VALIDATION REPORT

RECOVERY AND UTILIZATION OF ASSOCIATED GAS TO OPTIMIZE POWER GENERATION AT PETROAMAZONAS BLOCK 15 FACILITIES IN ECUADOR

REPORT NO. 2011-0034

REVISION NO. 01

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 2011-03-16	ConCert Project No.: PRJC-236202-2010-CCS-NOR	
Recommended for approval: Ole A. Flagstad	Approved by: Trine Kopperud	Organisational unit: DNV Climate Change and Environmental Services
Client: Tricorona Carbon Asset Management Pte. Ltd.		Client ref.: Susanne Haefeli-Hestvik

DNV CLIMATE CHANGE SERVICES AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 994774352 MVA

Summary:

Project Name: Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities

Country: Ecuador

Methodology: AM0009 **Version:** 4.0

GHG reducing Measure/Technology: Reduction of fugitive emissions from fuels (solid, oil and gas)

ER estimate: 97 019 tCO_2e per year (average)

Size

☒ Large Scale ☐ Small Scale

Validation Phases:

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

Validation Status

☐ Corrective Actions Requested ☐ Clarifications Requested
☒ Full Approval and submission for registration ☐ Rejected

In summary, it is DNV's opinion that the project activity "Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities" in Ecuador, as described in the PDD, version 02.41 of 28 Mar 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0009, version 4.0. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2011-0034	Subject Group: Environment
Report title: Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities in Ecuador	
Work carried out by: Francisco Chávez V., Michael Lehmann, Nitin Kapoor	
Work verified by: Ole A. Flagstad, Patrice Massicard	
Date of this revision: 2011-04-02 / Rev. No.: 01 / Number of pages: 35	

Indexing terms

Key words
Climate Change
Kyoto Protocol
Validation
Clean Development Mechanism

☒ No distribution without permission from the client or responsible organisational unit
☐ free distribution within DNV after 3 years
☐ Strictly confidential
☐ Unrestricted distribution

Table of Content *Page*

1 EXECUTIVE SUMMARY – VALIDATION OPINION 1

2 INTRODUCTION 3
2.1 Objective 3
2.2 Scope 3

3 METHODOLOGY 4
3.1 Desk review of the project design documentation 4
3.2 Follow-up interviews with project stakeholders 10
3.3 Resolution of outstanding issues 12
3.4 Internal quality control 14
3.5 Validation team 14

4 VALIDATION FINDINGS 15
4.1 Participation requirements 15
4.2 Project design 15
4.3 Application of selected baseline and monitoring methodology 17
4.4 Project boundary 17
4.5 Baseline identification 18
4.6 Additionality 20
4.7 Monitoring 27
4.8 Algorithms and/or formulae used to determine emission reductions 29
4.9 Environmental impacts 35
4.10 Comments by local stakeholders 35
4.11 Comments by Parties, stakeholders and NGOs 35

Appendix A Validation Protocol
Appendix B Curricula vitae of the validation team members

Abbreviations

AAI	Internal Environmental Audit (AAI, acronym from the Spanish name)
AFP	Allocation of Funds for Projects (Spanish: *Asignación de Fondos para Proyectos*).
ARCH	Hydrocarbons Regulation and Control Agency (acronym from the Spanish name)
bbl	Barrels
BTU	British Thermal Unit
CAPEX	Capital Expenditures (investment cost)
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CPF	Central Processing Facility
DNA	Designated National Authority
DNH	National Directorate of Hydrocarbons (DNH, acronym from the Spanish name)
DNV	Det Norske Veritas
DTU	Diesel Topping Unit
EB	UNFCCC Executive Board
EIA	Environmental Impact Audit/Assessment
EIA	Energy Information Administration
EPF	Edén Yuturi – Pañacocha Facility
ESP	Electrical Submergible Pump
EY	Eden Yuturi Facility
FAR	Forward Action Request
GAAP	Generally Accepted Accounting Principles
GHG	Greenhouse gas(es)
GOR	Gas/Oil ratio
GPS	Global Po
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IYLP / ILYP	Indillana, Yanaquincha, Limoncocha, & Paka Sur Facilities
LoA	Letter of approval
LPF	Limoncocha Processing Facility
N_2O	Nitrous oxide
NCV	Net Calorific Value
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OGE	Electricity Generation Optimization Project (Spanish abbreviation)
OPEX	Operational Expenditures (operational costs)
PAM	PETROAMAZONAS EP
PDD	Project Design Document
pp	Page number(s)

PP	Project Participant(s)
QA/QC	Quality Assurance/Quality Control
SCFD; SCF/D; scf	Standard cubic feet /day
tCO_2e	Tonnes of CO_2 equivalents
UNFCCC	United Nations Framework Convention on Climate Change
US / USA	United States of America

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity "Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities" in Ecuador. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is Ecuador and the Annex I Parties are Sweden and the Republic of Finland. All Parties fulfil the participation criteria and have approved the project and authorized the project participants PETROAMAZONAS EP, Tricorona Carbon Asset Management Pte. Ltd. *and Wärtsilä Finland Oy, respectively. The DNA from Ecuador confirmed that the project assists in achieving sustainable development.*

The project correctly applies the baseline and monitoring methodology AM0009, version 4.0 "Recovery and utilization of gas from oil wells that would otherwise be flared or vented".

The purpose of the project activity is to utilize the associated gas that in absence of the project activity would be flared at the oil fields of Block 15 and Block 31 in Ecuador. As a result, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 97 019 tCO_2e per year over the selected 10 year fixed crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV's opinion that the project activity "Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities" in Ecuador, as described in the PDD, version 02.41 dated 28 Mar 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0009, version 4.0. Hence, DNV requests the registration of the project as a CDM project activity.

Oslo, 2011-04-02

Michael Lehmann
CDM Validator

Oslo, 2011-04-02

Trine Kopperud
Head of Approval Centre & Nordic
DNV Climate Change Services AS

2 INTRODUCTION

Tricorona Carbon Asset Management Pte. Ltd. has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities project in Ecuador (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AM0009 (version 4.0). The validation was based on the recommendations in the Validation and Verification Manual /25/.

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

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

/1/ Berend van den Berg, David Neira (PETROAMAZONAS EP): *CDM-PDD for project activity "Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities" in Ecuador*,
- Version 01.1 dated 7 Jun 2010
- Version 02.1 dated 2 Dec 2010
- Version 02.3 dated 24 Jan 2011
- Version 02.31 dated 22 Feb 2011
- Version 02.34 dated 24 Feb 2011
- Version 02.35 dated 28 Feb 2011
- Version 02.37 dated 8 Mar 2011
- Version 02.38 dated 10 Mar 2011
- Version 02.40 dated 10 Mar 2011
- Version 02.41 dated 28 Mar 2011

/2/ PETROAMAZONAS: *CER calculations*
- *Included in files within reference* /3/

/3/ PETROAMAZONAS: *Investment Analysis*
- *Annex 2.1, 021210_Investment Analysis .xls*
- *Annex 2.1, 021210_Investment Analysis .xlsx*
- *Investment analysis + ERs calc.xls*
- *Doc 20, 2011-01-11 Investment Analysis.xlsx*
- *Investment Analysis_10032011.xlsx*
- *Investment Analysis_2011-03-28.xlsx*

/4/ Notification and reply of the proposed CDM project activity to the Ecuadorian DNA:
- *03_Petroamazonas 2009-03-18 DNA notification.pdf*, Version 922-PAM-GER-2009 dated 18 Mar 2009
- *2009-03-18 DNA notification&reply.pdf*, Version 1787 dated 8 Apr 2009

/5/ Various documents regarding the history of the proposed CDM project activity:
- *Before and After CPF AGIA _Rev 1_Photos.pdf*
- *Before and After Limoncocha _Rev 0_Photos.pdf*
- *Certificación ARCOLANDS Waukesha - Certification old gas units in*

Petroamazonas oil fields.pdf, date: 27 Jul 2010
- *Customer Copy- Work report Oxy _Wartsila document_ Site survey report, optimization of gas engines.pdf*, date: 15 May 2006
- *Scrapped Gas Generators Before Project Activity _Rev 1_ Photos.pdf*
- *TECNA previous Project Activity ILYP 2008 – Presentation of Optimization of Electricity Generation (OGE) project.pdf*, date: 25 May 2009
- *Conceptual engineering for the optimization of energy generation TECNA Report Energy Matrix Summary 2008.pdf*
- *The Resolution of the Board of Director of PETROECUADOR.docx "Optimization of electric generation with associated gas in the Amazonas district*".

/6/ Various documents regarding the calculations of emissions reduction (CER):
- Carlos Salemi (PETROAMAZONAS EP), *Topping plant gas consumption,* date:4 Nov *2010 - Annex 1, RE Consumo Gas Topping Plant.msg,*
- *PETROAMAZONAS EP, Preliminary daily production report (CPF), date:22 Apr 2010 Annex 2.3.1, Report PAM Diesel Production Topping Plant.pdf*
- *PETROAMAZONAS EP, Topping Plant "DTU" November 2008, Date: 6 Jul 2010 Annex 2.3.1, Toping Plant DTU noviembre2008.pdf*
- *PETROAMAZONAS EP, Topping Plant "DTU" December 2008, Date: 6 Jul 2010 Annex 2.3.1, Toping Plant DTU diciembre2008.pdf*
- *PETROAMAZONAS EP, Topping Plant "DTU" January 2009, Date: 6 Jul 2010 Annex 2.3.1, Toping Plant DTU enero2009.pdf*
- *PETROAMAZONAS EP, Topping Plant "DTU" February 2009, Date: 6 Jul 2010 Annex 2.3.1, Toping Plant DTU febrero2009.pdf*
- *Annex 2.7, LHV Fuels.pdf*
- *Annex 6, Produccion Real ILY - EY.xls*
- *Annex 6.1, RE Consumo Gas Topping Plant.msg*
- *2007 Real Production.pdf – (Production and pumping)*
- *2008 Real Production.pdf – (Production and pumping)*
- *2009 Real Production.pdf – (Production and pumping)*
- *2010 Real Production.pdf – (Production and pumping)*
- *LHV Fuels.pdf*
- *KPI Fuel Efficiency (Rev 0).xls*
- *Caterpillar Info.pdf*
- *Wartsila 32-liquid-fuel-engine.pdf*
- *Info Jenbacher.pdf*
- *Historic Data Block 15.pdf*
- *Crude oil analysis ResultReport_2010-NOLA-009410_(1 + 2).pdf*
- US National Institute of Standards and Technology, *http://physics.nist.gov/Pubs/SP811/appenB8.html#B*

/7/ Various documents related to the common practice analysis:
- *Agenda energética 2007 2011 - Energy Mix 2007 2011.pdf*
- *Matriz energética políticas y estrategias EC - Policies & Strategies for Energy Mix.pdf*
- *Referencias Quema y Uso de Gas Asociado Ecuador-tendencias a usar el gas asociado.pdf*
- *PAM Timeline for the replacement of old generators (Rev 2 BvdB).pdf*
- *Confirmation from the Ministry that the project is not common practice.pdf*

- *Inventory Gas Power Generation Equipment Project Activity (Rev 3).xls*
- *Energy Policy and Strategy for the Change of Energy Mix in Ecuador" ("Politicas y Estrategias para el Cambio de la Matriz Energetica del Ecuador"). Policies for the change of energy matrix in Ecuador.pdf*
- *Energy Information Administration Official Energy Statistics.pdf*

/8/ Angel Basantes, PETROAMAZONAS EP: *Budget approval/Investment decision*, Version: 0478-CERT AFP 490201-4499-PAM-FIN-2009, Date:12 Feb 2009
2009-02-12 Investment decision.pdf

/9/ Guillermo Bonilla Moyano, PETROAMAZONAS EP: *Purchase order for tie-in works for compressors*, Version: 0, Date: 25 Mar 2009
2009-03-11 First Purchase order.pdf

/10/ Various documents related to the forecast of: oil, water, and gas production, and energy demand for operations:

- Francisco Paz, PETROAMAZONAS EP: *Production forecast of oil and associated gas - Electricity Generation Optimization (OGE) project development within Petroamazonas' facilities in Block 15*, Version: PAM-EP-OPR-OGE-2010-0004, Date: 10 Sep 2010
  Memorandum No. PAM-EP-OPR-OGE-2010-00004Production Forecast Memorandum oil – assoc gas.pdf
- Comparativo Forecast PAM.xls
- Response Production - Gas Forecast PAM _Rev 0_.pdf
- Block 15 proyections and related information as per 15 Feb 2009
  Matriz MDL Bloque 15 Febrero 2009 (Rev 6)
- Approved quinquenal plan 2007 – 2011
  PLAN QUINQUENAL 2007 - 2011 (Aprobado) 95.pdf
- Approved quinquenal plan 2008 – 2012
  PLAN QUINQUENAL 2008-2012-Vsion Final Oct-2008 (Aprobado) 88.pdf
- Quinquenal plan 2009 – 2013
- Quinquenal plan 2010 – 2014
- Letter from the Ministry of Non Renewable Natural Resources validating the production forecast issued by PETROAMAZONAS in connection with the CDM project activity, dated: 15 Mar 2011.

/11/ Various documents related to the investment analysis:

- *Petroamazonas OC Generadores CPF - 11 Purchase Orders Generators CPF.pdf*
- *Petroamazonas Pedido Serie Riesgo País.xls*
- *KPI Net Calorrific Value - KPIs Investment Analysis (Rev 3 PDD).pdf*
- *Data Discount Rate OGE Edited Version.xls*
- *: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2007*
- *2008: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2008*
- *2009: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2009*
- *Mr. Eugenio Paladines C., Central Bank of Ecuador, "Country Risk Series for Ecuador from 2-Jan-2007 to 8-Jan-2009", email dated:8 July 2010*

- *Inventory Gas Power Generation Equipment Project Activity (Rev 0).xls*
  Inventory Gas Power Generation Equipment Project Activity (Rev 2).xls
  Inventory Gas Power Generation Equipment Project Activity (Rev 3) (2)
- *Project Emissions CDM PETROAMAZONAS (Rev 1) (2)*
- *List of contractual instruments - Listado de Instrumentos contractuales OGE 2009-Jul 2010.xls*
- *Analysis of Investmetnt Budget OGE 2009 - Análsis Presupuesto de Inversión OGE 2010 (Formato OGE Rev 0).xls*
- *Purchase Order CPF Generators - OC Generadores CPF - Purchase Order.zip*
- *POs Diesel Power Generation Units ILYP.pdf*
- *POs Crude Oil Power Generation Units EPF.pdf*
- *Project Funds Approval - Analyzed list of AFPs.XLS*
- *Project Funds Approval AFP-400415-FIN-1119-POGE.pdf*
- *Project Funds Approval AFP-490201-REVISION-FIN-0847-FIC.pdf*
- *Project Funds Approval AFP-490205-FIN-0670-FIC.pdf*
- *Project Funds Approval AFP-490205-REVISION-FIN-0852-FIC.pdf*
- *Project Funds Approval AFP-490301-REVISION-FIN-0853-FIC.pdf*
- *Project Funds Approval AFP-490411-FIN-0846-POGE Rev 1.pdf*
- *Project Funds Approval AFP-490411-FIN-2542-FIC.pdf*
- *Project Funds Approval AFP-490801-FIN-0671-FIC.pdf*
- *Project Funds Approval AFP-490801-FIN-0854-FIC.pdf*
- *Project Funds Approval CERT-AFP-490201-4499-FIN-0478-FIC.pdf*
- *Project Funds Approval CERT-AFP-490301-4452-FIN-0470-FIC.pdf*
- *Service Orders Listings – "Listado de Ordenes de Servicio.xls"*
- *Work Orders Lisitngs – "Listado de Ordenes de Trabajo.xls"*
- *Purchase orders OC -118-.pdf*
- *Service orders OS -80-.pdf*
- *Work orders OTQ -21-.pdf*
- *Programación OGE ILYP.pdf*
- *DNH Document regardiing fuel for Power Generation 2010.pdf*
- *DNH Document regarding Fuel for Power Generation 2009.pdf*
- *Diesel cost CP001334-2009-PETROCOMERCIAL Dec 08.pdf*
- *Diesel cost CP003477-2009-PETROCOMERCIAL Jan 09.pdf*
- *Diesel cost CP006403-2009-PETROCOMERCIAL Mar 09.pdf*
- *Diesel cost CP003615-2009-PETROCOMERCIAL Feb 09.pdf*
- *Budget control OGE Projects - OGE - Control Presupuestario Proyectos OGE (Rev 6.1 100609).xls*
- *Historical diesel prices 2000 – 2009,*
  www petrocomercial.pdf; Historical diesel prices_Petrocomercial 2000_2009.xlsx
- *OPTIMIZATION OF POWER GENERATION PROJECT.XLS*
- *Ecuador inflation rate (consumer prices) - Economy.pdf*
  http://www.indexmundi.com/ecuador/inflation_rate_%28consumer_prices%29.html

/12/ Various documents related to the legal framework in Ecuador in connection with the exploitation of hydrocarbons, crude oil and associated gas :

- *Hydrocarbons Law, Supreme Decree 2967 (Ley de Hidrocarburos, Decreto Supremo 2967)*
  ley_hidrocarburos_reformada.doc / Hydrocarbons Law, Supreme Decree 2967.doc

- *Autorizaciвn 2006-7, DNH Oficio No 0665-DNH-EE-802164 – Yearly authorization for the use and burning of gas - block 15.pdf*
- *Application for Yearly authorization for the use and burning of gas - block 15 2008-2009 (Solicitud DNH aprob. gas 2008-9.pdf)*
  Yearly authorization for the use and burning of gas - block 15.pdf
- *Annual authorization for the use and burning of gas at the block 15, 2008.pdf*
- *Authorization of use and flaring of associated gas at Petroamazonas operations, 2009.pdf*
- *Oficio MRNR Utilización de Crudo - Authorization for use of crude oil in topping plant.pdf*
- *Executive Decree (DECRETO EJECUTIVO) No. 314 - Petroamazonas Activities Legal Mandate*
  (DECRETO EJECUTIVO No.314.pdf)
- *Regulation to the tax law, Executive Decree 1051, Official Gazette Supplement 337, May 15 2008. Article 25.*
- *Authorization to incorporate the production of Pañacocha field into the national oil production.pdf*

/13/ Various documents regarding the stakeholder meetings:

- List of participants 2010-01-27 - *Listado participantes presentación OGE en Limoncocha.pdf*
- List of participants 2010-01-28 - *Listado participantes presentación OGE en EPF.pdf*
- Photos presentation Edén Yuturi - *Fotos Presentación Edén Yuturi 28-01-10 (13 Photos from stakeholder meeting)*
- Photos presentation Limoncocha - *Fotos Presentación Limoncocha 27-01-10 (25 Photos stakeholder meeting)*
- Minutes of Presentation Edén Yuturi - *Minuta Presentación Local OGE Comunidades Eden Yuturi 28.01.10.doc*
- Minutes of Presentation Limoncocha - *Minuta Presentación Local OGE Comunidades Limoncocha 27.01.10.doc*

/14/ PETROAMAZONAS, *List of Attendees*, DNV validation site visit:

- *DNV's site visit stakeholder meeting at CPF*, date: 8 Jul 2010
  03_Petroamazonas Registro de Asistencia Auditoría CPF Reunión Comunidades 08.07.10.pdf
- *DNV's site visit stakeholder meeting at EPF*, date: 7 Jul 2010
  03_Petroamazonas Registro de Asistencia Auditoría EPF Reunión Comunidades 07.07.10.pdf

/15/ Various documents regarding the areas where PETROAMAZONAS operates:

+) *Map of Areas of Direct Control of Petroamazonas.pdf*

+) *Wells list - Block 15*, date: 22 Nov 2010

- *Well List 01.11.10 Block 15.pdf*
- *Well List 01.01.07 Block 15.pdf*
- *Well List 01.01.10 Block 15.pdf*

/16/ PETROAMAZONAS: *Minutes of Conference Call AM009 applicability*, Date: 2 Nov 2010

/17/ ENTRIX: Internal Environmental Audit on the Auto generation Electric Systems within

the industrial complex INDILLANA-LIMONCOCHA- YANAQUINCHA and Field EDÉN YUTURI (*AUDITORÍA AMBIENTAL INTERNA A LOS SISTEMAS DE AUTOGENERACIÓN ELÉCTRICA DEL COMPLEJO INDILLANA-LIMONCOCHA-YANAQUINCHA Y CAMPO EDÉN YUTURI)* Project No. 1178605, Date: March 2009

