to an equivalent amount of fossil fuel (mixture of gasoline and ethanol) that would have been consumed in the baseline scenario by properly assuming that the same amount of net calorific values (NCV) are needed for the same services provided by the commercial fleet. The baseline fuel consumption pattern simply changes the fossil fuel (mixture of gasoline and ethanol) consumption to gasoline consumption. The baseline fuel consumption pattern was estimated by either analyzing available historical data or referring to data from the same cluster (stratum).
- The MED provided two approaches to estimate emission factors of gasoline: Option A and Option B, with Option A defined as the preferred approach. Both options are generally accepted methods for estimating emission factors. Option A is based on the chemical composition of gasoline to calculate an emission factor of the gasoline, while Option B is based on the NCV of gasoline and the emission factor per NCV. DNV can confirm that these two approaches are proper.

Data and Parameters Available at Validation

The fraction of gasoline in the fuel consumption pattern in the baseline scenario for the project region is determined *ex-ante*. The method for determining this parameter is to divide the total quantity of gasoline for a fleet consumed in baseline scenario by the corresponding total quantity of fuels for a fleet consumed in the baseline scenario. Historical values before project start should be used for the calculation of the parameter. In case, no historical data is available for a fleet, the historical data of a comparable fleet located in a similar region need to be used.

DNV can confirm that the parameter is proper to be determined *ex-ante* and the method to determine the value of the parameter is acceptable.

4.5.2 Project Emissions

The project emissions are generated by emergency gasoline consumption in the project scenario. The project emissions are calculated by multiplying the gasoline consumption with the corresponding gasoline emission factor. The emission factor was estimated using the same approaches described in Section 4.5.1. DNV can confirm that the project emission calculations are proper.

4.5.3 Leakage

No leakage emissions need to be considered for the MED. DNV can confirm this was acceptable, as justified in the response to CAR 5 in Appendix A of this report.

4.5.4 Quantification of Net Greenhouse Gas Emission Reductions

The net greenhouse gas (GHG) emission reductions are calculated by subtracting the project emissions from the baseline emissions. DNV can confirm that this approach was acceptable.

4.6 Monitoring

The activity parameters to be monitored for emission reduction calculations are defined appropriately and clearly listed in the MED, which will ensure that the emission reductions from the project activity be estimated properly. The activity parameters to be monitored and the corresponding monitoring methods are as follows:

- Ethanol consumption for a commercial fleet in a year:

  To be monitored through direct or indirect measurement of fuel quantity and type. The measurement frequency is every transaction.

  For direct measurement, the measurement instrument needs to be calibrated following the manufacturer's specification. For indirect measurement, the measurement approaches, such as fuel purchase invoices, is defined in the MED properly; in addition, the system of measurement and registry of data shall statistically guarantee that the data obtained, processed and registered satisfies 95% confidence interval.

- Weighted average net calorific value in a year (gasoline and ethanol):

  Three options for obtaining the values for these parameters are provided in the MED, including obtaining from the fuel supplier, measurement by the project participants, or from IPCC default values /5/. Monitoring frequency is defined for each option; conditions to use each option are defined as well.

- Weighted average mass fraction of carbon in gasoline in a year:

Two options for obtaining the value for the parameter are provided in the MED, including obtaining from the fuel supplier or measurement by the project participants. Monitoring frequency is defined for each option; conditions to use each option are defined as well.

- Weighted average density of gasoline in a year:

  Three options for obtaining the values for the parameter are provided in the MED, including obtaining from the fuel supplier, measurement by the project participants, from regional or national default values. Monitoring frequency is defined for each option; conditions to use each option are defined as well.

- Weighted average CO_2 emission factor of gasoline:

  Four options for obtaining the values for these parameters are provided in the MED, including obtaining from the fuel supplier, measurement by the project participants, or from regional or national default values, or from IPCC default values /5/. Monitoring frequency is defined for each option; conditions to use each option are defined as well.

Quality assurance measures have also been properly prescribed for all major monitoring activities to further ensure the accuracy and reliability of the emission reduction estimates. It is DNV's opinion that the defined quality assurance measures correctly cover areas such as calibration of monitoring equipment, statistic confidence interval, verifying uncertainty range of obtained values, and accreditation requirement for laboratory.

4.7 Data and Parameters

Both monitored and unmonitored data and parameters used in the emissions calculations are defined in the MED clearly and appropriately, making it possible for the emission reductions to be estimated and verified.