/18/ EP PETROECUADOR, *Description of the Sushifindi Industrial Complex,* date: 14 Jan 2011
http://ind.eppetroecuador.ec/ComplejosIndustriales/C.I.Shushufindi/index.htm
Petroamazonas - block 15 is surrounded of sensitive ecologic areas.pdf

/19/ Various documents regarding the environmental licenses:
- Approval Internal Environmental Audit August 2009.pdf
- Environmental license for the cosntruction and operation of a thermo-generating unit in Eden Yuturi
  CONELEC Lic-Ambiental EIA Nueva Termoeléctrica EY.pdf
- Environmental license 044 – Bi-annual Environemntal Audit
  DINAPA Licencia Ambiental 044 Auditoría Ambiental BiAnual y Area Indillana.pdf
- Environmental license 042 – Bi-annual Environemntal Audit
  Licencia Ambiental 042 Auditoría BiAnual y Area Limoncocha.pdf
- Expansion of the Environmental license 042 – Inclusion of Yamanunka platform
  MAE Inclusión Lic-Ambiental 042 Alcance EIA Yamanunka.pdf
- Environmental license 075
  MIN-MINAS Licencia Ambiental Area 075 EY.pdf

/20/ Various documents regarding the environmental law and regulations related to the project activity:
- Environmental management law - *Ley de Gestión Ambiental.pdf*
- Prevention and Environmental pollution control Law - *Ley de Prevencion y Control Contaminacion Ambiental.pdf*
- Environmental Regulation for Electrical Work Activities - *Reglamento ambiental para Actividades Eléctricas.doc*
- Unified Text of the Secondary Environmental Legislation, particularly Book VI and corresponding Annexes / specifications applicable to the electricity sector - *Texto Unificado - Libro VI*

/21/ *Samples of financial indicators for other oil exploration projects undertaken by PETROAMAZONAS:*
- *Project: EDY J -121 well drilling and completion, 31 Mar 2010 - Autorización de Fondos 1.pdf*
- *Project: Construction of a sand blasting area for drilling operations, 27 Jun 2008. - Autorización de Fondos 2.pdf*
- *Project: Construciotn and expansion of faclities for 3 new wells in Paka Sur, 8 May 2008 - Autorización de Fondos 3.pdf*
- *Project: Fuel storage tanks for Limoncocha, Jivino F,A,B,E, Yanaeste/Ooeste, Laguna, Itaya A and Concordia fileds, 14 Feb 2007- Autorización de Fondos 4.pdf*
- *Project: Construciotn of faclities for 3 new dual wells in Paka Sur, 25 Feb 2010 - Autorización de Fondos 5.pdf*
- *Project: Construction of facilities above ground for a dual well completion in Yanaquincha West 4, 3 Jul 2007. - Autorización de Fondos 6.pdf*

Project: Construction of a production platform for Limoncocha 8 for 4 wells), Nov 2009. - Autorización de Fondos 7.pdf

3.1.2 Letters of approval

/22/ Ministry of Environment (DNA of Ecuador): *Letter of approval* dated 15 Apr 2010, updated: 18 Mar 2011

/23/ Swedish Energy Agency (DNA of Sweden): *Letter of approval* dated 22 Mar 2011

/24/ Ministry for Foreign Affairs of Finland (DNA of Finland): *Letter of approval* dated 28 Mar 2011

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

/25/ CDM Executive Board: *Validation and Verification Manual,* version 1.2

/26/ CDM Executive Board: *Baseline and monitoring methodology AM0009*, version 4.0

/27/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, Version 05.2

/28/ CDM Executive Board: *Tool to calculate baseline, project and/or leakage emissions from electricity consumption*, Version 01

/29/ CDM Executive Board: *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*, Version 02

/30/ CDM Executive Board: *Guidelines on the demonstration and assessment of prior consideration of the CDM*, Versions: 01, 02 and 03

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

/31/ Wärtsilä Finland Oy (Finland)
http://www.wartsila.com/,en,home,,,,,,.htm

/32/ ABB Group
http://en.wikipedia.org/wiki/ABB_Group

/33/ Tricorona Carbon asset Management Pte. Ltd and Det Norske Veritas Certifiaction AS (DNV): Short frame agreement (Contract) for the Validation works of the" Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities" project , Date: 1 Jun 2010

3.2 Follow-up interviews with project stakeholders

On 6-8 July 2009 DNV visited the project site and performed interviews with project stakeholders /34/-/72/.

In addition, DNV performed follow-up interviews on 2 November 2010, 21 December 2010 and 12-14 January 2011 with representatives of the project participants: Tricorona Carbon Asset Management Pte Ltd., Wärtsilä Finland Oy & PETROAMAZONAS EP.

Date	Name	Organization	Topic

/34/		Dmitry Timofeev	Tricorona Carbon Asset Management Pte Ltd.	Project Design
/35/		David Neira	PETROAMAZONAS EP	Prior consideration of CDM
/36/	2007-07-06	Freddy Cuisana	PETROAMAZONAS EP	Investment analysis
/37/		Daniel Chiriboga	PETROAMAZONAS EP	Calculation of OM and BM emission factor
/38/		Tomás Márquez	PETROAMAZONAS EP	Benchmark selection
/39/		Yaw Vargas	Edén community	
/40/		Carlos Tapuy	Edén community	
/41/		Pablo Sanchez	PETROAMAZONAS EP	
/42/		Patricio Vinuera	PETROAMAZONAS EP	
/43/		Enrique Santos	PETROAMAZONAS EP	Stakeholder meeting held on Edén Yuri on 28-Jan-2010
/44/	2010-07-07	Hector Cabanilla	PETROAMAZONAS EP	
/45/		Freddy Cuisana P.	PETROAMAZONAS EP	
/46/		David Neira	PETROAMAZONAS EP	
/47/		Dmitry Timofeev	Tricorona Carbon Asset Management Pte Ltd.	
/48/		Giovanna Sánchez	PETROAMAZONAS EP	
/49/		Carmen Grefa	Rio Jivino	
/50/		Pedro Shinguayo	A.I.L.	
/51/		Limbu Catapucha	ANARISKA	
/52/		Manuel Benites	SMARTPRO	
/53/		StefaniaGuelcop	SMARTPRO	
/54/		Mariela Hernáez	SMARTPRO	
/55/		Johnny Flores	SMP	
/56/		Miguel Oyica	SMP	
/57/		Byron Moscoso	SMP	
/58/		Carlos Guzman	SMARTPRO/OGE	
/59/		Jerry Zambrano	PETROAMAZONAS EP	
/60/		Jose Santos	SMARPRO	Stakeholder meeting held on Limoncocha on 27-Jan-2010
/61/	2010-07-08	Jose Rendón	SAMRTPRO/OGE	
/62/		Miguel Vivas	PETROAMAZONAS EP	
/63/		Cesar Clonejo	SMARTPRO	
/64/		Apolonio Ardy	SMARTPRO	
/65/		Euoc Kente S.	A.I.L.	
/66/		Juanito Grefa	A.I.L.	
/67/		Sucre Cerda	J.P.L.	
/68/		Dmitry Timofeev	Tricorona Carbon Asset Management Pte Ltd.	
/69/		David Neira	PETROAMAZONAS EP	
/70/		Enrique Santos	PETROAMAZONAS EP	
/71/		Freddy Cuisana	PETROAMAZONAS EP	
/72/		Giovanna Sánchez	PETROAMAZONAS EP	

/73/			Dmitry Timofeev	Tricorona Carbon Asset Management Pte Ltd.	Conference call on the applicability conditions of the approved CDM methodology AM0009
/74/	2010-11-02		Susanne Haefeli-Hestvik	Tricorona Carbon Asset Management Pte Ltd.	
/75/	2010-12-21		Kristian Brüning	Wärtsilä Finland Oy	
/76/	2011-01-12	to	Berend van den Berg	PETROAMAZONAS EP	Confernce call to resolve various CARs and CLs
	2011-01-14				

3.3 Resolution of outstanding issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Recovery and Utilization of Associated Gas to Optimize Power Generation at PETROAMAZONAS Block 15 Facilities" in Ecuador is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

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

(b) The CDM requirements have not been met;

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

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	***Reference***	***Conclusion***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**) or a **corrective action request (CAR)** if a requirement is not met.*

Validation Protocol Table 2: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	*Gives reference to documents where the answer to the checklist question or item is found.*	*Means of verification (MoV) are **document review (DR)**, **interview (I)** or any other follow-up actions (e.g., on site visit and telephone or email interviews) and **cross-checking (CC)** with available information relating to projects or technologies similar to the proposed CDM project activity under validation.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A **corrective action request (CAR)** is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A **clarification request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A **forward action request (FAR)** during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/ or clarification requests	***Ref. to checklist question in table 2***	***Response by project participants***	***Validation conclusion***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here.*	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

Validation Protocol Table 4: Forward Action Requests		
Forward action request	***Ref. to checklist question in table 2***	***Response by project participants***
The FARs raised in Table 2 are repeated here.	*Reference to the checklist question number in Table 2 where the FAR is explained.*	*Response by project participants on how forward action request will be addressed prior to first verification.*

Figure 1: Validation protocol tables

3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

				Type of involvement						
Role	***Last Name***	***First Name***	***Country***	Administrative	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Sectoral competence
Project manager	Chávez V.	Francisco	Norway	✓						
Technical team leader (CDM validator)	Lehmann	Michael	Norway		✓	Inter-views	✓	✓		
GHG auditor	Chávez V.	Francisco	Norway		✓	✓	✓			✓
CDM validator	Kapoor	Nitin	India		✓					✓
Technical reviewer	Flagstad	Ole	Norway						✓	
TA input to TR	Massicard	Patrice	Norway							✓

The qualification of each individual validation team member is detailed in Appendix B to this report.

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the PDD, version 02.41 dated 28 Mar 2011.

4.1 Participation requirements

The project participants are *PETROAMAZONAS EP* of Ecuador and *Tricorona Carbon* Asset Management Pte. Ltd. and *Wärtsilä Finland Oy* of Sweden and the Republic of Finland, respectively. The host Party (Ecuador) and the Annex I Parties (Sweden and the Republic of Finland) meet all relevant participation requirements.

A letter of approval (LoA) /22/ was issued by DNA of Ecuador on 15 April 2010, authorizing *PETROAMAZONAS EP* of host Party as project participant and confirming that the project assists in achieving sustainable development. The DNA of Sweden issued the LoA /23/ on 22 Mar 2011 and authorized Tricorona AB as project participant. Also The DNA of Finland issued the LoA /24/ on 28 Mar 2011 and authorized Wärtsilä Finland Oy as project participant.

The letters of approval were received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /25/.

4.2 Project design

The proposed CDM project activity is based on the avoidance of burning (flaring) the associated gas resulting from the oil recovery (exploitation/production) activities of PETROAMAZONAS in the areas of Block 15 and Block 31, located in the north-east region the Ecuador, also known as the Amazon's region. The physical and spatial area of the project activity comprises the oil wells within Block 15, and Block 31 in Ecuador, as well as the physical installations for:

- Associated gas gathering facilities
- Associated gas processing facilities
- Power (electricity) generation equipment
- Convertion equipment (replacement of internal combustion engines with electrical motors)
- Electricity distribution equipment

The project is limited by the geographical coordinates delimiting the each of areas namely, Block 15, and Block 31. During the site visit DNV was able to verify via a GPS unit the coordinates given in the PDD for the main sites:

- Eden Yuturi: 0^o 31' 49"S 76^o 07' 42"W
- Limoncocha: 0^o 20' 45"S 76^o 40' 24"W
- Paka Sur: 0^o 25' 37"S 76^o 47' 35"W

- CPF: 0° 22' 30"S 76° 37' 59"W

PETROAMAZONAS EP is a state owned company with the mandate /12/ to perform the oil exploration and production activities within the allocated (licensed) blocks, which for the project activity it pertains Block 15 and Block 31.

Due to the characteristics of the oil fields comprised within the boundaries of the project activity, the oil is extracted by means of electrical pumps /15/ ("Electrical Submergible Pumps", or "ESP Pumps"). During the site visit, DNV was able to confirm the extraction method, and that the associated gas obtained from the oil production was flared in each of the fields.

For the sake of transparency it should also be mentioned that:

- At the CPF area there is a small Diesel Topping Unit/plant (DTU) which is used to produce diesel out of the extracted oil for local maintenance/needs. This unit is driven by associated gas. However, DNV confirms that its consumption of gas is not impacted by the project activity. Associated gas used in the topping plant is not considered in the estimation of the project's baseline emissions as the "F" point (re. gas measuring point for emission reduction calculations as per the approved methodology /26/) is located after the topping plant.
- Also prior the project activity an attempt was made by the previous oil field Operator (Occidental Petroleum Corporation - Oxy) to generate electricity out of raw (non-processed) associated gas. This proved to be unsuccessful and the equipment progressively continued deteriorating by the gas. Due to this situation, the Operator of the oil field decided to replace the gas driven generators, as they became non-operational (scrapped) with liquid fossil fuel generators, to satisfy the power requirements of the operations within the oil fields. Afterwards, when PETROAMAZONAS became the Operator of the oil field, initially continued with the strategy replacing the gas driven generators with liquid fossil fuel generators, until the moment when the possibility of the proposed CDM project activity was identified, and subsequently tested and approved for implementation. It should be noted that the PP estimated that none of such equipment would have been left operational at the time of commissioning of the proposed project activity (as presented graphically at the end of Annex 3 of the PDD). DNV has assessed such estimation based on the technical assessment reports /5/ regarding the conditions of such equipment, and the analysis of the rate at which the equipment was breaking down (declared non operational), and confirms that such it is reasonable, and that, in the absence of the project activity, all the equipment would have been scrapped by the estimated date (July 2009), During the site visit DNV was able to witness some of the equipment that has been scrapped, as well as the ongoing works to install the new equipment, and, where possible to refurbish/upgrade those components from the previous installation that could be recovered to suitably operate with processed associated gas, both of these under (as part of) the project activity /5/ /6/ /7/ /11/.

The project starting date is 12 Feb 2009. This is the date when the board of directors of PETROAMAZONAS EP confirms the availability of the initial funds for the project activity /8/. The approval of the initial funds represents the first financial commitment regarding the implementation of the project, and therefore the start of the CDM proposed project activity.

On 18 March 2009 PETROAMAZONAS sent a letter to the host country DNA /4/ (Ministry of Environment of Ecuador) informing that PETROAMAZONAS EP intends to develop the project activity under the CDM scheme. On 8 Apr 2009 the DNA of Ecuador (Minister of Environment of Ecuador) replies to PETROAMAZONAS' letter indicating that it starts the proceeding to consider the proposed project activity to be developed as a CDM project /4/.

The estimation of the project lifetime is very complex due to all the different types of equipment and components involved, therefore for the sake of having a reasonable frame it has been estimated as per the depreciation law in Ecuador /12/ which results in a project lifetime of 11 years /3/ (it should be noted that in the investment analysis provided for the project the salvage value of the project is added to the last year).

The associated gas recovered will be pre-treated for on-site consumption for power (electricity) generation purposes.

The historic oil production is as follows:

Historic production**		Year		
Oil fields*		**2007**	**2008**	**2009**
ILYP	Bbls/day	27 911	36 629	40 310
EY	Bbls/day	60 264	58 314	58 822
Total	Bbls/day	88 175	94 943	99 132

* Pañacocha field not included since it was not in production

** Associated gas was not measured (only flared); estimations for project activity based on GOR (Gas-Oil-Ratio)

The chosen crediting period for the project activity is 10 years and fixed, and the starting date is 1 Jan 2012.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The proposed project activity employs the methodology AM0009 *Recovery and utilization of gas from oil wells that would otherwise be flared or vented* version 4.0.

DNV could confirm through site visit observation that all applicability criteria of the methodology are met.

Furthermore, the assessment of the project's compliance with the applicability criteria of AM0009 (version 4.0) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

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

	GHGs involved	*Description*
Baseline emissions	CO_2	*Emissions from combustion of fossil fuels*

		used for power generation which are displaced by the project through utilization of the associated gas for power generation
Project emissions	*CO_2*	*Emissions due to the use of electricity by equipment installed for the purpose of the project activity*
Leakage	*None*	*No leakage needs to be considered in accordance with AM0009* /26/

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AM0009 (version 4.0).

The project's boundary comprises all the oil reservoirs and oil wells within Block 15 and Block 31 /15/ from where the associated gas is recovered, including the sites where the associated gas has been flared, as well as the equipment and corresponding sites from the oil wells to the associated gas processing facilities (pre-treatment), prior the on-site consumption.

It should be noted that, due to the nature of the oil (exploration &) production activity, the actual list of identified oil wells /15/ may vary over time due to the need of closing/abandoning a given well, and perforating a new one to continue with or enhance/increase the extraction of the crude oil from the oil reservoir(s) within the project boundaries. Thus, in compliance with the applicability criteria, at the time of the recovering, pre-treatment and utilization of the associated gas, all recovered gas comes from oil wells that are in operation and are producing oil at the time that the recovery of the associated gas takes place.

4.5 Baseline identification

The plausible alternative scenarios mentioned in the methodology AM0009 version 4.0, namely: alternative baseline scenarios for the associated gas from the project oil wells: G1-G9, and, alternative baseline scenarios for oil and gas infrastructure: P1-P5, are analyzed and presented in the PDD (no gas-lift scenarios are analysed since, as verified by DNV during the site visit, there are no gas-lift operations within the proposed CDM project activity). The feasibility of these alternative scenarios has been considered using different types of sources related to national legislation /12/, national conditions regarding hydrocarbons industry/market /7/, and common practice /7/. All used sources are clearly referred in the PDD.

The baseline scenario is then defined as the alternative scenario which meets legal and economical requirements and is economically the most attractive. Flaring of the associated gas at the production site (scenario G2), and the continuation of the operation of the existing oil and gas infrastructure without processing of any recovered associated gas and without any other significant changes (scenario P4) are defined as the baseline scenario of the proposed project activity. As mentioned above, it was estimated that none of the equipment installed by

the previous Operator of the oil fields, would have been left in operation at the time of commissioning for the proposed project activity as it shown by the corresponding technical assessment reports /5/. The following scenarios have been discarded as baseline scenarios accordingly:

G1 – Venting of associated gas is not permissible under the legal permit for utilization of associated gas given to PETROAMAZONAS /12/.

G3 – On-site use of the associated gas for power generation is not a viable alternative as a baseline scenario since the equipment would need to be prepared/acquired for this purpose and there are no sufficient incentives to proceed with this scenario without CDM benefits /5/ /7/ - This alternative is the proposed CDM project activity.

G4 – On-site use of the associated gas for liquefied natural gas (LNG) production is not a viable alternative as a baseline scenario since it requires some investment and there is no market for LNG in Ecuador /7/ that could justify the investment.

G5 – Injection of the associated gas into an oil or gas reservoir production is not a viable alternative as a baseline scenario since it requires some investment, and there is no guarantee that this course of action will enhance the oil recovery. It should be mentioned that this is a technically complex process and requires thorough studies in order not to risk to damage the production potential of the oil reservoir.

G6 – Recovery, transportation, processing of the associated gas and distribution of products thereof to end-users is not a viable alternative as a baseline scenario since it requires some investment and having the oil fields so remotely placed with respect to the end-users (Section 4.2 above), and the uncertainty of the quality and amount of the associated gas available /6/, the risk of pursuing this alternative is too high.

G7 – Recovery, transportation and compression of the associated gas and/or gas-lift gas into a gas pipeline without prior processing is not a viable alternative as a baseline scenario since it requires some investment and having the oil fields so remotely placed with respect to the end-users (section 4.2 above), and the uncertainty of the quality and amount of the associated gas available /6/, the risk of pursuing this alternative is too high.

G8 – Consumed on-site to meet energy demands, without being registered as a CDM project activity is not a viable alternative as a baseline scenario since it requires some investment to condition the gas for utilization in energy generation as demonstrated in the scenario G3 above.

G9 – Recovery, transportation and utilization of the associated gas and/or gas-lift gas as feedstock for manufacturing of useful products, since it requires some investment and, having the oil fields so remotely placed with respect to the end-users (Section 4.2 above), and the uncertainty of the quality and amount of the associated gas available /6/. Moreover, Ecuador currently does not have the petrochemical industry where associated gas could serve as a feedstock. Hence, the business risk for pursuing this alternative is too high.

P1 – Construction of a processing plant for processing the recovered gas, in the same way as in the project activity, without being registered as a CDM project activity, is not a viable alternative as a baseline scenario since it requires some investment to condition

the gas for its utilization. This scenario in combination with the scenario G3 is the proposed CDM project activity.

P2 – Construction of a processing plant of a lower capacity than under the project activity, which processes only non-associated gas and no recovered gas, is not a viable alternative as a baseline scenario since apart from the associated gas recovered from the oil production, there are no other sources of gas in Block 15 and Block 31, as demonstrated by the production records /5/ /6/ /7/.

P3 – Supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure is not a viable alternative as a baseline scenario since it requires some investment and, having the oil fields so remotely located (Section 4.2 above) with respect to the only existing facility in Ecuador for this purpose (Shushufindi Plant from EP PETROECUADOR /18/), and the uncertainty of the quality and amount of the associated gas available /6/, thus creating a business risk for pursuing this alternative which is too high.

P5 – Supplying recovered gas to a gas pipeline without prior processing and without being registered as a CDM project activity, is not an alternative since there is no pipeline or infrastructure for this, and the situation will be similar as for P3 above.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and DNV is of the opinion that the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario is correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

4.6 Additionality

The project demonstrates additionality in accordance with the requirements of AM0009 and by applying the "Tool for demonstration and assessment of additionality", version 05.2 /27/ in order to assess the additionality of the proposed project activity.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

The project starting date is 12 Feb 2009, when the board of directors of PETROAMAZONAS EP confirms the availability of the initial funds for the project activity /8/.

According to the “Guidelines on the demonstration and assessment of prior consideration of the CDM” /30/ version 01, project activities with a starting date on or after 2 August 2008, the project participant must inform a Host Party DNA and/or the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date and shall contain the precise geographical location and a brief description of the proposed project activity. PETROAMAZONAS EP submitted on 18 March 2009 an official letter to the Ministry of the

Environment (the Ecuadorian DNA) /4/ informing its intentions to seek a CDM status for the project activity and complying with the notification requirements of the above UNFCCC Guidelines /30/. Approximately one month later, the DNA confirmed receipt of PETROAMAZONAS letter /4/ indicating that the proposed project will be considered as a CDM project activity.

It should be noted that the "Guidelines on the demonstration and assessment of prior consideration of the CDM" /30/ were modified during the EB meeting 48 to version 02, and as of 17 Jul 2009 it is required that the project proponents notifies both the Host Party DNA and the UNFCCC Secretariat. However, according to version 01 of said guideline, which was the version in effect at the time of the project start date and the time the notification was submitted, a notification to the host Party DNA was sufficient. Thus DNV considers that the PP of the project activity complied with the UNFCCC requirements in force at the time of issuing the corresponding notification /4/ to the Host Party DNA.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

4.6.2 Identification of alternatives to the project activity

The identification of each and all of the alternatives to the project activity has been included under the analysis made in section 4.5 above (Baseline Scenario Identification). This analysis in accordance with step 1 and 2 described in AM0009 concludes that the only alternative scenarios that are feasible in technical terms are

1) flaring of the associated gas at the oil production sites (G2) which represents the continuation of the operation of the existing oil and gas infrastructure without processing of any associated gas (P4)

2) implementation of a gas pre-treatment equipment (P1) for on-site use of the associated gas for power generation (G3 or G8) as in the project activity, without being registered as a CDM project activity;

DNV considers the listed alternatives to be credible and complete.

4.6.3 Investment analysis

In accordance with step 3 described in AM0009 the economic attractiveness is assessed by determining an expected Internal Rate of Return (IRR), following the guidance for the investment analysis in the latest approved version of the "Tool for the demonstration and assessment of additionality", version 05.2 /27/. Since the proposed baseline scenario (baseline alternative 1 above) does not involve any investment, the economic attractiveness of the project activity (baseline alternative 2 above) is determined by evaluating the investment costs and incremental operational costs and savings of the project activity in comparison to the proposed baseline scenario.

It should be noted that the oil & gas forecast (projections) values /10/ used within the investment analysis are those that were available at the time of the decision to proceed with the project activity, while the oil & gas forecast (projections) values /10/ used in the emission reduction calculations are based on the latest available information. Therefore, there are some small variations between these 2 sets of data (forecast/projections) and the corresponding calculations based on each one of these respectively, due to the same nature/variability of any forecast made at 2 different points in time.

Choice of approach

A benchmark analysis (comparison of IRR with a benchmark) was selected. Besides considering the cost of equipment, the revenues of the project activity /3/ are based on the savings of liquid fossil fuel (diesel) /11/ which would have otherwise been used for the on-site power (electricity) generation /6/ to satisfy to the extent possible the energy demands (on-site consumption). Thus the choice of approach by the project proponent is appropriate.

Benchmark selection

A project will be financially attractive or acceptable when the IRR /3/ (financial measure of its returns) is better than the benchmark IRR used /11/. In the case of the proposed project activity, both the project and the benchmark refer to project IRR. The project benchmark /11/ is selected in accordance with one of the approaches stipulated by the "Tool for the demonstration and assessment of additionality", version 05.2 /27/, i.e. government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type. The average between January 2007 and January 2009 of the 20 year maturity US Treasury Bonds rate /11/, adjusted by the country risk, as per the Central Bank of Ecuador /11/, were applied to determine a project benchmark of 16%.

It is DNV's opinion that the choice of benchmark is adequate for the project activity, given that it is based on the returns of a known financial instrument (US Treasury Bonds), adjusted to the specific conditions (boundary) of the project activity (country risk). Furthermore, comparing this IRR benchmark with the internal discount rate for similar investments pursued by PAM (12% /21/), it seems also reasonable that a higher IRR is also expected for the project activity, because it is the first-of-its-kind project. It is therefore DNV's opinion that the benchmark chosen is appropriate and suitable for the project activity.

Input parameters

The profitability of the project activity is based on the revenues /3/ derived from the savings of liquid fossil fuel (diesel) /11/ that otherwise would be used for the on-site power (electricity) generation /6/, in order to satisfy to the extent possible the energy demands (on-site consumption). There is not an agreed upon price for associated gas in Ecuador; therefore, the gas has no monetary value. Moreover, the investment analysis represents the economic attractiveness of the project in the perspective of PETROAMAZONAS EP. Given the legal framework for oil exploration in Ecuador /12/ and the approval from the Ministry of Mines and Petroleum, via the Directorate of Hydrocarbons /11/, PETROAMAZONAS EP has no direct economic benefits from savings in crude oil and crude oil savings as a result of the project activity are thus not considered in the investment analysis (refer CL 38 in Table 3 in Appendix A)

Thus the input parameters affecting the profitability of the project and used in the investment analysis are as follows:

1) Amount/volume and characteristics of gas available for power generation. The amount of power (electricity) that can be generated out of the gas depends on the volume of gas available and the characteristics of the same, basically the NCV of the gas. The volume of gas available is linked to the oil production, hence associated gas, while the NCV of the gas is a property of the gas which tends to remain constant for the gas produced from within a given oil well.

a. Oil production.

The oil production forecast/projections, and hence the production of associated gas, has been provided by the Operations Department of PETROAMAZONAS /10/. From here it can be seen that for the ILYP fields/reservoirs the expected fluid (oil & water) production per day for 2012, for example, is 319 616 bbl/day, with an oil production of 32 174 bbl/day for a water cut of 88.8%, and from which the associated gas is estimated to be 7.2 million of SCFD with a Gas-Oil Ratio (GOR) of 225 cubic feet/bbl. The forecast of the oil production show a decline which by 2019 results in an oil production of 6 953 bbl/day (water cut of 95.8 %,) and a gas production of 1.5 million of SCFD or the same GOR. For the fields/reservoirs of Eden Yuturi, Block 31 and Pañacocha, the projected daily gas production for 2012 is 6,9 million of SCFD, which by 2019 declines to 2.5 million of SCFD. Although there is some uncertainty in projections of the oil production, and even more in the forecast of the gas production, as part of the assessment of the forecast estimations, DNV compared the production forecast /10/ with the historical production values /6/ and found a reasonable match between the values presented in both documents.

b. NCV of the gas.

The NCV of the gas is an inherent property of the gas and determines the amount of energy it has within. Considering that the gas comes in batches to the gas processing facility, the composition of the gas is determining factor to the NCV of the batch of gas. The gas composition (share of methane, CO_2, butane, and propane) is essential whereby this varies overtime and sometimes even abruptly depending on which wells are on line, maturity of the fields, reservoirs that are being tapped into, etc. However, for the purpose of production forecasting, it is common to consider all the gas from within the same reservoir as “one unit”, and therefore it is considered to be constant for that particular reservoir /6/ /7/.

2) On-site power requirements for operations.
The associated gas will be used to generate electricity to satisfy the power demands of the operations within the oil fields. The current situation /5/ /6/ /7/ and the production forecast /10/ show that there is not enough gas production to satisfy 100% the operational power requirements. However, it is here where the commercial benefits of the project activity will be most clearly seen, through the savings of the liquid fossil fuel (diesel) achieved by utilizing associated gas for power generation instead of the diesel. Thus the power requirements for the operations of PETROAMAZONAS within the project boundary (Block 15 and Block 31) were also estimated as part of the projections made by the Operations department of PETROAMAZONAS /10/, and compared with historical values for validation purposes /5/ /6/ /7/. Thus, for 2012, for example, the total power and energy demand for operations is approximately: 75.746 MW installed capacity and 663 535 MWh/year, from where 392 448 GWh/year will be generated from associated gas. By 2019, the contribution of generation from associated gas is expected to decline to approximately 101 797 MWh/year /10/.

3) Diesel price.

In Ecuador, the commercialization of the diesel is controlled/regulated via Petrocomercial, a daughter company of EP PETROECUADOR Thus based on the invoices issued by Petrocomercial, the price paid by PETROAMAZONAS for the diesel between Dec 2008 and Mar 2009 was 0.91 USD/gallon /11/. As stated above, the associated gas available will not be sufficient to meet power requirements for the operations of PETROAMAZONAS within the project boundary. Diesel being produced by the topping plan will thus continue to be used for power generation and the project will thus not impact the use of associated gas in the topping plant. Moreover, PETROAMAZONAS EP will continue to have to purchase diesel for power generation. However, the project will reduce diesel purchases and the savings due to the project activity are thus appropriately considered with the price PETROAMAZONAS EP pays for diesel.

4) Capital expenditures (CAPEX)/Investment.

   Given the constituency of PETROAMAZONAS (non-profit, state owned company), all capital expenditures have to be approved by the Ministry of Finance, via the so called Allocation of Funds for Projects (AFP acronym from the Spanish name). During the site visit, DNV was able to verify via the internal accounting system of PETROAMAZONAS the validity of the accounting of such funds against the expenditures of the project activity. Each of these AFPs /11/ has an account number against which the corresponding costs are charged. The total investment costs are $81 671 975 USD, and DNV has been able to verify via purchase orders issued for some of the services incurred /11/and some of the equipment bought /11/ that actual costs are the same or higher that those originally budgeted. As per the end of 2010, PETROAMAZONAS has spent 66.4% of the budgeted amount /11/. Thus the estimated investment amount seems reasonable and is realistic.

5) Project's lifetime

   The lifetime of the project has been estimated as per the depreciation law in Ecuador /12/, resulting in a project lifetime of 10 years equivalent to 120 months /3/ (In the calculation it is shown a total 11 years since the first and last year are only fractions of a full year). Furthermore, it should be noted that the salvage value of the project is added at last year, see below. Based on the above, it is DNV opinion that the project estimation is reasonable.

6) Residual (Salvage) value.

   Given that the lifetime of the project has been estimated based on the book value depreciation as per the corresponding law in Ecuador /12/, a salvage or residual value of the investment has been added at the end of the last year of the investment analysis. Such residual value has been estimated to be: $10 042 566, and DNV is of the opinion that this value is reasonable and reflects the generally accepted accounting principles (GAAP) and it is in accordance with the corresponding law in Ecuador.

Calculation and conclusion

DNV received the investment analysis spreadsheet /3/ from the PP. It was verified and found to be correct by DNV, and it specifies the references for each of the input values therein. The main assumption used in the calculations regards to the oil production forecast and the amount of electricity that can be generated from the corresponding gas

recovered. However, based on the documentation presented (see point 1 under Input Parameters above) it is DNV opinion that such assumption is reasonable and correct for the project activity and consistent with general oil production projections /10/. Finally, investment analysis has been calculated over 11 years, from 2009 where the initial expenditures took place, until 2019 where the residual book value of the assents was added.

Sensitivity analysis

The key input parameters that contribute by more than 20% to cost or revenue in any year have been varied, so that the IRR reaches the benchmark. The resulting values of such analysis are as follows:

- Investment (capital expenditure). For the project IRR to reach the benchmark IRR based on the variation of the investment costs, these need to be reduced by 35.9%. A change like this is not only counterintuitive, but also not realistic since DNV can confirm that according to the evidence presented the inflation rate in Ecuador /11/ and the trend of the costs incurred so far in the project activity /11/ shows that the investment will be higher, rather than lower than the values presented in the investment analysis. Therefore it is not possible for the PP to reduce the investment costs by 35.9% in order for the project activity to reach the benchmark value.
- Diesel price. For the project IRR to reach the benchmark IRR based on the variation of the price of diesel, this has to increase by +59%. The diesel price is determined by the government and has been kept stable during the last 6 years /11/, and DNV found no indication from the government to change the current price level, and even less to have an increase of almost 60%.
- Gas production increase. For the project IRR to reach the benchmark IRR based on the variation of the amount of gas available, this has to increase by 121% for bringing the project IRR up to 7.48%. Higher production rates of the associated gas beyond an increase of 121% will have no effect in the profitability since the current electricity generation installed capacity is determined based on the associated gas forecast and there is no more generation capacity (surplus). The current associated gas projections are based on the forecasted values of the oil fields adjusted/corrected to actual production values.

  It should be mentioned that the changes observed in the calculations from year 2014 and onwards are due to the prognosis of gas production increase for the ILYP fields, limited by the gas consumption capacity of the electricity generators. These fields are the oldest within the project activity and have been under production for several years, therefore the potential increase in gas production shown by the prognosis takes place after 2013. Thus, the actual additional savings in purchase of diesel originated by the extra production of gas for these fields are estimated to be possible only from 2014 and onwards.

  DNV is of the opinion that this or a higher increase in the amount of associated gas available for electricity generation is not realistic.
- Additional electricity generation capacity. For the project IRR to reach the benchmark IRR based on the variation of the electricity generation capacity, this has to increase by 240% for bringing the project IRR up to 9.71%. An increase in the electricity

generation installed capacity of this magnitude (+240%) will only bring the IRR up to a value of 9.71%. However, this also implies that the corresponding associated gas for this purpose is also available, but as explained above an increase of the gas production of 121% is already unlikely, thus the gas production projections do not support such increase of the electricity generation capacity scenario, and therefore it is considered unlikely.

In conclusion, the investment analysis and sensitivity assessment have shown that the project activity is not the most financially attractive option without the CDM benefits.

4.6.4 Common practice analysis

The geographical area considered for the common practice analysis is limited to Ecuador, mainly due to the legislation for the exploitation of hydrocarbons being particular for each (and most) countries.

In Ecuador, the government authorize and supervise each and all activities related to the oil industry via the Ministry of Mines and Petroleum, the National Directorate of Hydrocarbons (DNH, acronym from the Spanish name), and EP PETROECUADOR. PETROAMAZONAS has a legal mandate /12/ to undertake the oil exploration and production activities within the allocated Blocks /15/, from which Block 15 and Block 31 are within the boundaries of the project activity. All use and handling of the oil and gas extracted/produced is regulated, and in the case of the associated gas, PETROAMAZONAS receives annually an authorization from the DNH to burn the associated gas /12/. Likewise, other oil & gas operators in Ecuador need to have clear instructions from the government regarding what to do (how to proceed) with the hydrocarbons produced, even those for (on-site) own consumption. DNV has been able to verify through the site visit and the evidence provided by the PP that there is only one plant built exclusively for the purpose of refining associated gas (or natural gas) for further use, the Industrial Complex of Sushifindi /18/, belonging to EP PETROECUADOR. Furthermore, this plant was designed as such as a greenfield, opposite to the project activity that attempts to modify a brownfield from flaring to implement the project activity with gas processing (hence the first-of-its kind condition). In addition, the distance from the Sushifindi plant to the project site, the investment required for transporting the gas to the plant, the uncertainty on the quality and stability of the supply of associated gas, and the eventual decay of the gas reserves over the next 10 years, does not permit to consider this option as a plausible alternative to the project activity.

Based on the evidence presented for validation, DNV has been able to verify that the common practice in Ecuador is to burn the associated gas /7/, and utilization of gas for on-site consumption is not common practice in established oil fields. Any operator that uses associated gas for the on-site energy needs has considered this option at the design stage of the development of the oil field infrastructure (Greenfield projects). Furthermore, the Ministry of Non-Renewable Natural Resources confirms that the proposed CDM project activity is the first-of-its-kind in Ecuador /7/, thus confirming that the on-site utilization of associated gas to supply the energy requirements of existing oil exploration is not the common practice in Ecuador.

Finally, DNV is of the opinion that the evidence submitted supports the arguments presented by the PP, and that these sufficiently demonstrate the project's additionality, i.e. its ability to reduce anthropogenic emissions of greenhouse gases by sources below those that would have occurred in the absence of the registered CDM project activity.

4.7 Monitoring

The project applies the approved methodology AM0009 version 4.0, *Recovery and utilization of gas from oil wells that would otherwise be flared or vented* /26/, and the selected monitoring methodology is applicable for this project. The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions. The PDD provides a brief description of monitoring procedures to address the following issues:

- registration, monitoring, measurement and reporting procedures
- procedures for maintenance of monitoring equipment and installations including description of calibration intervals.
- procedures for cases of emergencies
- procedures for reviewing and storing of the monitoring gained information, data and results, including reviewing periodicity and the responsible person (position)

The environmental impacts are considered minor and will be monitored via the internal environmental audits /17/ during the project lifetime.

The project monitoring plan is in compliance with the monitoring methodology AM0009 (version 4.0).

It is DNV's opinion, that he monitoring plan is feasible and that the project participant are able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

The methodology requires to determine ex-ante the CO_2 emission factor for the methane ($EF_{CO2,Methane}$). The methodology also provides the value to be used: 49. 55 tCO2/TJ, which comes from the Energy Information Administration (EIA), Department of Energy.

Also, given that the PP wants to have the flexibility to either calculate electricity consumption (approach 1) or measure electricity consumption (approach 2) the project emissions *ex-post*, or a combination of these 2 approaches but respecting the conservativity principle, then the emission factor for electricity generation (for source *j* in year *y*) for the associated gas handling equipment, is also specified *ex-ante* as 1.3 tCO_2/MWh, i.e. the default value that may be applied according to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /28/.

In case of measuring the electricity consumption to determine the project emissions (see approach 2 below under project emissions), the emission factor for electricity generation will be determined based on the total electricity generation and the total fuel consumption for electricity generation. For this case, the NCVs for the diesel (42.3 TJ/Gg) and crude oil (43.0 TJ/Gg) taken from "2006 IPCC Guidlines for National Greenhouse Gas Inventories, Volume 2: Energy", Table 1. 2 will be used and remain unchanged over the crediting period. Likewise, the emission factors for the diesel (74.1 tCO_2/TJ) and crude oil (73.3 tCO_2/TJ) taken from

"2006 IPCC Guidlines for National Greenhouse Gas Inventories, Volume 2: Energy", Table 1.4 will be used and remain unchanged over the crediting period.

4.7.2 Parameters monitored ex-post

Given that the project is still under construction and not all the characteristics of the equipment are yet known, the monitoring plan provides for determining the project emissions ex-post based on either: a) the calculation of the electricity consumption by the gas processing equipment (referred to in the PDD as Approach 1), or b) by means of measuring the electricity consumption (Approach 2).

As per PDD /1/ chapter B.7.1 the following parameters will be monitored:

- $V_{F,y}$: Volume of total recovered gas measured at point F (corresponding to Figure No. 2 in approved methodology /26/), after pre –treatment and before it is consumed on-site for energy (electricity) generation, during the period y.
- $NCV_{RG,F,y}$: Net calorific value of recovered gas measured at point F (corresponding to Figure No. 2 in approved methodology /26/) during the period y.
- $EC_{PJ,j,y}$: Quantity of electricity consumed by the gas processing equipment (pre-treatment) of the project activity. In the case that Approach 1 is followed this parameter will be calculated based on the nominal consumption rate of the installed gas processing equipment at 100% load factor, adjusted by the amount of gas that can be consumed by the electricity generation equipment, based on the installed capacity and 100% load factor. In case that Approach 2 is followed the electricity consumption of the gas processing equipment will be measured.
- $EN_{aux,\ y}$: Nominal capacity (electricity consumption rate) of the gas processing equipment (pre-treatment). Considering that Approach 1 is followed, this parameter will be determined based on the nominal plates from the installed equipment.
- $EN_{gas,j,y}$: Nominal capacity (electricity generation) of the gas-based electricity generators j in the year y. Considering that Approach 1 is followed, this parameter will be determined based on the nominal plates from the installed generators.
- $EG_{gas,\ j,y}$: Quantity of electricity generated by gas-based electricity generators j in the year y. Considering that Approach 2 is followed, the data will be taken from electricity meters at gas-based energy generators
- $FC_{n,i,t}$: Quantity of fossil fuel type i fired in the captive power plant n in the time period t. Considering that Approach 2 is followed, this parameter will be either: measured by a mass/flow meter, or, obtained from the invoices issued for the corresponding fuel.
- $EG_{n,\ t}$: Quantity of electricity generated in captive power plant n in the time period t. Considering that Approach 2 is followed, this parameter will be measured.