The data unit, description, and sources of data for each parameter are described clearly. The monitored parameters include those related to the project activity level and the specific properties of fuels, such as consumption of ethanol, net calorific value, mass of fraction of carbon, density, and emission factor. The un-monitored data include fraction of gasoline in the fuel consumption pattern in the baseline scenario for the project region.

4.8 Adherence to the Project-level Principles of the VCS Program

The MED was developed in line with the project-level principles of VCS 2007.1, as elaborated above. It is also deemed by DNV that the principles of relevance, completeness, consistency, accuracy, transparency, and conservativeness are properly addressed in the MED.

4.9 Relationship to Approved or Pending Methodology

The relationships of the MED to approved or pending methodologies under the VCS program and CDM were thoroughly analyzed in the MED. No similar methodologies were found. Therefore, DNV can confirm that the MED is eligible for application as a new VCS methodology.

4.10 Comments by Stakeholders

DNV reviewed the comments and responses as described below, and is of the opinion that the methodology developer has taken due account of all comments submitted and that all of the responses from the project developer are adequate.

KeyAssociados & Ecofrotas' Response to the public comments received (*italic*)

Comment 1

Submitted By: Thales West
Organization: Independent
Country: Brazil
This comment was received via email by the VCS Association.

For whom it may concern, Public comments on: Methodology for Complete Substitution of Gasoline and its Blends by Ethanol in Commercial Fleets of Flex-fuel Vehicles, Keyassociados and Ecofrotas: http://www.v-c-s.org/methodology_sgbe.html. As far as I'm concern the gasoline vs. ethanol prices aren't stable enough so a long-time based project could guarantee its additionality during its life-time (ethanol could become economically more interesting than gasoline).

Prices of both ethanol and gasoline are not stable; the flex fuel technology allows the consumer to choose the cheaper fuel each time he fills the car. The proposed approach (ROA) takes in consideration historical price fluctuations as well as historical consumption pattern in the project region; therefore it addresses the key questions of additionality. The eligible projects must guarantee that they will give up the option of choice in the result of the project activity (i.e. can fill their flex-fuel car only with ethanol), therefore the approach that calculates the value of this lost option in the specific project region reality results in precise assessment of additionality.

DNV's comment: The additionality is demonstrated at the project level and that this methodology only reflects the approach to be followed. Project developer will have to demonstrate that at the time of decision making the project is not the most attractive scenario for the crediting period. Assumptions and historical data will be checked by the validator of the project to confirm that the data used is conservative and represents the most likely scenario analysis when it comes to analyze the attractiveness of a project. Furthermore, the methodology requires conducting a sensitive analysis to model possible variations of the hypothesis done for the crediting period.

Also, there is already a strong pressure by the community/market to organization reduce their carbon footprint and, one way to do that, would be exactly use ethanol in the vehicles (especially in countries where flex-fuel vehicle are, in general, preferred than non flex-fuel ones), that is why I consider this methodology could become a simple instrument to improve profits with no great efforts beyond the ones that would be already taken by simple sustainability strategies and environmental concerns. It does not changes habits nor contribute to clean development (unless it is implemented in countries where flex-fuel vehicles are not used), it also doesn't implicate in significant risks to the project entity and, I'm guessing, the monitoring plan could be easily rigged.

Improving of profits is not possible under the project activity because the PP [...shall present to DOE a clear result of the value of the switch option from the baseline scenario and demonstrate objectively how this switch option will be lost with the project activity undertaken and, therefore, the project activity without the VCS benefits would not be financially attractive.]

The QA/QC monitoring procedures are based on all confidence level requirements of UNFCCC: [If direct measurement is used, the respective equipment shall be regularly calibrated following the manufacture specification. If indirect measurement is used, the system of measurement and registry of data shall statistically guarantee that the data (variables of type and quantity of fuel consumed) obtained, processed and registered satisfies 95% confidence interval.] The reliability of monitoring plan of the PP will be assessed by specialized DOE during the project validation process.

DNV's comment: The additionality assessment of a project based on the proposed methodology will address the issue of "simple instrument to improve profits…" DNV's review of the monitoring plan included QA/QC procedures as described above in Section 4.6 and can confirm that the monitoring plan required in the proposed methodology is acceptable.

Comment 2

Submitted By: Warwick Manfrinato
Organization: Plant Environmental Intelligence
Country: Brazil
This comment was received via email by the VCS Association.

1. There is a strong weakness in the proposed document as it does not point a leakage analysis. In principle, it is my belief that no project based activity or system is leakage-free.