It should be mentioned that the project activity indicates the F point(s) at the following facilities (see Annex 5 of PDD /1/):

- CPF x 1

- LPF x 1
- Paka Sur x 1
- Eden Yuturi x 2

In the case of following approach 1, the PP will use a factor of 100% load regarding the operating time of the equipment, which is a conservative estimate. Also regarding the emission factor, it will be calculated as indicated in Approach 2 (which is in line with the approved methodology), or it will be assumed to be the default value specified by the methodology, namely 1.3 tCO_2/MWh.

4.7.3 Management system and quality assurance

A brief description of the management structure of the project activity and the main roles and duties is provided in the monitoring plan section of PDD.

The OGE Project Director or Maintenance Manager will be responsible for the overall process of the emission reduction estimations and issuing the corresponding monitoring report.

The CDM Supervisor is responsible for ensuring compliance with the monitoring plan, correctness of the data collected, monitoring and auditing internal activities and external factors, such as regulatory issues, that could have an impact on the project activity. Also, the CDM Project Manager will be responsible for structuring and overseeing all the data collection activities, measurements, calibration and reporting in line with the monitoring plan

The PDD presents provisions for training and other QA/QC procedures such as data collection, reconciliation and storing, equipment calibration, etc., to ensure the proper management and operation of the project activity.

The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

4.8 Algorithms and/or formulae used to determine emission reductions

As per the approved methodology /26/, the baseline emissions are calculated as follows:

BASELINE EMISSIONS:

$$BE_y = V_{F,y} \bullet NCV_{RG,F,y} \bullet EF_{CO_2,Methane}$$

Where:

BE_y	=	Baseline emissions during the period y, (tCO2e)
$V_{F,,y}$	=	Volume of total recovered gas measured at point F (Figure No.2 of approved methodology /26/), after pre-treatment and before on-site consumption for energy production, during the period y, (Nm^3)
$NCV_{RG,\,F,\,y}$	=	Net calorific value of recovered gas measured at point F (Figure No.2 of approved methodology /26/) during the period y, (TJ/Nm^3)
$EF_{CO2,\,Methane}$	=	CO_2 emission factor for methane (tCO_2/TJ)

However, in the emission reduction calculations presented for validation the volumes of total recovered gas to be measured at point F are estimated as follows:

The calculations are divided in 2 sections as follows:

- ILYP Production and electricity demand estimations
- Eden Yuturi, Block 31 and Pañacocha Production electricity demand estimations

For both sections, DNV can confirm that the forecast of the oil and gas production, and the forecast of electricity demand for each area, are both based on the "Production Forecast Memorando No. PAM-EP-OPR-OGE-2010-00004" issued by the Operations Department of PETROAMAZONAS /10/. DNV was able to confirm during the site visit, that the normal practice in PETROAMAZONAS is to prepare a 5 years forecast, which it is submitted to the government of Ecuador, that in turns validates the estimations and includes it into the estimations of the national oil & gas reserves. However, given the need of the having data beyond the 5 years normal forecast, the Operations Department of PETROAMAZONAS extended the normal 5 years forecast to include all the lifetime of the project activity, resulting in a forecast from 2010 to 2019. The forecast presents 2 scenarios: one conservative and one most probable scenario, and the emission reductions calculations are based on the most probable scenario.

Thus, the baseline scenario is the annual gas production forecast taken from the production forecast /10/ that would be flared in the absence of the project activity. In the case of ILYP, the annual gas consumption by the topping plant to produce diesel for local consumption /6/ is subtracted from the annual forecast since the topping plant will not be impacted by the project and will continue to utilize part of the associated gas available. This results in a forecasted amount of 2 091.3 million cubic feet/year for 2012, for example, while in the case of Eden Yuturi, Block 31 and Pañacocha the baseline scenario forecasted amount for 2012 is 3 033.8 million cubic feet/year, resulting in a total baseline scenario forecast of 5 125.1 million cubic feet/year. It should be noticed that during the years 2009 – 2011 for ILYP, and 2009 – 2013 for Eden Yuturi, Pañacocha and Block 31, the project does not have yet sufficient generation capacity installed in order to consume all the associated gas available for electricity generation. This implies that during these periods, some of the associated gas available for electricity generation will also be flared, and correspondingly this amount of gas is discounted from the ER calculations, For the year 2012, for example, such reduction is equal to 557 million cubic feet/year. Thus, under the above considerations, the annual volume of gas that would have been flared in the absence of the project activity measured at point F in 2012, for example, is equal to 129,4 million m^3/year, which multiplied by the estimated $NCV_{RG,\ F,\ 2012}$ /11/, and the esmission factor indicated in the approved methodology /26/, results in an estimated annual total baseline emissions in the absence the project activity of 215 114 tCO_2 for 2012, for example.

LEAKAGE EMISSIONS:

As per the approved methodology /26/, the leakage emissions are deemed to be zero.

PROJECT EMISSIONS:

$$PE_y = PE_{CO_2,fossilfuels,y} + PE_{co_2,elec,y}$$

Where:

PE_y = Project emissions in the period y, (tCO_2e)

$PE_{CO2,fossilfuels,y}$ = CO_2 emissions due to consumption of fossil fuels for the recovery, re-treatment, transportation, and, if applicable, compression of the recovered gas up to the points A and C in Figure No.2 of approved methodology /26/ during the period y, (tCO_2e), calculated applying the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /29/ where process j corresponds to a source of fuel combustion (e.g. a compressor, etc).

$PE_{CO2,elec,y}$ = CO_2 emissions due to the use of electricity for recovery, pre-treatment, transportation and, if applicable, compression of the recovered gas up to the points A and C in Figure No.2 of approved methodology /26/ during the period y, (tCO_2e), calculated applying the latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /28/.

The project activity doesn't utilize any fossil fuel to drive auxiliary systems related to the project activity, but rather generates electricity from associated gas to power such auxiliary systems (mainly gas handling equipment, pre-treatment). Thus,

$$PE_y = PE_{co_2,elec,y} = \sum_j EC_{PJ,j,y} \bullet EF_{EL,j,y} \bullet \left(1 + TDL_{j,y}\right)$$

Where:

$PE_{CO2,elec,y}$ = Project emissions from electricity consumption in year y (tCO_2/y)

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project's electricity consumption source j in year y (MWh/yr) – gas processing equipment (pre-treatment)

$EF_{EL,j,y}$ = Emission factor for electricity generation for source j in year y (tCO_2/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to project's gas handling equipment (pre-treatment) j in year y. As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) /28/, the project falls under scenario B ("Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s)"). TDL is assumed as zero for the both approaches.

j = sources of electricity consumption

However, given that the project is still under construction and not all the characteristics of the equipment are yet known, the project emissions will be estimated *ex-post* once based on either of the following 2 approaches,:

- Approach 1 – Calculation of the electricity consumption by the gas processing equipment.

- Approach 2 – Measurement of the electricity consumption by the gas processing equipment.

Under approach 1, the electricity consumption of the gas handling equipment (pre-treatment) will be calculated as follows:

$$EC_{PJ,j,y} = \left(EN_{aux,y} \bullet 8760\right) \bullet \frac{EG_{gas,j,y}}{EN_{gas,y} \bullet 8760}$$

Where:

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project's electricity consumption source j in year y (MWh/yr) – gas processing equipment (pre-treatment)

$EN_{aux,y}$ = Nominal (rated) consumption of auxiliary (gas handling) equipment (MW) in year y

$EG_{gas,j,y}$ = Quantity of electricity generated by gas-based electricity generators (MWh) j in the year y

$EN_{gas,j,y}$ = Nominal capacity of gas-based electricity generating equipment (MW) in year y

j = sources of electricity consumption

8760 = hours in a year

In this case it is conservatively assumed that the load factor is 100%. It is DNV's opinion that this conservativeness compensates for uncertainty introduced by the calculating approach compared to measuring the electricity consumption.

Under approach 2 where the electricity consumption ($EC_{PJ,j,y}$) will be measured, the emission factor ($EF_{EL,j,y}$) will be determined as follows:

$$EF_{EL,j,y} = \frac{\sum_n \sum_i FC_{n,i,t} \bullet NCV_{i,t} \bullet EF_{CO2,i,t}}{\sum_n EG_{n,t}}$$

Where:

$EF_{EL,j,y}$ = Emission factor for electricity generation for source j in year y (tCO_2/MWh)

$FC_{n.i.t}$ = Quantity of fossil fuel type i (associated gas, diesel or crude oil) fired in the captive power plant n in the time period t (mass or volume unit)

$NCV_{i,t}$ = Average net calorific value of fossil fuel type i (for associated gas only. Diesel and crude oil respective NCVs are determined *ex-ante*) used in the period t (GJ / mass or volume unit)

$EF_{CO2,i,t}$	= Average CO_2 emission factor of fossil fuel type i (Associated gas, diesel and crude oil respective emission factors are determined *ex-ante*) used in the period t (tCO_2 / GJ)
$EG_{n,t}$	= Quantity of electricity generated in captive power plant n in the time period t (MWh)
i	= Fossil fuel types fired in captive power plant n in the time period t
j	= Sources of electricity consumption in the project
n	= Fossil fuel fired captive power plants installed at the site of the electricity consumption project source
t	= Time period for which the emission factor for electricity generation is determined.

EMISSIONS REDUCTIONS:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in the period y (t CO_2e)
BE_y	=	Baseline emissions in the period y (t CO_2e)
PEy	=	Project emissions in the period y (t CO2e)

Regarding the project emissions presented in the emission reductions calculations spreadsheet, these are calculated as follows:

1) The following calculations are determined separately for both: the ILYP, and, the EDEN Yuturi (EY) & Block 31 fields respectively.
2) From the production forecast provided by PETROAMAZONAS operations department /10/ it is extracted the total fluid and water production as well as the electricity demand for the years 2010-2019. The equivalent information for the year 2009 is taken from the quinquennial plan 2008-2012 /10/, while for the years 2020-2021, this information is determined as the value of the previous year minus the average reduction (change) of the previous 5 years.
3) Based on the values resulting from point 2) above, the annual oil production and the corresponding associated gas (according the GOR) are determined.

Baseline scenario:

4) The baseline emissions are estimated on the basis of flaring all the associated gas produced as per the production forecast (point 2 above), minus the gas flared due to generation capacity limitations. The average annual associated gas estimated during the time horizon of the project activity is: 994,9 million ft^3 for ILYP, and, 1 328,5 million ft^3 for EY/Block 31.

Project scenario:

5) The project emissions are determined based on both: the power requirements for operations of the oil fields and energy that can be obtained from the available associated gas as per the production forecast (point 2 above).

6) At the beginning of the project some gas is still flared due to the time required for completing 100% the construction of the project. However, as the implementation of the project activity progresses, the amount of associated gas flared is lower since this is utilized for electricity generation. Thus by 2012 when the project is fully implemented, all the associated available to the project activity will be used for electricity generation. Only the gas used for electricity generation is subtracted from the baseline estimations. It should be mentioned that regarding the associated gas handling equipment, the design of the project activity includes 20% extra processing capacity for back-up purposes.
7) The calculations in point 6 above, result in following values:
   For ILYP:
   a) an average annual electricity generation from associated gas of 89 325 MWh/y,
   b) an installed generation capacity 27 500 kW, that will have a maximum annual production of 192 720 MWh/y

   For EY/Block 31
   c) an average annual electricity generation from associated gas of 125 904 MWh/y,
   d) an installed generation capacity 33 500 kW, that will have a maximum annual production of 234 768 MWh/y

Emissions reductions calculations for ILYP, EY and Block 31:

8) The baseline emissions are estimated as the product of the volume of associated gas flared, multiplied by its corresponding NCV (33.55 MJ/m^3, based on 900 BTU/ft^3, as per the values estimated for the oil fields –"KPI Net calorific value" /6/ and the conversion values to MJ/m^3 from US National Institute for Standards and Technology /6/), then multiplied by the methane emission factor (49.55 tCO_2/TJ, as defined by the approved methodology /26/), resulting in an annual average of 109 399 tCO_2 over the time horizon of the project activity, 2009 – 2021 (114 908 tCO_2 over the chosen crediting period).
9) The project emissions are calculated as per the formulae presented under the project emissions section above, Approach 1, which results in an estimated annual average project emissions for the project's time horizon of 18 962 tCO_2 (17 888 tCO_2 over the chosen crediting period)..
10) All this resulting in an average emission reduction estimate during the time horizon of the project activity (2009-2021) of 90 437 tCO_2,(97 019 tCO_2 during the chosen crediting period).

Based on the calculations and results presented in the sections above, the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 97 019 tCO_2e per year for the selected crediting period (2012 – 2021).

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All

estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

The project's impact on discharge of effluents, solid waste management, emissions, air quality, noise level, electromagnetic fields and social aspects has been discussed in the PDD. The project is regulated under the Ecuadorian environmental law /12/, and the compliance with it is ensured/monitored via periodical environmental audits by the Ministry of Environment. During the validation process DNV was provided with one report of such environmental audits done in March 2009 upon the environmental management procedures related to power generation activities in Block 15 during 2008 /17/.

DNV was able to verify possible environmental impacts via the environmental internal audit /17/ and its approval /19/, and through the site visit. DNV is of the opinion that the impacts are properly described in the PDD, and no adverse impacts from the project activity can be expected.

4.10 Comments by local stakeholders

The PP performed 2 local stakeholders' information meetings: one in the area of Eden Yuturi on 27 Jan 2010 and the other one in the area of Limoncocha on 28 Jan 2010 /13/. During these meetings the PP informed the people present about the intentions of PETROAMAZONAS to develop the project activity, the project itself was presented, its impact and other related issues.

During the site visit, DNV was provided with the list of participants of those meetings /13/, and through the interviews arranged during the site visit, DNV was able to confirm that some of the people present at the meetings organized by PETROAMAZONAS was also present at the interviews. All the interviewed people, and in particular those present at the information meetings arranged by PETROAMAZONAS, were able to confirm that the information given by PETROAMAZONAS in the information meetings was as per the information given to DNV, that the project activity is well accepted by the local communities, and it is seen as positive actions from PETROAMAZONAS to address issues/concerns they have expressed to PETROAMAZONAS already before the conception of the project activity, among others the flaring of the gas.

DNV is of the opinion that the stakeholders' consultation is done by an appropriate medium and that a relevant selection of stakeholders has been made, and therefore, DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01.1, dated: 07 June 2010, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website[*] invited to provide comments during a 30 days period from 09 Jun 2010 to 08 Jul 2010.

No comments were received.

[*] http://cdm.unfccc.int/Projects/Validation/DB/VDUHQH9F7NQSBQLH7APAEI7NM5D6ES/view.html

- o0o -

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	No public funding from Annex I Party involved
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements checklist

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity						
A.1	**Title of the project activity (VVM para 55-57)**					
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes		OK
A.2	**Description of the project activity (VVM para 58-64)**					
A.2.1	How was the design of the project assessed?	/1/	DR	*What type is the project?* ☒ Project in existing facility or utilizing existing equipment(s) ☒ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO_2e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO_2e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis. ☐ The project is an individual small scale project activity with emission reductions		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				not exceeding 15 000 tCO_2e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☐ Reviewing available designs and feasibility studies		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	Not applicable – the project is not a green field project.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:	/1/	DR	Not applicable – the project is not a small scale project	~~CL 2~~ ~~CL 3~~ ~~CL 4~~	OK
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR	Yes. The objective of the proposed CDM project activity is to reduce the GHG emissions as a result of reducing the flaring of associated gas within Block 15 and Block 31 in Ecuador, by conditioning and further utilizing it for electricity generation. The field “Pañacocha” is within Block 15 and such it is confusing to specify it in the text where the Block 15 is mentioned in general. Likewise, block 31 is not yet into production and the text has to be revised accordingly.	~~CL 1~~ ~~CL 42~~	OK
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	Yes, in Annex 5 of the PDD it is listed the equipment and described the conditions of the same prior to the proposed CDM project activity and how it is intended to be dealt with due to the	~~CL 35~~ ~~CL 39~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				CDM proposed project activity.		
A.2.6	Does the project design engineering reflect current good practices?	/1/	DR	Yes, the PP has involved international companies with proven track records each in their fields of expertise, which reflects the reliability and good design and implementation of the systems and equipments to be implemented in the proposed CDM project activity.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/	DR	Yes, given that some of the involved suppliers are companies from Annex I countries such as Wärtsilä Finland Oy (Finland) /31/, and ABB (Swiss-Sweden)/32/, among others, who bring their expertise to Ecuador to be utilized/implemented in this project, it can be concluded that there is a technology transfer from Annex I Party caused by the proposed CDM project. Furthermore, since the proposed technology implies the utilization of associated gas for power generation, this will increase the performance of the oil related activities of the PP by utilization a waste by-product (associated gas) for power generation instead of the current practice of consuming liquid fossil thus reducing the amount of GHG emissions.	~~CL 6~~	OK
A.3	**Participation requirements (VVM para 51-54, 125-127)**					
A.3.1	Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			OK