It was explained during the DOE's assessment in the CAR#5, as follows: "As per applicability conditions, project boundary contains commercial fleets that consist exclusively of flex-fuel vehicles. Therefore, in the baseline scenario the same flex-fuel cars would have been used. If the host country possesses flex-fuel fleets, it means that both fuels are available at the gas stations in the host country independently of the consumer's choice, and no extra transportation of fuels due to the project activity is needed. Therefore, the project activity does not imply in leakage, and no leakage emissions are considered in this methodology".

DNV's comment: As in the review of CAR 5, DNV can confirm there is no need to consider leakage when applying this proposed methodology.

2. In this case, it should not be different. Based on the fact that emissions outside the project boundaries, caused by project activities will be fully possible. To pose a negative assumption to that, project proponent would have to demonstrate the nexus between its proposed activities and the reduction of consumption of gasoline in the region, outside its fleet or even worse in the country of interest. Thus, methodology would have to include a mechanism that demonstrate the reduction of use of gasoline the proposed project is actually achieving and that it is also not being used by others outside the project. This would entail, necessarily, the involvement of the refinery plants responsible for the gasoline consumed by project proponents of such methodology, demonstrating that it has reduced its production of gasoline due to the project itself. Of-course that crude arriving at the refinery could be shipped elsewhere for production of gasoline, but this could be an acceptable limit for leakage analysis.

The project boundary is the commercial fleet that is implementing the project activity (not using gasoline anymore) and the gas stations of the Host Country, independently of the project activity will continue having both fuels available for sell. The fossil fuel consumption inside the project boundary will be reduced to zero (except in cases gasoline has to be used in a different section of the motor) and it has no relation with the productive/logistical process of each fuel.

DNV's comment: As in the review of CAR 5, DNV can confirm there is no need to consider leakage when applying this proposed methodology.

3. It also could be argued that the production of gasoline has been increasing steadily over the years in the region of project, since the moment that a steady-state use of ethanol occurred. A much more complex analysis is needed to be possible to identify the additionality level that a fleet exchange of fuel consumption would have today.

During the validation, the DOE will critically assess the evidences presented in the VCS-PD as a support for additionality assessment according to the "CDM Combined tool to identify the baseline scenario and demonstrate additionality". The DOE will use its Sectoral and financial expertise to .define whether further explanation or a more complex analysis is required.

DNV's comment: The additionality assessment of a project based on the proposed methodology will address this issue.

4. Therefore, the baseline analysis needs to take in consideration the reduction of emissions due to the ethanol use in the country fleet has taken place in the initial years of the introduction of a new fuel in the system. We believe that it is very difficult to demonstrate – by methodology based on additionality criteria – i.e. that emission reductions can be accounted for by simple comparison of change in fuel 2 consumptions. This would be the case for Brazil, where we assume this methodology was born. Whereas we believe in the benefit of use of ethanol in emission reductions, we also believe this methodology needs improvement in concept to make possible the desired benefit to be achieved.

The baseline scenario will be based on historical data as it is not possible to forecast the fuel consumption of gasoline and ethanol in a future scenario, so the parameter "Fraction of gasoline in the fuel consumption pattern in project region, in the baseline scenario ($F_{gas,R,y}$)" is calculated ex-ante and applied to the whole crediting period.

DNV's comment: The baseline selection of a project based on the proposed methodology will address this issue.

4.11 Evidence for DNV's Fulfillment of Eligibility Requirements

DNV Climate Change Services AS (DNV) has accreditation of performing validation for all of the 15 sectoral scopes under CDM. DNV, therefore, is eligible under the VCS Program to perform assessments for the MED, which falls under the sectoral scope of transport.

According to VCS sectoral scopes mapped against ANSI project level groups, the sectoral scope of transport belongs to ANSI Group 1, "GHG emission reductions from fuel combustion," which covers the following VCS sectoral scope:

- 1. Energy Industries (renewable/non-renewable sources).
- 2. Energy distribution.
- 3. Energy demand.
- 4. Manufacturing industries.
- 6. Construction.
- 7. Transport.

DNV has completed validation of more than 10 registered CDM projects under ANSI Group 1; 10 of these projects are listed in the table below.