	Ecuador (host)	Sweden	Finland
a) Party has ratified the Kyoto Protocol	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
b) Party has designated a Designated National Authority	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
c) The assigned amount has been determined	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.3.2 Do the letters of approval meet the following requirements?	/1/ /22/ /23/ /24/	DR		~~CAR 1~~ ~~CAR 2~~	OK
	Ecuador (host)		Sweden	Finland	
a) LoA confirms that Party has ratified the Kyoto Protocol	☒ Yes ☐ No		☒ Yes ☐ No	☒ Yes ☐ No	
b) LoA confirms that participation is voluntary	☒ Yes ☐ No		☒ Yes ☐ No	☒ Yes ☐ No	
c) The LoA confirms that the project contributes to the sustainable development of the host country?	☒ Yes ☐ No		NA	NA	
d) The LoA refers to the precise project activity title in the PDD	☒ Yes ☐ No		☒ Yes ☐ No	☒ Yes ☐ No	
e) The LoA is unconditional with respect to (a) to (d) above	☒ Yes ☐ No		☒ Yes ☐ No	☒ Yes ☐ No	
f) The LoA is issued by the respective Party's DNA	☒ Yes ☐ No		☒ Yes ☐ No	☒ Yes ☐ No	
g) The LoA was received directly by the DNA or the PP	☐ DNA ☒ PP		☐ DNA ☒ PP	☐ DNA ☒ PP	
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic					
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	The PP shall present the LoA from Annex I country authorizing the corresponding participants.	~~CAR 1~~	OK
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/	DR	The PP shall provide the precise coordinates that together define the precise location of the project and its boundaries.	~~CL 5~~	OK
A.5 Public funding of the project activity					
A.5.1 In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is	/1/	DR	DNV did not find any evidence of diverted public funds from Annex I Parties. However the PP is requested to present all the	~~CL 7~~ ~~CL 22~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	not counted towards the financial obligations of these Parties?			AFP's adding up to the total amount invested in the project shown in the investment analysis.		
B Application of a baseline and monitoring methodology						
B.1	**Methodology applied (VVM para 65-76)**					
B.1.1	Does the project apply an approved methodology and the correct and valid version thereof?	/1/	DR	Yes, the project applies the methodology AM0009 version 4.0, "*Recovery and utilization of gas from oil wells that would otherwise be flared or vented*"		OK
B.1.2	If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/	DR	No specific guidance has been applied.		OK
B.2	**Applicability of methodology (and tools) (VVM para 65-76)** *Insert a row for each applicability criteria of the applied methodology (and tools)*					
B.2.1	How was it validated that project complies with the following applicability criteria: *The methodology is applicable to project activities that recover and utilise associated gas and/or gas-lift gas from oil wells. The associated gas and/or gas-lift gas was flared or vented prior to the implementation of the project activity*?	/1/ /7/	DR	DNV has verified via the site visit that the PP business activity entails the exploration and production of crude oil, from which the associated gas is flared. Furthermore, the PP has an approval issued annually by the Mines and Petroleum Ministry of Ecuador to use liquid fossil fuel for electricity generation/7/. The objective of the proposed CDM project activity is to utilize the associated gas to power generation that will be provided to the sites where the crude oil extraction/production takes place.	~~CL 21~~	OK
B.2.2	How was it validated that project complies with the following applicability criteria: *Under the project activity the recovered gas is:*	/1/ /11/	DR	As stated above in B.2.1, the objective of the proposed CDM project activity is to utilize the associated gas to meet as much as possible the		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	a) Consumed on-site to meet energy demands; and/or *b) Transported to and compressed into a gas pipeline without prior processing; and/or* *c) Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensate) that are transported and sold to final consumer(s)?*			on-site energy demands. All the evidence presented to DNV for validations demonstrate that the equipment, installation and services to be provided under the project activity /11/ relates to power generation based on the associated gas recovered.		
B.2.3	How was it validated that project complies with the following applicability criteria: *The project activity does not lead to changes in the process of oil-production, such as an increase in the quantity or quality of oil extracted, in the oil-wells within the project boundaries*?	/1/ /6/ /10/	DR	The site visit performed by DNV did not revealed any indication pointing to changes in the process or operations from the PP leading to increase oil production due to the project activity. Furthermore, the oil production forecast /10/ is consistent with historic production values /6/.	~~CL 8~~	OK
B.2.4	How was it validated that project complies with the following applicability criteria: *The injection of any gases into the oil reservoir and its production system is allowed in the project activity only for the purpose of the gas-lift process*?	/1/ /6/.	DR	The site visit performed by DNV did not reveal any indication of any gas injection within the project boundaries to enhance oil production. Furthermore, DNV was able to verify from the Daily Production reports /6/, that the extraction method is by means of "Electrical Submergible Pumps" (ESP Pumps).	~~CL 9~~	OK
B.2.5	How was it validated that project complies with the following applicability criteria: *All recovered gas comes from oil wells that are in operation and are producing oil at the time of the recovery of the associated gas and/or gas-lift gas*?	/1/	DR	DNV found no evidence of gas wells within project boundaries during the site visit. Also during DNV's site visit it was verified that the current works of pipelines intended to supply the associated gas to CPF and EY processing sites comes from the oil producing wells within the project' boundaries. However this should be confirmed during the first verification.	~~CL 10~~ FAR 1	OK
B.2.6	How was it validated that project complies with the following applicability criteria: *The methodology is only applicable if the identified baseline*	/1/ /7/ /12/	DR	The baseline scenario is to use on site the associated gas, according to current legislation /7/ /12/, and to flare the remaining gas. This is	~~CL 11~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	scenario is: *a) The continuation of the current practice of either venting (scenario G1) or flaring (scenario G2) of the associated gas and/or gas-lift gas; and* *b) The continued operation of the existing oil and gas infrastructure without processing of any recovered associated gas and/or gas-lift gas and without any other significant changes (scenario P4); and* *c) In the case where gas-lift is used under the project activity: the gas-lift gas under the baseline uses the same source as under the project activity and the same quantity as under the project activity (scenario O1).?*			the combination of G2 and P4 scenarios of the methodology, which confirms its applicability.		
B.2.7	Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	DR	The baseline of the project activity in the absence of possible CDM benefits would be to continue flaring the associated gas, and use liquid fossil fuel to generate electricity.		OK
B.3	**Project boundary (VVM para 78-80)**					
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/	DR	Yes, the project's system boundaries are clearly defined according to the methodology, which are: -) The wells and the oil reservoirs in Block 15 and Block 31. -) The sites where the associated gas is flared at Block 15and Block 31. -) The gas recovery and handling equipment at Block 15 (compressors, pipelines, treatment, buffer, etc.)	~~CL 12~~	OK
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	The GHG source of CO_2 is the use of the associated gas for the following project activity: - Recovery, - Pre-treatment, - Transportation, and if applicable,	~~CL 23~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			- Compression of the recovered gas. The PP is requested to update figure no. 3 in the PDD as per the wells within project boundary.		
B.3.3 Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/	DR	No, the project does not involve other emissions sources not foreseen by the methodology.		OK
B.4 Baseline scenario determination (VVM para 81-88, 105-107) *Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.*					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR	All the plausible scenarios for the associated gas (9 scenarios), and for the existing and new infrastructure (5 scenarios), have been considered in compliance with the methodology, concluding that the situation existing before the project activity G2 (flaring of the associated gas at the oil production site) and P4 (Continuation of the operation of the existing oil and gas infrastructure without processing of any recovered associated gas and/or gas-lift gas and without any other significant changes), were the only likely scenarios. No gas-lift-gas scenarios are considered since		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				there is not gas lift wells within the project boundaries (see B.2.4 above)		
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /5/ /6/ /7/ /12/ /18/ /26/	DR	During the site visit it has been checked the artificial lift systems in place, namely, the electric submersible pumps (ESP). Therefore the alternatives that assume gas-lift (O) have been eliminated. 26 of the remaining 45 (G + P) combinations have been eliminated due to incompatibility of the resulting combined baseline alternative. During the site visit has been also checked that: - Production reports /6/ /7/ and operation permits from the corresponding legislation /12/ show that there is not non-associated gas within the project boundaries, which leaves out eight P2 possible combinations. - The official Daily Production reports /6/ show that the extraction method for each well is by means of "Electrical Submergible Pumps" (ESP Pumps). Therefore, there is not gas injection in the oil fields under the project boundary as the lift system used is based on ESP pumps. - The injection of the associated gas and/or gas-lift gas into an oil or gas reservoir (G5) is not feasible either because there are not known oil fields available for temporary storage. Neither there is any certainty that associated gas injection will enhance oil recovery. - G7+P4 and G7+P5 combinations have been eliminated because they imply the compression and supply of the recovered gas without prior processing. However, during the site visit is has		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			been verified that there is no other site in the vicinity of the project site as to make this a feasible alternative due to the investment costs required to achieve this, and the low volumes of associated gas produced /6/ /7/. - The scenario G1+P4 is not feasible because it's not in compliance with current legislation and permits given to the PP /12/. - The proposed project activity without being registered as a CDM project activity (G8+P1): scenario has been discarded because it's not economically attractive compared to the baseline scenario which does not require any investment. The baseline was determined by elimination of the alternative baseline scenarios selected and analysed according to the approved methodology /26/ . The PDD lists all the assumptions and data used by the PDD on the following alternative baseline scenarios: G1 – As stated in the PDD, DNV confirmed during the site visit that there is no venting of associated gas within the project boundaries. Furthermore, venting requires prior legal authorization, which is not included in PETROAMAZONAS legal mandate for oil & gas exploration and production activities /12/, nor in the authorization given annually to dispose off the associated gas /12/. Therefore this scenario is not an alternative to the PP. G3 – On-site use of the associated gas for power generation is not a viable alternative as a baseline		

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			scenario since the equipment would need to be prepared/acquired for this purpose and there are no sufficient incentives to proceed with this scenario without the CDM benefits /5/ /7/ - This alternative is the proposed CDM project activity. G4 – On-site use of the associated gas for liquefied natural gas (LNG) production is not a viable alternative as a baseline scenario since it requires some investment and there is no market for LNG in Ecuador /7/ that could justify the investment. G5 – Injection of the associated gas into an oil or gas reservoir production is not a viable alternative as a baseline scenario since it requires some investment and there is no guarantee that this course of action will enhance the oil recovery. It should be mentioned that this is a technically complex process and requires thorough studies in order not to risk to damage the production potential of the oil reservoir. G6 – Recovery, transportation, processing of the associated gas and distribution of products thereof to end-users without being registered as a CDM project activity, is not a viable alternative as a baseline scenario since it requires some investment and having the oil fields so remotely placed with respect to the end-users (Section 4.2 above), and the uncertainty of the quality and amount of the associated gas available /6/, the risk of pursuing this alternative is too high. G7 – Recovery, transportation and compression of the associated gas and/or gas-lift gas into a gas		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			pipeline without prior processing, without being registered as a CDM project activity, is not a viable alternative as a baseline scenario since it requires some investment and having the oil fields so remotely placed with respect to the end-users (section 4.2 above), and the uncertainty of the quality and amount of the associated gas available /6/, the risk of pursuing this alternative is too high. G8 – Consumed on-site to meet energy demands without being registered as a CDM project activity is not a viable alternative as a baseline scenario since it requires some investment to condition the gas for utilization in energy generation as demonstrated in the scenario G3 above. G9 – Recovery, transportation and utilization of the associated gas and/or gas-lift gas as feedstock for manufacturing of useful products, since it requires some investment and, having the oil fields so remotely placed with respect to the end-users (Section 4.2 above). Moreover, given the uncertainty of the quality and amount of the associated gas available /6/, and the fact that Ecuador currently does not have the petrochemical industry where associated gas could serve as a feedstock, this alternative is not plausible. P1 – Construction of a processing plant for processing the recovered gas, in the same way as in the project activity, without being registered as a CDM project activity, is not a viable alternative			

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			as a baseline scenario since it requires some investment to condition the gas for its utilization. This scenario in combination with the scenario G3 is the proposed CDM project activity. P2 – Construction of a processing plant of a lower capacity than under the project activity, which processes only non-associated gas and no recovered gas is not a viable alternative as a baseline scenario since apart from the associated gas recovered from the oil production, there are no other sources of gas in Block 15and Block 31, as demonstrated by the production records /5/ /6/ /7/. P3 – Supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure, without being registered as a CDM project activity, is not a viable alternative as a baseline scenario since it requires some investment and, having the oil fields so remotely located (Section 4.2 above) with respect to the only existing facility in Ecuador for this purpose (Shushufindi Plant from EP PETROECUADOR /18/), and the uncertainty of the quality and amount of the associated gas available /6/, makes this alternative not plausible.		
B.4.3 What is the baseline scenario?	/1/	DR	The continuation of flaring of the associated gas with no significant changes in the oil and gas infrastructure (G2+P4) scenario is the baseline.	~~CL 13~~	OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	The determination of the baseline scenario follow the steps indicated by the methodology and considered all possible scenarios.		OK
B.4.5 Has the baseline scenario been determined using	/1/	DR	No particular assumptions have been done during		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	conservative assumptions where possible?			the determination of the baseline scenario.		
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	From the evidences analysed by DNV, nothing has been found indicating that the baseline scenario is not in line with relevant national and/or sectoral policies.	~~CL 14~~	OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	The baseline scenario is compatible with the available data; however some of these should be clearly referenced. The PP has provided the corresponding references and clarifications, and DNV has been able to verify that these refer to the available data.	~~CL 1~~ ~~CL 2~~ ~~CL 4~~ ~~CL 6~~ ~~CL 11~~ ~~CL 14~~ ~~CL 18~~ ~~CL 19~~ ~~CL 20~~ ~~CL 25~~ ~~CL 26~~	OK
B.4.8	Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed	/1/	DR	The baseline determination is adequately documented in the PDD section B4.	~~CL 24~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	CDM project activity					
B.5	**Additionality determination (VVM para 94-121)**					
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /26/ /27/	DR	As per the approved methodology, the additionality of the project is assessed with basis on the "Tool for demonstration and assessment of additionality", version 05.2.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/ /12/	DR	Yes, the regulatory requirements correctly have been taken into account to evaluate the project activity and the alternatives.		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /5/ /6/ /7/ /9/ /10/ /11/ /12/	DR	The evidences provided bythe PP are sufficient to support the arguments presented.		OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	Investment analysis		OK
	Prior consideration of CDM (VVM para 98-103)					
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /4/ /8/ /4/ /12/	DR	On 12 Feb 2009 the board of directors of PETROAMAZONAS EP confirms the availability of the initial funds for the project activity /8/ (It should be noted that PETROAMAZONAS EP is a non-profit organization whose funds are subject to the approval of the Government of Ecuador via the Ministry of Finance as per the Hydrocarbons Law of Ecuador /12/, thus the availability of such funds is considered in this case a real action	~~CL 15~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			regarding the implementation of the project, and therefore the start of the CDM proposed project activity). On 18 Mar 2009 PETROAMAZONAS sends a letter to the host country DNA /4/ (Ministry of Environment of Ecuador) informing the PETROAMAZONAS EP intends to develop the project activity under the CDM scheme. On 8 Apr 2009 the DNA of Ecuador (Minister of Environment of Ecuador) replies to PETROAMAZONAS letter indicating that it starts the proceeding to consider the proposed project activity to be developed as a CDM project /4/.		
B.5.6 If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/	DR	Yes, see B.5.5 above.		OK.
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7 What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/	DR	As per paragraph 8, point a, of the Guidelines on the demonstration and assessment of prior consideration of the CDM /30/ in validating proposed CDM project activities where there is less than 2 years of a gap between the documented evidence the DOE shall conclude that continuing and real actions were taken to secure CDM status for the project activity. Given that the starting date of the proposed CDM project activity is 13 Mar 2009 (see B.5.8 below), and the contract signature with DNV (DOE) for the validation of the project activity is 1 June		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				2010 /33/, DNV can confirm that the PP undertook continued efforts to secure CDM status of the proposed CDM project activity.		
B.5.8	When did the construction of the project activity start?	/1/ /9/	DR	The construction of the project activity started on 13 Mar 2009 with the tie-in's work order (engineering, fabrication and installation) to tie-in the new pipelines to the existing flares pipelines /9/.		OK
B.5.9	When was the project commissioned?	/1/	DR	DNV was able to confirm during the site visit that the project is still under construction.		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	Yes, see B.5.7 and B.5.8 above.		OK
	Investment analysis (VVM para 108-114) *The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.*					
B.5.11	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/ /3/ /6/ /10/ /11/	DR	Yes, the CDM benefits of the project activity are created through the savings of liquid fossil fuel used for electricity generation that is replaced by the associated gas.		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	The following alternative scenarios from those outlined in the methodology, are reflected in the PDD and involve investment: - G3, on-site use of the associated gas for power generation – proposed CDM project activity. - G6: Recovery, transportation, processing of the associated gas and distribution of products thereof to end-users without being registered as		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				a CDM project activity - G7: Recovery, transportation and compression of the associated gas and/or gas-lift gas into a gas pipeline without prior processing, without being registered as a CDM project activity. - G8: Consumed on-site to meet energy demands without being registered as a CDM project activity - P1: Construction of a processing plant for processing the recovered gas, in the same way as in the project activity, without being registered as a CDM project activity - P3: Supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure, without being registered as a CDM project activity - P5: Supplying recovered gas to a gas pipeline without prior processing and without being registered as a CDM project activity		
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	Yes, see B.5.11	~~CL 16~~	OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/ /11/	DR	Yes. The benchmark is based on the treasury bond rates from the USA, adjusted by the country risk published/provided by the Central Bank of Ecuador.		OK.
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/ /3/ /10/ /11/	DR	The financial indicator is the project IRR /3/ /10/ /11/ based on the savings of the liquid fossil fuel that would have been used for electricity generation. The project's benchmark /11/ is the average between January 2007 and January 2009 of the 20 year maturity US Treasury Bonds rate,		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				adjusted by the country risk.		
B.5.16	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/ /5/ /6/ /7/	DR	Yes. It has been demonstrated that the old equipment fuelled by associated-gas was to be scrapped/obsolete in absence of the project activity. Furthermore, the associated gas utilized in the topping plant is not impacted by the project activity.		OK
B.5.17	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /12/	DR	Not applicable since financial indicator it is based on cost savings. However the salvage value added at the end of the financial analysis calculations is estimated based on the applicable law for depreciation of assets.		OK
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/	DR	Yes. The time horizon for the investment analysis is 10 years, and the salvage value has been added to the calculations at the last year.		OK
B.5.19	When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/	DR	The project does not involve an FSR.		OK
B.5.20	How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /6/ /10/	DR	☐ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☐ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☒ Other approach.	~~CL 41~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Provide details on how the load factor was validated: The project activity is a first-of-its-kind in Ecuador; therefore there is not other similar project to compare it with. However, the amount of electricity generated will be based on the amount of associated gas available (minus the topping plant consumption), which is again based on the projections made by the PP and reported to the Government of Ecuador. It also should be noted that the electricity generation capacity is determined according to the prognosis/projections of gas available for this purpose (associated natural uncertainty in the prognosis/projections of the quality and quantity of associated gas produced). Therefore in the extraordinary event that more gas is available for electricity generation, this will be capped by the installed capacity, at least in the short-medium term, while more generation equipment is purchased, installed and ready to operate.		
B.5.21 How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /6/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the output price was validated:* The cost (price) of the diesel has been crossed checked as per the invoices of the fuel issued by the supplier (Petrocomercial).	~~CL 38~~	OK
B.5.22 How were the investment costs assessed? Were the data	/1/	DR	☐ Cross-check against third-party or publicly		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/3/ /9/ /11/		available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants *Provide details on how the investment costs were validated:* The investment costs were verified by DNV during the site visit, through the internal accounting system of the PP, and by random sampling of some purchase orders issued to individual contractors/suppliers/vendors, for some of the line items listed in the project accounting structure.		
B.5.23	How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /3/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the O&M costs were validated:* The incrementatl O&M costs are considered to be zero, which is a conservative assumption, as the project's O&M costs are likely to be higher than the current O&M costs for continuing to flare associated gas.		OK
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Provide details on how other input parameters were validated: There are no other input parameters to the investment analysis than the amount of associated gas produced and available for electricity generation, and the cost of diesel saved to generate the same amount of electricity.		
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/	DR	Yes.	~~CL 17~~ ~~CL 36~~ ~~CL 37~~	OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/	DR	Yes. A sensitivity analysis was made for the input parameters: capital expenditure (investment cost), diesel price, gas production. Also a correlation was made between an eventual increase in the amount of associated gas produced and the possible expansion of the generation installed capacity (in case there is more associated gas available for generation, see B.5.20).and the sensitivity analysis then made for the increase in electricity production capacity.		OK
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	See B.5.28 below.		OK
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/ /6/ /10/ /11/	DR	The key parameters have been varied enough for the IRR to reach the benchmark value, and their respective changes values are: - Investment (capital expenditure): -35.9%. A change like this is not only counterintuitive, but also not realistic since Ecuador does experience in the last year inflation rate higher than 0%. Furthermore the project capital expenditures		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			have passed the 66% of the budgeted amount, and therefore it is not longer possible to reduce these now more than the remaining 34% (not realistic). - Diesel price: +59%. The diesel price is determined by the government and has been kept stable during the last 6 years, and DNV found no indication from the government to change the current price level, and even less to have an increase of almost 60% - *Gas production increase: 121% for an IRR: 7.47%. The current associated gas projections are based on the appraisal surveys of the oil fields adjusted/corrected to actual production values. Although this also involve a degree of uncertainty, it is highly improbable to expect an increase of this level (121%) which then again will bring the IRR to approximately 7.5%*, which still is under the benchmark value. Higher production rates of the associated gas, if any, will have no effect in the profitability since the current electricity generation installed capacity is determined based on current project and not potential probabilistic surplus. DNV is of the opinion that this or a higher increase in the amount of associated gas available for electricity generation is not realistic. - *Additional electricity generation capacity: 240%, for an IRR: 9.71%. An increase in the electricity generation installed capacity of this magnitude (+240%) will only bring the IRR up to a value of 9.71%. This will also imply that the corresponding associated gas for this		

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				purpose is also available, however as explained above, the gas production projections do not support such scenario, therefore it is considered unlikely. *The goal seek function/tool in the spreadsheet is not able to reach higher values for the IRR than those mentioned here.		
	Barrier analysis (VVM para 115-118)					
B.5.29	Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	Not applicable as AM0009 requires to assess the economic attractiveness of the identified baseline alternatives by determining an IRR.		NA
B.5.30	How were the investment barriers assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable		NA
B.5.31	How does CDM alleviate the investment barriers?	/1/	DR	Not applicable		NA
B.5.32	Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable		NA
B.5.33	How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable.		NA
B.5.34	How does CDM alleviate the technological barriers?	/1/	DR	Not applicable.		NA
B.5.35	Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable.		NA
B.5.36	How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	Not applicable.		NA
B.5.37	How does CDM alleviate the barriers due to prevailing	/1/	DR	Not applicable.		NA