Name of Project	Date Validation Report was Issued	Date Project Was Registered	Name of the GHG Program
BRT Bogotá, Colombia: TransMilenio Phase II - IV	21 September 2006	7 December 2006	CDM

Modal Shift from Road to Train for transportation of cars	29 September 2010	4 February 2011	CDM
Kuyasa low-cost urban housing energy upgrade project, Khayelitsha (Cape Town; South Africa)	28 June 2005	27 August 2005	CDM
Moldova Biomass Heating in Rural Communities	5 December 2005	20 January 2006	CDM
Moldova Energy conservation and greenhouse gases emission reduction	12 December 2005	29 January 2006	CDM
Reduction in steam consumption in stripper reboilers through process modifications	4 March 2006	2 June 2006	CDM
Improvement in Energy Consumption of a Hotel	25 September 2006	18 November 2006	CDM
Optimization of steam consumption by applying retrofit measures in blow heat recovery system	11 September 2006	24 December 2006	CDM
Optimization of steam consumption at the evaporator	29 September 2006	12 January 2007	CDM
GHG emissions reduction through the installation of energy efficient vacuum creating system in the vacuum distillation column of petroleum refinery	18 December 2006	1 April 2007	CDM

APPENDIX A

RESOLUTION OF CORRECTIVE ACTION AND CLARIFICATION REQUESTS

Clarifications and corrective action requests by assessment team	Summary of methodology developer response	Assessment team conclusion
CAR 1 Project Boundary The following issues need to be corrected: 1. Guidelines/examples need to be given to facilitate the determination of whether the project is "homogeneous in terms of availability and prices of fuels" and when "stratification" is necessary. 2. Guidelines/examples need to be given to facilitate the determination of what constitutes "credible historical data" and a "compatible environment" with regard to historic fuel use data.	1. Conditions and procedure of stratification have been changed. The stratification is obligatory and requires application of clustering analysis (see changes in the methodology). 2. "Credible historical data" was changed to "historical data", and aligned with a CDM approach, e.g. ACM0012. "Compatible environment" was changed to "the same cluster."	DNV reviewed the changes and could confirm that the changes resulted in the MED being applied properly. The CAR was closed.
CAR 2 Procedure for Determining the Baseline Scenario The following issues need to be corrected: 1. The purpose of Step 1 is to identify all of the alternative scenarios; hence, in the description of "Any other scenarios as applicable to the specific regional and project contexts could also be considered," "could" needs to be changed to "shall." 2. It is described that "The evidence of non-compliance shall be estimated based on the procedure given in the second bullet under applicability conditions." However, the second bullet under applicable conditions does not address this issue.	1. "Could" was changed to "shall." 2. The referenced phrase was deleted. 3. The referenced phrase was changed to "the proposed project activity." 4. Flex cars provide the owner with the flexibility to choose fuels at each refueling stop, depending on their current price. A choice to adopt just one fuel in a flex-fuel car faces an economic barrier if the adopted fuel is temporarily or	DNV reviewed the changes and could confirm the following: 1. The change is acceptable. 2. The deletion is acceptable. 3. The change is acceptable. 4. The justification gives detailed information for the appropriateness of the tool; the justification is acceptable. 5. The step chosen is acceptable as justified in the response. The CAR was closed.

3. Description of "CDM project activity" is not relevant. 4. Justification needs to be given (not necessarily in the proposed methodology; it can be given in this document) of why the attached "Tool to use Real Option Analysis (ROA) in Fuel Switch Projects" is appropriate to be used for assessing an economic barrier. 5. As per the CDM tool "Combined tool to identify the baseline scenario and demonstrate additionality," which is referenced in the proposed methodology, economic barrier analysis belongs to Step 3, "investment analysis," not Step 2, "barrier analysis" as described in the proposed methodology.	permanently more expensive. The lost option to choose cheaper fuel has its specific value. According to BASTIAN-PINTO (*attached*), the analysis of the flexibility of the flex-fuel car is a real options problem which cannot be modeled by traditional valuation methods such as discounted cash flow methods. The investment (car) is irreversible, since it is partially lost in case the consumer decides to resell his car, since the resale price is generally lower than the dealer price. There is uncertainty about the future behavior of fuel prices, and finally, there is flexibility to choose the fuel which has a better cost-benefit relation each time the car needs to be filled up. These three conditions require that option pricing methods be used when valuing the advantages of a flex fuel car. The option to choose fuels is a classic switch option, where there is flexibility to switch between gasoline and ethanol. Therefore, the real option analysis (ROA) is appropriate to analyze the economic barrier of using exclusively renewable fuel in flex fuel cars that allow for gas use as well.	