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	practise?					
B.5.38	Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable.		NA
B.5.39	How were the other barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable.		NA
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	Not applicable.		NA
B.5.41	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable.		NA
	Common practice analysis (VVM para 119-121)					
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/ /7/	DR	The geographical scope of the common practice analysis is the country of Ecuador.		OK
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/ /7/	DR	The common practice for existing oil fields (brown fields) is to flare the associated gas as demonstrated by the evidence provided and the letter form the Ministry of Non Renewable Resources from Ecuador that the project activity is first-of-its-kind.		OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/ /7/	DR	The letter form the Ministry of Non Renewable Resources from Ecuador that the project activity is first-of-its-kind, plus other documents listed within reference /7/ of section 3.1.1 of this validation report.		OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	None, this project activity is the first-of-its-kind in Ecuador	~~CL 19~~	OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	See B.5.45		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	DNV is of the opinion that the common practice is the baseline, namely flaring of the associated gas produced in existing oil fields is not common practise in Ecuador.		OK
	Conclusion					
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	DNV is of the opinion that the project activity is additional.		OK
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVM para 199-203)					
B.6.1	How was the CO_2 emission factor for methane available at validation verified?	/1/	DR	The approved methodology (AM0009 version 4.0) already provides the value for this parameter, namely 49.55 tCO_2/TJ		OK
	Baseline emissions (VVM para 89-93)					
B.6.2	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /3/ /6/	DR	Yes, an unprotected spreadsheet showing all the calculations has been submitted for validation as well as the corresponding references for the input values.		OK
B.6.3	Have conservative assumptions been used when calculating the baseline emissions?	/1/ /3/ /5/ /6/ /7/ /10/	DR	Yes. The prognosis/projections of the oil production and thus the associated gas are in line with the historical values. Also the consumption of the topping plant has been subtracted, and the gas driven generation capacity previously installed is deemed to be zero (see B.5.16).		OK
B.6.4	Are uncertainties in the baseline emission estimates properly addressed?	/1/ /6/ /10/	DR	There are no significant uncertainties related to the baseline emissions, other than the projected oil production, which has been cross checked against historical production.	~~CL 18~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Project emissions (VVM para 89-93)						
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /26/	DR	Yes. The calculations for the project emissions follow the procedure indicated in the approved methodology; these are complete and presented in a transparent manner.		OK
B.6.6	Have conservative assumptions been used when calculating the project emissions?	/1/ /3/ /10/	DR	The project emissions have been estimated based on the forecast of the oil and gas production The project emissions will be originated by the electricity consumption of the gas processing (pre-treatment) equipment. However, given that the project is still under construction the PP will determine the project emissions ex-post based on either: a) the calculation of the electricity consumption by the gas processing equipment (referred to in the PDD as Approach 1), or, b) by means of measuring the electricity consumption(Approach 2). In the case of following approach 1, the PP will use a factor of 100% load regarding the operating time of the equipment, which is a conservative estimate. Also regarding the emission factor, it will be calculated as indicated in Approach 2 (which is in line with the approved methodology), or it will be assumed to be the default value specified by the methodology, namely: 1.3 tCO_2/MWh	~~CL 27~~ ~~CL 40~~	OK
B.6.7	Are uncertainties in the project emission estimates properly addressed?	/1/ /3/ /10/	DR	There are no significant uncertainties for the project activity, other than the projected oil production, which has been cross checked against historical production.	~~CL 40~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Leakage (VVM para 89-93)						
B.6.8	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /26/	DR	No leakage emissions are considered in the approved methodology.		OK
B.6.9	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	Not applicable		NA
B.6.10	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Not applicable		NA
Emission Reductions (VVM para 89-93)						
B.6.11	Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.	/1/	DR	- Yes. All assumptions and data are listed in PDD and related documents, and data are properly referenced. - Yes, all documentation is correctly quoted and interpreted. - Yes, values are deemed reasonable in the context of the project activity - Yes the methodology has been correctly applied and the emission reductions can be replicated based on the documentation submitted.		OK
B.7	**Monitoring plan (VVM para 122-124)**					
Data and parameters monitored						
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	The PP shall revise the data and parameters monitored under section B.7.1 of the PDD to include for each parameter (namely, $V_{F,y}$ and $NCV_{RG,F,y}$) , the following: 1) Frequency of measurement 2) Data recording frequency 3) Accuracy of the meter(s).	~~CL 28~~ ~~CL 30~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				4) The QA/QC procedures as per the approved methodology 5) Maintenance procedures for the meters and/or corresponding ruling standard. Furthermore, The PP is requested to explain the data variables presented under section B.7.2, point A, of the PDD: VC,1,y; VC,2,y; VC,3,y; VL,y; wcarbon,C,2,y; wcarbon,C,3,y, the relation of each one to the CDM project activity and, ensure those that those data variables part of the CDM project activity are presented in the PDD according to the with the monitoring requirements specified in the approved methodology, if applicable.		
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	Yes.	~~CL 30~~	OK
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	- $V_{F,y}$: Continuous flow measurement, using a Coriolis Flow Meter, using a Coriolis Flow Meter. The Flow Computer is a computer that calculates with high accuracy the volumetric flow gas. It performs this calculation using the mass flow delivered by the Coriolis Flow Meter and the Standard density value that is obtained from the gas composition provided by the on-line chromatograph. This signal is sent to the system operator via an Ethernet link/based system. - $NCV_{RG,F,y}$: Continuous measurement, using an on-line chromatographer. - $EC_{PJ,j,y}$: (if the measuring option is chosen – approach 2) Continuous	~~CL 30~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				measurement by an electricity meter grade, 0.5 or better. - $FC_{n,i,t}$: (if the measuring option is chosen – approach 2) Depending on the fuel used, measurement can be done via flow meters, purchase invoices and other appropriate methods. - $EG_{n,t}$: (if the measuring option is chosen – approach 2) Continuous measurement by an electricity meter grade, 0.5 or better. - $EN_{aux,y}$: (if default values are used - approach 1) nominal consumption capacity will be used. This will be taken form the nominal plates of the equipment. - $EG_{gas,j,y}$: (if default values are used - approach 1) Continuous measurement by an electricity meter grade, 0.5 or better, installed at the energy generators. - $EN_{gas,j,y}$: (if default values are used - approach 1) nominal capacity for the generation equipment will be used. This will be taken form the nominal plates of the electricity generating equipment.		
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	- $V_{F,y}$: The most significant advantage of Coriolis meters is its high accuracy under wide flow ranges and conditions. Coriolis meters measure mass flow directly, and. at normal conditions, it is expected a flow rate accuracy rating of +/- 0.74 %. - $NCV_{RG,F,y}$: Analyzers are of international	~~CL 28~~ ~~CL 30~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				standard, and the parameters will be measured on-line, and its accuracy: +/- 1% for components with measured ranges >5% +/- 2% for components with measured ranges =< 5%. - $EC_{PJ,j,y}$: (if the measuring option is chosen – approach 2) Electricity meter is grade 0.5 or better. - $FC_{n,i,t}$: (if the measuring option is chosen – approach 2) Depending on the fuel used, the meter's accuracy level will be in line with commonly used in industry or better. - $EG_{n,t}$: (if the measuring option is chosen – approach 2) Electricity meter is grade 0.5 or better. - $EN_{aux,y}$: (if default values are used - approach 1) nominal consumption capacity for the auxiliary equipment will be used. Not applicable (accuracy). - $EG_{gas,j,y}$: (if default values are used - approach 1) Electricity meter is grade 0.5 or better. - $EN_{gas,j,y}$: (if default values are used - approach 1) nominal capacity for the generation equipment will be used. Not applicable (accuracy).		
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	- $V_{F,y}$: The coriolis meters will be calibrated in line with industry standards and relevant laws, at least every 12 months. - $NCV_{RG,F,y}$: chromatograph will be	~~CL 28~~ ~~CL 30~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			calibrated in line with industry standards and relevant laws, at least every 12 months. - $EC_{PJ,j,y}$: (if the measuring option is chosen – approach 2) Electricity meter is grade 0.5 or better and its calibration will be done in line with appropriate industrial standards and relevant laws, at least every 12 months. The maintenance will be done in accordance with the operational manual of the corresponding Original Equipment Manufacturer. - $FC_{n,i,t}$: (if the measuring option is chosen – approach 2) Depending on the fuel used, the meter calibration will be done in line with appropriate industrial standards and relevant laws, at least every 12 months. The maintenance will be done in accordance with the operational manual of the corresponding Original Equipment Manufacturer. - $EG_{n,t}$: (if the measuring option is chosen – approach 2) Electricity meter is grade 0.5 or better and its calibration will be done in line with appropriate industrial standards and relevant laws, at least every 12 months. The maintenance will be done in accordance with the operational manual of the corresponding Original Equipment Manufacturer. - $EN_{aux,y}$: (if default values are used - approach 1) nominal consumption		

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				capacity for the auxiliary equipment will be used. Neither maintenance nor calibration is required. - $EG_{gas,j,y}$: (if default values are used - approach 1) Electricity meter is grade 0.5 or better and its calibration will be done in line with appropriate industrial standards and relevant laws, at least every 12 months. The maintenance will be done in accordance with the operational manual of the corresponding Original Equipment Manufacturer. - $EN_{gas,j,y}$: (if default values are used - approach 1) nominal capacity for the generation equipment will be used. Neither maintenance nor calibration is required.		
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	- $V_{F,y}$: Continuous flow measurement, using a Coriolis Flow Meter - $NCV_{RG,F,y}$: Continuous measurement, using an on-line chromatographer - $EC_{PJ,j,y}$: (if the measuring option is chosen – approach 2) electricity consumed will be measured contiuously. - $FC_{n,i,t}$: (if the measuring option is chosen – approach 2) Depending on the fuel used, measurement can happen via flow meters, purchase invoices and other appropriate methods. Monitoring frequency will be applied according to the type of measurement. In case of flow/mass meters - the data is measured	~~CL 28~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				continuously and is recorded and stored automatically and continuously. In case of the data is based on purchase invoices – as soon as the invoice is available. - $EG_{n,t}$: (if the measuring option is chosen – approach 2) electricity generated will be measured contiuously. - $EN_{aux,y}$: (if default values are used - approach 1) nominal capacity for the auxiliary equipment installed will be collected yearly - $EG_{gas,j,y}$: (if default values are used - approach 1) electricity generated will be measured contiuously. - $EN_{gas,j,y}$: (if default values are used - approach 1) nominal capacity for the generation equipment will be collected yearly		
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	- VF,y: recorded and stored automatically and continuously - $NCV_{RG,F,y}$: recorded and stored automatically and continuously - $EC_{PJ,j,y}$: (if the measuring option is chosen – approach 2) electricity consumed will be recorded and stored automatically and continuously. - $FC_{n,i,t}$: (if the measuring option is chosen – approach 2) Depending on the fuel used, measurement can happen via flow meters, purchase invoices and other appropriate methods. Monitoring	~~CL 28~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				frequency will be applied according to the type of measurement. In case of flow/mass meters - the data is measured continuously and is recorded and stored automatically and continuously. In case of the data is based on purchase invoices – as soon as the invoice is available. - $EG_{n,t}$: (if the measuring option is chosen – approach 2) electricity generated will be recorded and stored automatically and continuously. - $EN_{aux,y}$: (if default values are used - approach 1) nominal capacity for the auxiliary equipment installed will be collected yearly - $EG_{gas,j,y}$: (if default values are used - approach 1) electricity generated will be recorded and stored automatically and continuously. - $EN_{gas,j,y}$: (if default values are used - approach 1) nominal capacity for the generation equipment will be collected yearly		
	Ability of project participants to implement monitoring plan					
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	During the site visit, DNV was able to verify the location where the gas processing facilities are to be built/ centralized, and all the equipment deemed to be installed is available in the market.		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and			Yes		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	how to process performance documentation)?					
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	The PP shall present the procedures for quality assurance including the specification of the main meter ($V_{F,y}$), and handling of erroneous readings, etc.	~~CL 29~~	OK
B.7.11	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Yes		OK
	Monitoring of sustainable development indicators/ environmental impacts					
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	Yes.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Not required. DNV was able to verify during the site visit that the requirements for monitoring of the environmental impacts are comprised within the legal authorization of PETROAMAZONAS to perform the oil& gas exploration and production activities.		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/ /22/	DR	Yes, as confirmed by the Letter of Approval form the host country.		OK
	C Duration of the project activity / crediting period					
C.1.1	**Start date of project activity (VVM para 99-100, 104)**					
C.1.2	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/ /8/ /9/	DR	The starting date of the project activity is 12 Feb 2009, date of the approval of the funds for the project activity by the Ministry of Finance. The initial contract for the construction of the project activity is dated 11 Mar 2009, which		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				corresponds to the tie-in works for the compressors that started on 13 Mar 2009.		
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/ /12/	DR	Yes. The operational life of the main equipment is estimated as per the National law to be 10 years, and this is reflected accordingly in the industry analysis, where the salvage value for the remaining years is added at the end of the last year.		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	Yes		OK
D Environmental Impacts (VVM para 131-133)						
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/	DR	The PP shall present the EIA for the project activity as well as the corresponding approval.	~~CL 31~~	OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/	DR	DNV can confirm to have received the following evidences /20/, and that they are applicable to the proposed project activity : 1) Environmental management law (Ley de Gestión ambiental), Chapter III, Articles 28 & 29, Stakeholder Consutlation/Participation in Environmental Management. 2) Prevention and Environmental pollution Control Law (Ley de Prevención y Control de la Contaminación Ambiental). 3) Environmental Regulation for Electrical Work Activities (Reglamento ambiental para Actividades Eléctricas) 4) Unified Text of the Secondary Environmental Legislation, particularly Book VI and	~~CL 32~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				corresponding Annexes / specifications applicable to the electricity sector (Texto Unificado de la Legislación Ambiental Secundaria, particularmente el Libro VI y sus anexos respectivos / especificaciones aplicables al sector eléctrico) DNV can confirm that the PP has complied with the requirements of the above laws and regulations via the stakeholder process held as part of the project activity /13/, and the corresponding environmental licenses issued by the respective authorities /19/.		
D.1.3	Will the project create any adverse environmental effects?	/1/	DR	No		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/ /17/	DR	Yes. The environmental effects of the project activity and corresponding actions are summarized in the ENTRIX Environtmental Audit Report and included in the PDD.		OK
E Stakeholder Comments (VVM para 128-130)						
E.1.1	Have relevant stakeholders been consulted?	/1/ /13/	DR	Yes. The PP presented the project activity to the relevant stakeholders through: - 2 local stakeholders meetings - Several national and international forums (Carbon Expo 2009, Latin American Carbon Forum 2009, Oil& Power Conference 2009) - National Authorities of Ecuador		OK
E.1.2	Have appropriate media been used to invite comments by	/1/	DR	Yes. The PP used news magazine, industry- and		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	local stakeholders?	/13/		environmental magazines and national newspapers, the publicity received throughout the various national and international forums, and 2 campaigns inviting the local communities to attend the 2 local meetings held in the area of the project activity.		
E.1.3	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	DNV can confirm that the PP has complied with the requirements outlined in the Environmental Management Law, Chapter III, Articles 28 & 29, Stakeholder Consultation/Participation in Environmental Management, by holding the stakeholder meetings /13/ where the local stakeholder were informed of the project activity and given the opportunity to raise their opinion and/or concerns on the project activity. Furthermore, DNV was able to confirm during the site visit interviews (references /14/, and /34/ to /72/) that the meetings were held as I indicated by the PP, the information provided as in an open and complete manner and all questions raised were satisfactorily clarified by the PP.	~~CL 33~~	OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/	DR	DNV has been able to review the evidence provided /13/ and can confirm that it corresponds with the information received directly by DNV during the interviews held during the site visit (references: /14/, and /73/ to /76/).	~~CL 34~~	OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /13/ /17/	DR	Yes. DNV was able to verify during the site visit that that the comments made by the local stakeholders during the project activity presentation meetings have been addressed by the PETROAMAZONAS during the development of the project activity. This is further reflected in the		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			environmental audit report carried out by ENTRIX.		

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 1 The PP shall present for validation the LoA from the participating Annex I parties.	A.3.2	Both LoAs from Sweden and Finland have been provided to the DOE.	DNV can confirm to have received copy of both LoAs for the Annex I countries: Sweden and Finland, and each comply with the requirements for a LoA as stated in Table 2 above. CAR closed.
CAR 2 The PP is requested to correct the Project title such that in both the PDD and the LoA it is exactly the same. Note: Project name in all LoA's and PDD shall be exactly the same.	A.3.2	The LoA has been re-issued by the DNA of Ecuador, with exactly the same name for the project activity as in the PDD.	DNV can confirm that the new LoA does comply with the requirement of having the same name for the project activity as in the PDD, as well as all the other requirements for a LoA. CAR closed.
CL 1 Footnote 1, page 1, "Details of activities can be found in the "Ingeniería Conceptual OGE ILYP y EPF" package presented by TECNA – an engineering / consulting firm with experience in gas projects whose headquarters are located in Argentina –" Which activities? Footnote not referenced to text.	A.2.4 B.4.7	Project has passed the point of Conceptual Engineering and therefore it is not relevant anymore. The reference and the footnote have been removed. See the updated PDD.	DNV has been able to review the updated PDD and can confirm that the reference in question has been removed. CL closed.
CL 2 Revise/clarify (page 3, 3rd bullet point): "By substituting, a part of the electricity generated with liquid fossil fuel with power generated with associated gas".	A.2.3 B.4.7	See rephrased text in the updated PDD.	DNV has been able to review the updated PDD and can confirm that the text in question has been adequately rephrased. CL closed.
CL 3	A.2.3	The savings estimation has been re-	The PDD has been revised to reflect the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Demonstrate and present precise evidence to page and paragraph (page 3, 3rd bullet point): "the proposed Project Activity will save approximately 25 to 30 million gallons of fossil fuel per year"		estimated to be approximately 25 million gallons of fossil fuel per year. See Investment Analysis which includes fuel savings calculation and corresponding evidence.	new estimations of the fossil fuel savings. Also, DNV has been able to verify in the investment analysis the savings estimation of fossil fuel specified in the PDD. CL closed.
CL 4 Submit precise evidence to page and paragraph (page 3, 4th bullet point): "The Ministry of Electricity and Renewable Energy estimates that almost 80% of the associated gas in Ecuador is burned."	A.2.3 B.4.7	See the document "Energy Policy and Strategy for the Change of Energy Mix in Ecuador" ("*Politicas y Estrategias para el Cambio de la Matriz Energetica del Ecuador*") by the Ministry of Electricity and Renewable Energy from May 2008, page 62. It should be noted that according to the law in force (see "Hydrocarbons Law, Supreme Decree 2967.doc") gas flaring is not prohibited but it is subject to authorization and PAM has it, see docs "Annual authorization for the use and burning of gas at the block 15, 2008.pdf" and "Authorization of use and flaring of associated gas at PETROAMAZONAS operations, 2009.pdf").	DNV has been able to confirm that the text in question is specified in the reference provided /7/. Furthermore, DNV can confirm that the Reformed Hydrocarbons Law /12/, Articles 34-39, indicates that the associated gas can be flared upon the authorization from the corresponding Ministry. The PP has provided evidence /12/ showing that PETROAMAZONAS has applied and received the corresponding authorization from the Hydrocarbons General Directorate, Ministry of Mines and Petroleum, for the exploitation, transport and flaring of the unused associated gas. CL closed.
CL 5 The PP shall provide the precise coordinates that together define the precise location of the project and its boundaries.	A.4.1	The coordinates have been verified and the PDD updated accordingly.	DNV has been able to verify that the coordinates reported in the PDD concur with those registered during the site visit. CL closed.
CL 6 Demonstrate that (PDD, page 7th, 1st paragraph): "Power at Block 15, prior to the Project Activity, was generated with power generating	A.2.7 B.4.7	The PDD has been revised accordingly.	The evidence provided by the PP /5/ (TECNA report, etc.) shows that there was few gas generation units, and these were in poor operating conditions mainly because

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
infrastructure burning liquid fossil fuels (diesel and crude oil).”			of their unsuitability to operate with associated gas /5/. Thus the power requirements for the operations of PETROAMAZONAS were fulfilled via liquid fossil fuel generators. CL closed.
CL 7 Show the structure of the project investment (sources).	A.5.1	The financial analysis shows that the structure of the investment does not include any public funding. Project funding comes form the PETROAMAZONAS funds (See AFP individual files and Analyzed list of AFPs.xls).	DNV has been able to review the approval of funds for the project activity /11/, and can confirm that the estimation of the funds for the project activity have been updated (original budget presented in the investment analysis /3/), and as per the 31 December 2010 the total approved funds are: $ 58.176 million USD, and the actual costs registered in the company books for the project activity are: $ 58.56 million USD /11/. Thus DNV can confirm that there is no public funding allocated to the project activity. CL closed.
CL 8 Demonstrate compliance with applicability criteria: “The project activity does not lead to changes in the process of oil-production, such as an increase in the quantity or quality of oil extracted, in the oil-wells within the project boundaries.”	B.2.3	The forecast in the document “Memorandum No. PAM-EP-OPR-OGE-2010-00004” clearly shows a decline in oil production over the coming years. There is no reason to believe that the quality of oil will change. This project does not entail any investment in refining technology.	DNV has been able to verify in the evidence presented /10/ that the oil production is forecasted to decrease throughout the lifetime of the proposed CDM project activity. CL Closed
CL 9	B.2.4	There is no gas injection equipment	DNV can confirm that the PDD has been

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Demonstrate compliance with applicability criteria: "The injection of any gases into the oil reservoir and its production system is allowed in the project activity only for the purpose of the gas-lift process."		installed at the oilfield. The PDD has been changed accordingly.	updated accordingly. Furthermore, during the site visit DNV found no evidence of gas injection taking place at the oil fields. CL closed.
CL 10 Demonstrate compliance with applicability criteria: "All recovered gas comes from oil wells that are in operation and are producing oil at the time of the recovery of the associated gas and/or gas-lift gas."	B.2.5	Project Activity and future drilling activities are limited to identify reservoirs. Please refer to the production forecast "Memorandum No. PAM-EP-OPR-OGE-2010-00004" as well as oil-wells' lists (Well Lists from 01.01.07, 01.01.10 & 01.11.10 Block 15) that are currently (2010-11-01 the latest update) planned to be exploited.	The evidence provided /15/ confirms that all wells listed there are producing oil, water and gas, and none is producing only gas, or, gas & water. The production of the Pañacocha field has been approved by the Ministry of Non-Renewable Natural Resources /12/ to be incorporated into the nation al production as soon as the field development plan is approved. Block 31 is not currently under production, but estimated to be in operation within the time horizon of the proposed project activity, thus the projections for oil production do include these fields. CL closed.
CL 11 Demonstrate compliance with applicability criteria: "Finally, the methodology is only applicable if the identified baseline scenario is: 1) The continuation of the current practice of either venting (scenario G1) or flaring (scenario G2) of the associated gas and/or gas-lift gas; and 2) The continued operation of the existing oil and	B.2.6 B.4.7	Please refer to the updated PDD. Also, the situation was explained during the conference call between DNV, Tricorona, Wärtsilä and PETROAMAZONAS and appropriate evidence was provided after that. Please refer to the minutes of that call which was held on 2nd of November 2010 as well as to appropriate evidence: - Minutes of Conference Call AM009 applicability 021110 _Rev sent to	1) DNV can confirm that during the site visit there were few associated gas electricity generating units in operation at the site. These generating units had been refurbished as a result of the project activity. In addition, the project participant presented evidence showing that some generating units were operating before the project activity with associated gas. However, the condition of these was

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
gas infrastructure without processing of any recovered associated gas and/or gas-lift gas and without any other significant changes (scenario P4); and 3) In the case where gas-lift is used under the project activity: the gas-lift gas under the baseline uses the same source as under the project activity and the same quantity as under the project activity (scenario O1)."		DNV - Confirmation from the Ministry that the project is not common practice	deteriorating as demonstrated by the technical reports presented /5/. The latter is further substantiated by the fact that the project participant invested in liquid fossil fuel generating units /11/ for supplying the power requirements of the oil fields operations, instead of refurbishing the existing associating gas operating units available prior the proposed CDM project activity. The above facts and evidences sufficiently substantiate the intention of the project participation to eliminate all associated gas generating units due to the costs of refurbishment and their physical deterioration by operating with associated gas. Therefore it can be considered that the associated gas would be flared in the absence of the proposed CDM project activity. 2) Based on the same reasoning as point 1 above, not having equipment ready to operate with associated gas (absence of the proposed CDM project activity), there would be no (need to) processing of any gas, and the operation of the existing oil and gas infrastructure will continue without any significant changes. 3) During the site visit to the proposed CDM project activity, DNV found no evidence of gas-lift processes (equipment) used in the boundaries of the oil fields. The hydrocarbons are extracted by means Electrical Submergible Pumps" (ESP

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			Pumps). Thus this applicability criteria does not apply to the proposed CDM project activity. CL Closed.
CL 12 Verify project geographical/physical boundaries and coordinates	B.3.1	Please see document “Map of Areas of Direct Control of PETROAMAZONAS”. Also the PDD has been updated to include the GPS coordinates of the points that define the limits of both Blocks, 15 and 31.	DNV has reviewed the information and the updated PDD and can confirm that the project activity’s geographical boundaries and coordinates are now properly declared. CL closed.
CL 13 Show historic information about oil fields/wells to verify oil production &associated gas production amounts, and extraction method.	B.4.3	Please refer to the historic oil production (Oil production report for the period of 01/01/2007 – 01/09/2010) to verify oil volumes. And daily production reports samples (Field Daily Production Report for 01/01/2007; for 01/01/2010; for 01/11/2010) to verify associated gas volumes. The extraction method is done by means of "Electrical Submergible Pumps" (ESP Pumps).	Based on the Production and Pumping Report for the ILY and EY from 1 Jan 2007 to 1 Sep 2010 /6/, DNV can confirm an average daily oil production of 94 651.39 BBL/day. Based on the Daily Production reports /6/ and the Production and Pumping report /6/ the daily associated gas production is estimated approximately 17.521 MSCF. Also, DNV was able to verify from the Daily Production reports /6/, that the extraction method is by means of "Electrical Submergible Pumps" (ESP Pumps). CL Closed
CL 14 Verify policy: Policy # 9, “Innovaciones Tecnológicas y Prevención de la Contaminación”; see details at	B.4.6 B.4.7	To make it clear the PDD has been revised and a reference has been made to the applicable law while the reference to the PAM’s policy has been taken out.	DNV has reviewed the PDD and can confirm that it includes the change indicated by the PP, and the applicable law has been included /12/.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
http://www.petroamazonas.ec/html/SSA/politicasDeSSA.html			CL closed
CL 15 March 18, 2009: PETROAMAZONAS submitted an official letter to the Ministry of the Environment (the Ecuadorian DNA) to inform its intentions to develop the CDM Project Activity and its intention to seek CDM status. Approximately one month later, the DNA confirmed receipt of PETROAMAZONAS letter indicating that it would support Project Activities with the objective to grant National Approval Status.	B.5.5	Please refer to the letter doc 18.	DNV has been able to confirm the evidence in question. CL closed
CL 16 Revise selection of benchmark concept and value.	B.5.13	Please refer to the docs below. The PDD was updated appropriately. +) Daily Treasury Yield Curve Rates - 2007: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2007 - 2008: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2008 - 2009: http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2009	DNV has reviewed the evidence presented and can confirm that the proposed project activity benchmark /11/ is the average between January 2007 and January 2009 of the 20 year maturity US Treasury Bonds rate /11/, adjusted by the country risk, as per the Central Bank of Ecuador /11/, which together results in a benchmark of 16%. DNV finds this approach reasonable for the proposed project activity. CL closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		+) Country risk estimation , email from Eugenio Paladines C. from the Central Bank of Ecuador to PETROAMAZONAS and DNV dated: 8 July 2010 *PETROAMAZONAS Pedido Serie Riesgo País.xls* +) Data Discount Rate OGE Edited Version.xls	
CL 17 Revise investment analysis inputs and calculations flow, and provide precise reference (to page and paragraph number) for each and all the inputs presented in the investment analysis	B.5.25	The investment analysis has been revised and the corresponding references submitted to DNV.	DNV has been able to review the investment analysis and can confirm that all the inputs are properly referenced, and these have been also provided. DNV can also confirm that the corresponding information (inputs) can be traced to the evidences provided CL closed.
CL 18 Explain further the comments about previous partial utilization of associated gas, thus not all gas was vented/flares (3.2 matriz energética políticas y estrategias EC.pdf), and intentions of increase the percentage of utilization of the associated gas (3.3 Referencias Quema y Uso de Gas Asociado Ecuador-tendencias a usar el gas asociado.pdf)	B.4.8 B.6.4	Please refer to the updated PDD. Also, the situation was explained during the conference call between DNV, Tricorona, Wärtsilä and PETROAMAZONAS /16/ and appropriate evidence was provided after that. Where reference is made to the Confirmation from the Ministry that the project is not common practice. Please refer also to the CL 11 which addresses this question as well.	Although the Govenrment of Ecuador has recognized in previous years the possibility of using the natural/associated gas recovered, these policies have not received any incentives to be applied to brownfield projects, and therefore the project activity is the first-of-its-kind as confirmed by the letter of the Ministry of Non-Renewable Natural Resources /7/. CL closed.
CL 19 Clarify whether the Sushufindi processing plant processed any associated gas at all, before project	B.4.8 B.5.45	Sushufindi has been established at a much earlier time and by another state owned company with a different mandate (to produce LPG). The hydrocarbon regulation	DNV has received a copy of the legal mandate for PETROAMAZONAS EP and can confirm that the mandate for PETROAMAZONAS EP is the exploration

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
activity		is such that PETROAMAZONAS' sole mandate is to extract oil. It is not an option to transport the gas of this project activity to the Sushufindi plant because the costs are prohibitive. Gas is being in processed in the Shushufindi Gas Processing Plant but not gas from the Project Activity given the lack of infra-structure and lack of critical mass and future supply guarantee to justify this investment. Additionally the following must be taken into consideration: - In the hypothetical scenario in which raw gas were to be delivered to the Shushufindi Gas Processing Plant the residual gas would have such low LHV that it would result in a derating factor of the power generation equipment any where in the range of 30 – 50%. - The Shushufindi Gas Processing Plant uses much of the residual gas it produces for its own consumption whereby in many cases this results in them not being able to provide a 100% supply guarantee to the Project Activity. Since the Project Activity requires switching the power generation matrix from diesel / crude oil to associated gas it is essential to guarantee the fuel supply.	and production of hydrocarbons within the allocated blocks/areas /12/. DNV has been able to confirm via the evidence presented /18/ that the Sushifindi plant (owned by EP PETROECUADOR through its daughter company Petroindustrial /18/) although originally designed to process the natural gas produced in some oil fields, among other the Limoncocha field, for several reasons however, the gas from the Limoncocha oild field has not been transported to the Sushifindi plant. Some of these reasons are: the distance from PETROAMAZONAS oil fields makes it no cost effective, and the fact that Block 15 (where the Limncocha field is located) is surrounded by several ecologically sensitive areas /18/. Also the government support /7/ /22/ to the project activity is a proof that there are no intentions to pursue the original intention of sending the gas from Limcocha oil filed to be processed in the Sushifindi plant. CL closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 20 Provide listing with identification of the wells included in the scope of the project activity.	B.4.7	Please refer to docs 24.1 – 24.3 with the list of oil-wells that are currently (2010-11-01 the latest update) planned to be exploited.	DNV has reviewed the evidence provided /15/ and finds it sufficient to address the issue raised. CL closed.
CL 21 It will need to be further clarified the consumption of associated gas in old generators and topping plant; since the methodology does make provisions for this condition.	B.2.1	Please refer to the meetings at DNV in Oslo 12-14 Jan 2011, and the evidence presented, where the consumption of the topping plant is not accounted for in the project activity, and that all previous generators would have been scrapped if the project activity wouldn't have taken place. Please refer also to the CL 10 which addressed this question as well.	Based on the evidence presented /5/ /6/ /7/ and the explanation provided during the meetings at DNV in Oslo (references /73/ to /76/,) DNV can confirm that: 1) As per the methodology requirements, the gas considered within the project activity is the gas that would be flared prior the project activity. To ensure compliance with this point the "F" points where the gas considered for the project activity is measured as per the approved methodology /26/, is located after the topping plant, which then will not consider the consumption of gas by the topping plant. 2) The old gas driven generation equipment installed by the previous operator (Occidental Petroleum Corporation – Oxy), were becoming non-operational (deteriorated) given the unsuitability of the equipment and the characteristics of the associated gas, as indicated by the corresponding technical reports. Thus all this equipment would have been scrapped by mid-year 2009 if the project activity would not have

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			taken place. Based on the evidence and explanations presented DNV finds the response of the PP reasonable and sufficient to address the issue raised. CL closed.
CL 22 The PP is requested to present all the AFP's adding up to the total amount invested in the project shown in the investment analysis.	A.5.1	The requested documentation has been submitted to DNV. See also CL 7	DNV has been able to review the approval of funds for the project activity /11/, and can confirm that the estimation of the funds for the project activity have been updated (original budget presented in the investment analysis /3/), and as per the 31 December 2010 the total approved funds are: $ 58.176 million USD, and the actual costs registered in the company books for the project activity are: $ 58.56 million USD /11/. Thus DNV can confirm that there is no public funding allocated to the project activity. CL closed.
CL 23 Update figure No. 3 in PDD to specify Block 15 and Block 31 oil wells.	B.3.2	The figure has been updated as well as the PDD.	DNV can confirm that the PDD has been corrected to specify the areas corresponding to: Block 15 and Block 31 oil wells. CL closed
CL 24 PDD pp 17, scenario G4 states: "There is no	B.4.8	LNG and LPG are totally different products. Liquefied Natural Gas (LNG)	DNV finds the explanation of the difference in LPG and LNG sufficiently address the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
infrastructure, and consequently, no market for LNG in Ecuador (see EIA details in Annex 3). However, Annex 3, pp 46, states "The LPG production is limited, which consequently forces Ecuador to import this fuel to meet internal demand." The PP is requested to clarify/correct why Ecuador is importing LPG if there is no market for it. Also revise whether Annex 3 is an EIA (Environmental Impact Assessment).		consists mainly of methane and its application requires a pipe network or a special transportation system. For more information please refer to http://en.wikipedia.org/wiki/Liquefied_natural_gas. Liquefied Petroleum Gas (LPG) is a mix of hydrocarbon gases predominantly propane and butane and since it can be easily liquefied it is usually supplied in cylinders and it is used for rural heating, as a motor fuel, refrigeration and for cooking. For more information please refer to http://en.wikipedia.org/wiki/Liquefied_petroleum_gas. Indeed, there is no infrastructure for LNG in Ecuador as it would require much more advanced technologies comparing to LPG and there is market and infrastructure for LPG in Ecuador. Also, EIA stands for Energy Information Administration. Appropriate changes were made in the PDD.	issue raised. Also the PDD has been updated as for the meaning of "EIA" used. CL closed.
CL 25 The PP is requested to present precise referenced evidence for the estimated amount of gas flared, (re. PDD Annex 3, pp 46, "It is estimated that around 1.25 million cubic meters of associated gas have been flared due to a lack of pipelines,….").	B.4.7	Estimated amount of gas flared was derived from "Políticas y estrategias para el cambio de la Matriz Energética del Ecuador", please find this document attached.	DNV has been able to verify that the amount of gas flared in Ecuador is as per the evidence provided /7/. CL closed.
CL 26 The PP is requested to provide the following	B.4.7	Please find attached "Country Brief Analysis Ecuador, April 2008.pdf".	DNV has been able to verify that the amount of gas flared in Ecuador is as per

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
reference for validation: "Energy Information Administration (Official Energy Statistics from the U. S. Government), "Country BriefAnalysis: Ecuador Energy Data, Statistics and Analysis - Oil, Gas, Electricity, Coal", April 2008."			the evidence provided /7/. CL closed.
CL 27 The PP shall provide a list of the following: 1) The equipment to be used in the project activity (mainly gas handling equipment), their corresponding power capacity in MW and its location (re. to the text written in the PDD "2% of the total power demand 60-80 MW"). 2) List of the 150 units operating today for electricity generation with their respective capacities and location. 3) List of the estimated 30 units for electricity generation specifying capacity and location.	B.6.6	1) This argument has been removed based on the change of approach regarding project emissions. 2) This statement has been removed from the PDD as the list of operating equipment is not final, the project is still under construction 3) It was estimated that there would be about 30 units, currently it is estimated to be 37 units. Please refer to the table in the Annex 5.	DNV's assessment of the responses receive is as follow: 1) The utlization factor of the gas processing equipment should be at least 100% of the equivalent installed capacity required to supply the maximum rated gas consumption the electricity generation equipment. The PP has modified the corresponding files that provide the input to the investment analysis and emissions reductions calculations to reflect the required 100% load (see also CL 40). 2) DNV can confirm that the PDD has been updated accordingly. Furthermore, given that the construction of the project is ongoing, such a list will be updated continuously until the implementation is finished, and therefore it is limited the value of specifying it at this stage. 3) DNV can confirm that the Annex 5 in the PDD includes now the 37

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			units, as indicated by the PP, each with its corresponding tag number (identification). CL closed
CL 28 The PP shall revise the data and parameters monitored under section B.7.1 of the PDD to include for each parameter (namely, $V_{F,y}$ and $NCV_{RG,F,y}$) , the following: 1) Frequency of measurement 2) Data recording frequency 3) Accuracy of the meter(s). 4) The QA/QC procedures as per the approved methodology 5) Maintenance procedures for the meters and/or corresponding ruling standard.	B.7.1 B.7.4 B.7.5 B.7.6 B.7.7 Table	PDD has been updated.	DNV has reviewed the PDD and can confirm that the tables in Section B.7.1 include the information required, and also conform to the requirements of the methodology. CL closed.
CL 29 The PP shall present the procedures for quality assurance including the specification of the main meter ($V_{F,y}$), and handling of erroneous readings, etc.	B.7.10	PDD has been updated.	DNV has reviewed the updated PDD and can confirm that the specification of the main meter is included in the tables in Section B.7.1. In addition in section B.7.2. part C is included the QA/QC procedures for error handling. DNV is of the opinion that the above is according to the monitoring and QA/QC requirements of the methodology. CL closed
CL 30 The PP is requested to explain the data variables presented under section B.7.2, point A, of the	B.7.1 B.7.2	These parameters were included in the monitoring plan erroneously and now have been taken out, please refer to the updated	DNV confirms that the PDD has been updated as per the response of the PP.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
PDD: $V_{C,1,y}$; $V_{C,2,y}$; $V_{C,3,y}$; $V_{L,y}$; $w_{carbon,C,2,y}$; $w_{carbon,C,3,y}$, the relation of each one to the CDM project activity and, ensure those that those data variables part of the CDM project activity are presented in the PDD according to the with the monitoring requirements specified in the approved methodology, if applicable.	B.7.3 B.7.4 B.7.3 B.7.5	PDD.	CL closed.
CL 31 The PP shall submit for validation: - The approvals issued to the EIA's in connection with the environmental licenses No. 014, 044, 042 and 075 respectively. - The EIA published on 30 May 2008, under communication DE-08-1070 - Approval to the Internal Environmental Audit (AAI).	D.1.1	The requested evidence has been provided to DNV.	DNV can confirm that the evidence provided correspond to: a) the official approval of the EIA's in connection with the environmental licenses No. 014, 044, 042 and 075 respectively, b) the approval of the AAI regarding the thermoelectric auto generation system in the areas under the project activity, and c) the EIA published on 30 May 2008, under communication DE-08-1070. The approval of the EIA /19/ corresponds to the EIA report /19/, which in turn evaluates the impact of electricity generation based on internal combustion (thermal generation). The AAI /19/ is periodical audit specified in the EIA report and it is in accordance with article 8 of the regulation for electrical activities /20/. The AAI specifies aspects that are required to be monitored by the PP during the implementation and operation of the project activity. There it can also be observed that such monitoring activity is

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			taking place accordingly. CL closed.
CL 32 The PP shall present for validation, copy of the following legislations referenced to the precise page and paragraph: 1) Environmental management law (Ley de Gestión ambiental). 2) Prevention and Environmental pollution control Law (Ley de Prevención y Control de la Contaminación Ambiental). 3) Environmental Regulation for Electrical Work Activities (Reglamento ambiental para Actividades Eléctricas) 4) Unified Text of the Secondary Environmental Legislation, particularly Book VI and corresponding Annexes / specifications applicable to the electricity sector (Texto Unificado de la Legislación Ambiental Secundaria, particularmente el Libro VI y sus anexos respectivos / especificaciones aplicables al sector eléctrico)	D.1.2	The requested evidence has been provided to DNV.	DNV can confirm to have received the following evidences /20/, and that they are applicable to the proposed project activity : 1) Environmental management law (Ley de Gestión ambiental), Chapter III, Articles 28 & 29, Stakeholder Consutlation/Participation in Environmental Management. 2) Prevention and Environmental pollution Control Law (Ley de Prevención y Control de la Contaminación Ambiental). 3) Environmental Regulation for Electrical Work Activities (Reglamento ambiental para Actividades Eléctricas) 4) Unified Text of the Secondary Environmental Legislation, particularly Book VI and corresponding Annexes / specifications applicable to the electricity sector (Texto Unificado de la Legislación Ambiental Secundaria, particularmente el Libro VI y sus anexos respectivos / especificaciones aplicables al sector eléctrico) DNV can confirm that the PP has complied with the requirements of the above laws and regulations via the stakeholder process held as part of the project activity /13/, and the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			corresponding environmental licenses issued by the respective authorities /19/. CL closed.
CL 33 The PP shall specify whether there are any legal requirements for holding a stakeholder consultation and/or the process to follow in this respect. The corresponding evidence precisely referenced shall be presented for validation.	E.1.3	Please refer to the Environmental Management Law, Chapter III, Articles 28 & 29, where you will find the Stakeholder Participation requirements. See also CL 23	DNV can confirm that the PP has complied with the requirements outlined in the Environmental Management Law, Chapter III, Articles 28 & 29, Stakeholder Consultation/Participation in Environmental Management, by holding the stakeholder meetings /13/ where the local stakeholder were informed of the project activity and given the opportunity to raise their opinion and/or concerns on the project activity. Furthermore, DNV was able to confirm during the site visit interviews (references /14/, and /34/ to /72/) that the meetings were held as indicated by the PP, the information provided as in an open and complete manner and all questions raised were satisfactorily clarified by the PP. CL closed.
CL 34 The PP shall provide a list of the comments received during the stakeholders meetings.	E.1.4	The minutes of the stakeholder meetings held at Edén Yuturi 28.01.10, and Limoncocha 27.01.10, have been provided to DNV for validation.	DNV has been able to review the evidence provided /13/ and can confirm that it corresponds with the information received directly by DNV during the interviews held during the site visit (references: /14/, and /73/ to /76/).