	5. "Investment analysis" presupposes existence of the fact of investment in the project activity. The investment decision (acquisition of flex or non-flex fuel car) is not covered by the proposed methodology: as per applicability conditions, the methodology is applicable only when flex-fuel cars are used BOTH in the baseline scenario and in the project activity. As explained in Item 4 above, the flex fuel car operator opts for either gas or ethanol at each refueling stop. Each refueling decision cannot be considered an investment as per the definition above. Therefore, as there is no evidence of an investment in the proposed methodology, Step 3 is not applicable, and the identified barrier belongs to Step 2.	
CAR 3 Baseline Emissions - 1 The following issues need to be corrected: 1. The "similar region" under Section 8.2 needs to be defined. 2. The "reference period" under Section 8.2 needs to be defined.	1. "Similar region" was changed to "the same cluster." 2. "Reference period" is a historical period just before the project activity, during which the baseline consumption pattern was constructed.	DNV reviewed the changes and could confirm that the following: 1. The change and the relevant explanation in the MED made the concept clearer and be properly applied. 2. The explanation given to reference period is clear and can

		allow the concept to be applied properly. The CAR was closed.
CAR 4 Baseline Emissions - 2 The fuel consumption part of equation (2) is not correct, as shown below by expanding the parameter (F), "Fraction of gasoline in the annual fuel consumption in the baseline scenario in project region" and parameter (T) "conversion factor between gasoline and ethanol in project region:" Gasoline consumption (L) = Ethanol consumption (project) (L) * [Total Gasoline consumption (baseline) (L) / Total fuel consumption (gasoline + ethanol) (baseline) (L)] * [NCV of gasoline (GJ/L) / NCV of ethanol (GJ/L)] The ethanol consumption should be divided by parameter T instead of being multiplied by it. NCV of gasoline (GJ/L) should be changed to NCV of mixture of gasoline and ethanol in baseline scenario (GJ/L)	The formula was corrected (see methodology).	DNV reviewed the changed formulae and could confirm the changed formulae were correct for calculating the baseline emissions. The CAR was closed.
CAR 5 Leakage A justification of why "No leakage emissions are considered in this methodology" must be provided (not necessarily in the proposed methodology; it can be given in this document).	As per applicability conditions, project boundary contains commercial fleets that consist exclusively of flex-fuel vehicles. Therefore, in the baseline scenario the same flex-fuel cars would have	DNV could confirm that "no leakage" was acceptable for the MED as the project activity based on the MED will not cause more emissions outside the project boundary compared with the baseline scenario.

	been used. If the host country possesses flex-fuel fleets, it means that both fuels are available at the gas stations in the host country independently of the consumer's choice, and no extra transportation of fuels due to the project activity is needed. Therefore, the project activity does not imply leakage, and no leakage emissions are considered in this methodology.	The CAR was closed.
CAR 6 Data and Parameters not Monitored The following parameters cannot be listed under this section, as they need to use monitored data to be calculated: COEFgas,y Tff,R,y	The referenced parameters were moved to section "Data and Parameters Monitored."	The two parameters have been properly added to the section "Data and Parameters Monitored" in the revised MED. The CAR was closed.
CAR 7 Data and Parameters Monitored - 1 Editorial problems under this section and throughout the document need to be corrected.	Editorial problems were corrected.	DNV checked the revised MED and could confirm that all the editorial problems have been properly fixed. The CAR was closed.
CAR 8 Data and Parameters Monitored – 2 1. For the measurement of ethanol consumption by the commercial fleet (FC ethanol,i,R,y), it is described under this section "Direct or indirect measurement of fuel quantity and type." This description is not clear and needs to provide a specific description of the	1. The definitions of direct and indirect measurement of fuel consumption in the project activity were added to "Definitions" section. 2. The QA/QC procedures were	DNV reviewed the revised MED and could confirm the following: 1. The definitions were reviewed and deemed acceptable and clear for application. 2. The defined QA/QC procedures were reviewed and found proper.

measurement methods for "direct or indirect measurement." 2. In addition, for this parameter the QA/QC procedure is defined as "the most appropriate that guarantees that at least in 95% of cases the fuel used in the project activity is ethanol." The description is not clear and the selection of the value used (95%) needs to be justified. The relevant effects of this procedure on the emission reduction calculations also need to be described and a conservative bound for the parameter needs to be established. Finally, the 95% value should refer to the entire volume of fuel used, rather than the number of 'cases' of fuel use.	changed, defining the procedures for direct and direct measurement. *Note*: the value of 95% confidence level is adopted based on Annex 7 of EB21 "Use of regression analysis in methodologies."	The CAR was closed.
CAR 9 Guidelines to use Real Option Analysis (ROA) in Fuel Switch Projects The following issues need to be corrected: 1. The last paragraph on the first page of the Guidelines, including all the bullets, is not relevant. 2. The last sentence of the Guideline, "then proceed to Common practice analysis according to the latest version Combined tool to identify the baseline scenario and demonstrate additionality" is not relevant for this Guideline. 3. Please describe in more detail how ROA will be calculated and why the distribution of outcomes can be assumed to follow a log-normal distribution. What are the distributions of the underlying stochastic processes? Why is this relevant?	1. The bullets were included in order to provide options to substantiate the assumptions of the analysis. The bullets in reference were removed. 2. The referenced sentence was removed. 3. In any investment analysis, assumptions must be made. These assumptions are specific to certain methodological procedures and techniques for the estimation of parameters. Therefore this item was restructured in order to aggregate other methodologies that must be proved by the PP according to its	DNV reviewed the revised MED and could confirm the following: 1. The irrelevant description was deleted. 2. The irrelevant sentence was removed. 3. The explanation in the response was reasonable and hence accepted. 4. Reference document list was provided in the MED. The reference documents can help the ROA be understood and applied properly. 5. The irrelevant description was removed. 6. The revision allows the project developer to choose the most

4. Since the ROA guidelines are not widely used in the economic barrier assessment of offset projects, an example for using the guidelines needs to be given to assist in the understanding and application of the guidelines. 5. All the "CDM" references in the guideline need to be deleted or revised. 6. The ROA guidelines, including stochastic processes, sensitivity analysis and illustrative examples, need to be significantly expanded and justified to ensure their utility in this sort of application.	project's characteristics. 4. There are several publications applying real options analysis on flexible operating modes to evaluate a switch options. The studies and working papers are provided in the MED. 5. CDM references were removed. 6. Stochastic process modeling assumption was removed so that the project developer can choose and support the best modeling type to analyze its VCS project. Illustrative examples can be seen in studies sent. The sensitivity analysis should be done in order to evaluate if the switch option is still valuable under reasonable changes on significant parameters. For example: fuel price, correlation of fuel prices. Please see sensitivity analysis in the working papers sent.	appropriate approach, with justification. The CAR was closed.
CL 1 For a fuel switch project, one option is to conduct an investment analysis is "Exchange Option," as described in "MARGRABE, W. The Value of an Option to	The referenced methodology (Exchange Option, MARGRABE) is used to valuate the option to	Exchange option allows pricing the option to exchange one asset for another or one asset for a two assets portfolio, which is the study case. Decision tree

Exchange One Asset for Another. Journal of Finance, 33:177–186, 1978." DNV requests that the methodology developer assess this option and justify if the option in the proposed methodology is more appropriate for the project activity applicable under the proposed methodology.	**exchange** one **asset** for another. The proposed methodology is applicable only to cases where the technology (flex-fuel vehicle) in BOTH **baseline scenario and project activity accept two different fuel types**, still the project participant **opts** to utilize just one, less carbon intensive fuel. As no exchange of assets is evaluated in the proposed methodology, the "Exchange Option" methodology is not applicable to the project situation.	methodologies demand sensitivity analysis to verify the robustness of critical assumptions. The response is acceptable because decision trees with the due care criteria can also result in an accurate price. The CL was closed.
CL 2 The proposed methodology describes that "The project emissions from ethanol consumption that is renewable fuel are considered zero." It needs to be justified how the ethanol will be produced from renewable materials.	A new applicability condition was added, with a footnote that defines the procedure to confirm the statement in reference.	DNV reviewed the revision and found that one of the applicability conditions was to confirm the ethanol was from renewable sources. Hence, the project developer needs to justify the ethanol was renewable fuel. The CL was closed.
CL 3 Page numbers need to be added to the proposed methodology.	Page numbers were added to the proposed methodology.	Page numbers were added. The CL was closed.
CL 4 The project applying the proposed methodology has high risk of double-counting. The proposed methodology needs to define requirements related to the double-counting issue.	Refer to new revision of the methodology document	DNV reviewed the additions to the applicability conditions and found them to be acceptable. One condition requires a contract establishing clear ownership of the emission reductions between the project proponent and vehicle owner,

		reducing the possibility that both can claim the reductions. The second condition requires the contract to state that the fleet owner cannot participate in other projects with a biofuel producer or retailer. Since a producer or retailer can only claim emission reductions by demonstrating that the fuel has been consumed, this condition prevents the fleet owner's consumption from being counted more than once. The CL was closed.

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