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			CL closed
CL 35 PDD, annex 5: - Ensure that there is a clear(er) representation of the conditions prior and after the start of operations of the project activity (commissioning date of the 1st generator under the project activity), per location - Clarify whether there is 4 or 5 location under the project activity with power generation activity - Clarify what is the purpose of the Table in page 50, and re-arrange the table with that purpose in mind (e.g. what is the point to add scrapped generation with new generation?).	A.2.5	- The table has been corrected. This table is taken from the "06 Inventory Gas Power…" which is attached - There are five locations. The one which is missing is Yamanunka which has been added into Annex 5 - The table has been corrected. The purpose of the table is providing information about the equipment which is used in the project. Part of this equipment was installed before the project but was overhauled and kept running only due to the project and the other part was or will be newly installed	DNV has reviewed the response of the PP to the issue raised and finds it sufficient. The PDD has been updated as mentioned in the response. CL closed.
CL 36 Provide evidence (precisely referenced) for: 1) 25% increase of project costs above budget 2) time frame for the diesel price (PDD/Inv. analysis shows 0.901 $/gal) 3) diesel price variations for previous period(s) and corresponding length of previous period(s) 4) footnote 6: Inventory Gas Power Generation Equipment Project Activity for the latest projections on associated gas-based capacity additions	B.5.25	1) PDD has been edited to present rather the country's inflation trend and total costs incurred 2) Please refer to "Historical diesel prices_Petrocomercial 2000_2009.xlsx" 3) Please refer to "Historical diesel prices_Petrocomercial 2000_2009.xlsx" 4) Please refer to the latest update of the "06 Inventory Gas Power…". attached	DNV has reviewed the response of the PP and can confirm that: 1) The PDD has been edited as per the response of the PP. Furthermore, DNV can confirm that according to the evidence presented the inflation rate in Ecuador /11/ and the trend of the costs incurred so far in the project activity /11/ justify enough the fact that is not possible to have an scenario where the investment of the project activity (CAPEX) will be lower than the values presented in the investment analysis, but rather higher if any. Therefore it is

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			not possible for the PP to reduce the investment costs by 35.9 % in order for the project activity to reach the benchmark value. 2) Based on the evidence presented /11/, DNV can confirm that from July 2003 to December 2009 the price of the diesel in Ecuador has been the same. DNV found no evidence during the validation of the project activity that could indicate any change of this situation. 3) Based on the evidence presented /11/, DNV can confirm that between January 2000 and June 2003 the price of diesel increased from 0.273 to 0.879 USD/gallon. 4) DNV has revised the evidence presented, and the calculations presented in the "Inventory Gas power …" file reflect a 100% load. Further assessment and closure of this point is presented under CL 40. CL closed
CL 37 The PP shall explain the sudden changes in electricity demand in 2012-2013 at EY and 2013-2014 at ILYP, and the corresponding correlation/verification versus production forecast.	B.5.25	In regard to the issue of a sudden increase in electricity demand in 2013 at EY, this relates to the start of Block 31 operations and the subsequent increase in power demand. This causes the significant level-increase in demand.	DNV has reviewed and assessed the response to the issue raised and can confirm the following: 1) The forecast presented in the investment analysis /3/ is made up of 2 forecasts: a) the input values (see below) for years

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		In regards to the issue of the change in electricity demand in ILYP: The change comes from different forecasts as we need to match two different data series i.e. projections in the investment analysis to best reflect the information available at time of investment decision. Note, projections change all the time. Regarding the correlation/verification vs production forecasts: Please note that there are no government historical records confirming these projections. Due to high focus on actual production figures rather than forecasts that change often anyway, the forecasts made by PETROAMAZONAS are merely acknowledged by ARCH (Hydrocarbon Regulation and Control Agency), part of the Ministry of Petroleum and Mines.	2009-2013 taken from an in-house (PETROAMAZONAS) estimation /10/, based on the 5 year forecasts (quinquennial plans) submitted to the National Directorate of Hydrocarbons (DNH). The input values for the years 2014-2019 are taken from the production forecast /10/ prepared by PETROAMAZONAS operations department for the project activity. This forecast has been validated by the Ministry of Non Renewable Natural Resources /1/. 2) The forecast presented in the emissions reduction calculations /3/ 2010-2019, is taken from the production forecast /10/ prepared by PETROAMAZONAS operations department for the project activity. The values for the year 2009 were taken from the 5 year forecast /10/. Input values to the investment analysis and ER calculations taken form the corresponding forecasts are: - Total fluid production - Water recovery - Flare gas based on GOR - Total electric capacity demand for operations. The changes to the trends in ILYP and EY

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			fields are satisfactorily explained and these are included as remarks in the corresponding cells in the investment analysis calculations file. CL closed
CL 38 In the fields of Eden Yuturi, Pañacocha and Block 31 the liquid fossil fuel used for power generation is crude oil and the project will thus result in crude oil savings. Further clarifications are requested for not considering these savings in the investment analysis.	B.5.21	PETROMAZONAS EP (PAM) is an independent state-owned company with a governance structure that empowers its management to make its own independent investment propositions and decisions. The scope for the proposed Project Activity was developed by internal experts within PAM and then reviewed and approved by the internal planning department. Based on this approval, which included supposed income from CERs, the PAM Board of Directors decided to go-ahead with the project and apply for funding from the Ministry of Finance. The decision to invest funds resides solely with the PAM Board of Directors based on their criteria and corresponding investment analysis. There is therefore a very clear distinction between the Government and the Company because, the scope of the investment, the design and the feasibility evaluation of the Project Activity was done independently by PAM and not motivated by a request, decree, or order from the Government of Ecuador. In addition to funding the annual operating expenses of PAM, the Government frees budgetary funds for PAM's investment	DNV was able to confirm that given the legal framework for oil exploration in Ecuador /12/ and the approval from the Ministry of Mines and Petroleum, via the Directorate of Hydrocarbons /11/, PETROAMAZONAS EP has no direct economic benefits from savings in crude oil. DNV's further investigations also confirmed that while PETROAMAZONAS EP is owned 100% by the State (Government) of Ecuador, PETROAMAZONAS EP is responsible for proposing and developing the business within the mandate laid out in the corresponding Decree. PETROAMAZONAS EP is run by a management overseen by a Board of Directors presided by the Minister of Petroleum and Mines. It is thus in DNV's opinion acceptable that the investment analysis, which represents the economic attractiveness of the project in the perspective of PETROAMAZONAS EP, does not consider crude oil savings as a result of the project activity. DNV's further investigation showed that

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		projects on a need-basis according to PAM's judgement and proposition. PAM could have decided to ask the Government to allocate the funds now being invested in the Project Activity for drilling / exploration activities whereby these would have shown a far higher rate of return (diverting the Project Activity funds to drilling activities could have increased oil production by as much as 10,000 bbl/day assuming an average cost of USD 5,000,000 per well and an average production of 500 bbl/day per well). The boundary between PAM and the Government is very clear and the by-laws of PAM also make it clear that the company is run by a Management Team and its corresponding Board of Directors and not the Government. This is a very common situation and can be confirmed by any corporate finance expert: governments provide mandates to state-owned companies; they do not initiate, assess and approve individual projects. We understand the description of the initial budget approval is misleading and thus have changed the PDD accordingly. The investment analysis focuses on the core decision made by PAM's management to support the Project Activity. This decision	while PETROAMAZONAS EP has no direct economic benefits from saving in crude oils, the crude oil production rate is one of the main key performance indicators for PETROAMAZONAS EP. However, DNV's calculation showed that the crude oil savings achieved as a result of the project at Eden Yuturi, Pañacocha and Block 31 only represent 2-3% of the total crude oil production at Eden Yuturi, Pañacocha and Block 31. The savings are thus rather insignificant and it is in DNV's opinion reasonable to assume that it is not likely that the project would be implemented only to improve the key performance indicator of crude oil production. Moreover, to increase crude oil production, the project would have to compete with other investment opportunities, such as investing into further drilling and exploration. CL closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		was made in awareness of PAM's by-laws that assign no value to crude oil usage and thereby do not merit a broader financial evaluation of the Project Activity. PAM is judged by the amount of oil it produces, not by the amount of associated gas it optimizes and or the amount of oil it supplies to the entity that sells the oil which means that there was no indirect benefit of increased oil supply by PAM. Thus, the IRR analysis is line with the additionality tool and investment appraisal guidance.	
CL 39 The following aspects within the PDD shall be revised for inconsistencies and/or to provide further clarifications as needed: 1) pp 4 / Annex 1: The name for PETROAMAZONAS is not the same on page 4 and Annex 1. Furthermore, it should be clarified whether it is Petroamazoans Ecuador S.A or PETROAMAZONAS EP 2) pp 5: It is not fully clear how Panacocha is different from block 15. Also although the name of Pañacocha has been removed from some sentences in the PDD, the text should be revised since it is now missing an "and" where the name used to be ("are located in the Block 15, Block 31"), and in other places it now reads that "Block 31 is located inside Block 15". (see also CL 42)	A.2.5	The PDD has been revised accordingly. 1) The name was clarified, it is "PETROAMAZONAS EP", and this entity is the owner of the project. The PDD has been revised accordingly. 2) The PDD has been revised 3) Footnote 6 on page 7 last paragraph has been deleted. 4) PDD revised 5) PDD revised 6) The PDD has been revised. 7) We have added it under B.7.2: A. Data collection task: Data needs to be collected for monitoring the Project Activity whereby the collected data must comply with minimum	DNV has reviewed and assessed the response the issues raised as follows: 1) DNV has reviewed the PDD and can confirm the name referenced throughout the PDD is PETROAMAZONAS EP which is consistent with the name of the PP declared in the LoA issued by the DNA of Ecuador. /22/. 2) DNV has reviewed the PDD and can confirm that it has been revised as per the response of the PP. 3) The footnote 6 on page 7 last paragraph has been deleted, and it is now only on page 26. 4) The PDD has been revised to include the specification that all the oil fields listed are located within Block 15. This was also confirmed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
3) pp 7: There is a footnote 6 at the end of the last paragraph but there is no footnote 6 4) pp 8: Table should indicate at which block these equipment are installed 5) pp 9: The abbreviations ILYP and EY are nowhere defined 6) pp 26: Text makes reference to a footnote 13 which does not seem to be correct. The PP should explain and/or revise the relation between the text and footnote. 7) pp 33/34: The PDD should further clarify if they intend to install more than one flow meter and gas chromatograph		requirements as laid out in Section B.7.1. For every relevant parameter: recording and filing instructions must be issued thereby making sure indicated parameter are recorded and registered accordingly (physical and digital). Measuring points F are indicated in the Annex 5. These points will be supplied with flow meters and chromatographs as stated in the section B.7.1. The section B.6.3. has been revised as well.	during DNV's site visit. 5) The abbreviations are specified in the PDD (also included in this validation report). 6) DNV has reviewed the PDD and can confirm that it has been revised as per the response of the PP. 7) DNV has reviewed the corresponding sections of the PDD and can confirm that it now makes reference to the layout diagrams in Annex 5 of the PDD, where it is specified that there will be 5 "F" points: 1) one F point at CPF 2) one F point at LPF 3) one F point at Paka sur field 4) & 5) two F points at Eden Yuturi On each of the above F points both NCV and gas flow will be measured as indicated in the monitoring section above. CL closed.
CL 40 The PP is requested to revise the phrasing in the PDD of the "approach 1 (ex-post) – no direct measurement…", such that it clearly reflects the calculation process of the project emissions in the absence of measuring the electricity consumption of the gas handling equipment. Also the project emissions calculations (Excel file	B.6.7	The PDD has been edited as follows: "The quantity of electricity consumed ($EC_{PJ,j,y}$) by the auxiliary gas handling equipment (refinery/ies) is calculated based on: the rated consumption (MW) of the refineries and the actual load of gas-based electricity generation equipment (gas generators). The load of gas generators has direct relation to the load of refineries, and	DNV can confirm that the PDD has been edited to reflect the change indicated in the response of the PP. Furthermore, the load factors has been revised to 100% in the following files, which are input to the investment analysis and ER calculations /3/:

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
and supporting documentation) shall be revised to reflect the 100% load factor utilization of the electricity generating equipment, and the proportional part of the gas handling equipment to satisfy the total demand of the electricity generating equipment.		it is established in the formula below. Rationale: the amount of gas to be pre-treated is always in line with gas consumed by gas generators, and gas consumption directly affects amount of electricity produced. In other words, load factors of these equipments are in direct correlation to each other." Also the workloads have been changed to 100% to comply with the conservativity principle for the calculations in Approach 1.	- Project Emissions CMD Project PETROAMAZONAS (Rev 1) (2) /11/ - Inventory Gas Power Generation Equipment Project Activity (Rev 3) (2) /11/ CL closed.
CL 41 Provide a copy of the five-year forecast validated by the government of Ecuador or a ministry or an official governmental body confirming the forecast provided by PETROAMAZONAS.	B.5.20	Please note that the government as such does not validate production forecast records provided by the oil companies. Forecast figures are presented to the ARCH (Hydrocarbon Regulation and Control Agency – part of the Ministry of Petroleum and Mines) whereby they are the entity that audit and validate actual crude oil production and review and approve drilling and construction activities. One must bear in mind that forecast figures are constantly updated within any any oil company. Following our discussion, please find attached the quinquennial plans 2007-2011 and 2008-2012 which were approved by DNH. Regarding the quinquennial plans 2010-2014 and 2009-2013 these were presented to the DNH (now ARCH)	DNV has been able to review the following documentation /10/ : - Approved quinquenal plan 2007 – 2011 - Approved quinquenal plan 2008 – 2012 - Quinquenal plan 2009 – 2013 - Quinquenal plan 2010 – 2014 - Letter from the Ministry of Non Renewable Natural Resources /2/ validating the production forecast issued by PETROAMAZONAS in connection with the CDM project acitiviy Based on the validation letter of the forecast prepared by PETROAMAZONAS for the project activity issued by the Ministry of Non Renewable Natural Resources /3/, the consistency of the estimations presented, and the actual production measured

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		without getting formal acknowledgement of receipt for the reasons we indicate here below: - Over the past two years the Government of Ecuador has been renegotiating contracts with private operators whereby these negotiations only came to a close last month (Feb 2011) - Some negotiations were successful but many were not whereby the corresponding blocks were handed over to PETROAMAZONAS EP to operate (for example, Block 7, Block 21, Block 18, etc.). - The DNH (now ARCH) was looking for a consolidated Production Forecast from PETROAMAZONAS EP (including the Blocks that were handed over) but PETROAMAZONAS EP was not in the position to freeze any forecast until all the dust was settled (one month ago). The fact that the DNH (now ARCH) did not formally approve the attached Planes Quinquenales does NOT make the attached documents less official since the attached documents are external documents (PETROAMAZONAS EP was evaluated and judged based on these forecasts).	between 2007-2010, up to last year, DNV can conclude that there is enough evidence to justify the forecast values used in the investment analysis and emission reduction calculations as real and representative for the estimated production of the fields within the boundary and for the lifetime horizon of the project activity. CL closed.
CL 42 In PDD A2.1 it is stated “associated gas was previously flared at block 15, block 31”,	A.2.4	The PDD has been updated.	DNV has been able to revise the PDD and can confirm it has been updated and inconsistencies clarified as per the response

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
while in A3.2 it is stated it would be flared at block 31. The text in the PDD should be revised to match the time and context of the sentences previously involving the name of "Pañacocha" and involving the Block 31 (e.g. Block 31 has not been previously flaring).			of the PP. CL closed

Table 4 Forward action requests

Forward action request	Reference to Table 2
FAR 1 As per the approved methodology, during the first verification it should be confirmed that the associated gas supply to the processing facilities at CPF and EY sites comes from oil wells that are in operation and within the project's boundaries.	B.2.5

- o0o -

APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Nitin Kapoor

Nitin Kapoor holds a Bachelor in Chemical Engineering from BITS-Pilani and is also a qualified Chartered Financial Analyst (CFA). He has an overall experience of 15 years and 4 months as on date (October 2010). Prior to joining DNV he had experience of 10 years and 5 months in Oil & Gas as well as manufacturing sector (food) with leading MNC's like ITC, Coca Cola and Enron Oil and Gas. During his stint in industry part his responsibilities included carrying out energy audits and to identify potential areas of improvement. His experience includes analysis of specific consumptions (primarily on energy, raw materials and utilities) of processes based on historical data, carrying out material balances (heat and mass), analysis of equipment performance and identification and measurement of energy saving opportunities. He has also been responsible for the operations of the complete Crude Distillation Unit in the refinery, complete platform operations in Oil and Gas sector as well as for the utilities like steam, AHU while at ITC. He also has been responsible of the ETP operations in Coca Cola and ITC as well as Water and Sewage treatment plants while working offshore. He has been responsible for EMS and QMS at ITC and Coca Cola.

He has experience of around 3.5 years in validation and verification of numerous CDM projects within DNV. He is also a Lead Auditor for QMS, auditor for EMS and Safety. His qualification, industrial experience and project experience in CDM demonstrate his sufficient sectoral competence in Energy Generation from renewable energy sources, energy efficiency, heat distribution energy demand as well as waste handling and disposal.

His direct work experience in Oil and Gas and food sector demonstrates his sectoral competence in these industries as well.

Patrice Massicard

Patrice Massicrd holds a Master degree in Mechanical Engineering. He has an overall experience of around 10 years. Prior to joining DNV, having around 3 years experience in Oil & Gas industry and 5 years experience in mechanical industry covering equipment design.

He has experience of around 2 years in DNV for the certification of mechanical equiments, and 6 month experience in the validation of CDM projects.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in the filed of mechanical industries.

Ole Andreas Flagstad

Ole Andreas Flagstad holds a Master Degree in thermodynamics/energy efficiency and has an overall working experience of around 20 years. He has worked both in public and private sector, including 5 years with a research institute (IFE) where specific responsibilities included running an energy efficiency network in the food industry and direct intervention with the industry. Other work experience includes working in European research programmes, administering national research programmes and International Energy Agency annexes.

Ole Andreas Flagstad has 4 years experience in validation and verification of projects within CDM, JI and other carbon credit schemes. His qualifications and experience in carbon credit schemes (primarily CDM and JI), qualifies him for different roles in a broad group of technical areas.

Michael Lehmann

Michael Lehmann holds a Master Degree in Environmental Sciences with a specialisation in environmental chemistry. He has an overall working experience of around 13 years.

Since 1999 he has worked in the climate change field and has closely followed the international response to the climate change challenge (UNFCCC, Kyoto Protocol) and the responses by national governments (EU ETS, UK ETS) and business. He has managed the validation and verification of many CDM and JI projects and thas carried out the technical review of numerous climate change project validations and verifications. Through his extensive work with validation and verification of CDM and JI projects, he has aquired sectoral competence within energy generation from renewable energy sources, electricity distribution, waste handling and disposal and animal waste management.

He has also experience with verifying corporate greenhouse gas emissions and emission reductions from verifying the emissions of the Norwegian process, paper & pulp and oil & gas industry. Earlier, he has managed DNV Research's R&D activities with the objective to build and to enhance DNV's knowledge in the field of CO2 capture and storage. He also conducted R&D to conclude on measuring systems and reporting formats necessary to accurately and trustworthy report greenhouse gas emission reductions, especially addressing uncertainties. He also provided technical environmental advisory services to clients within the process industry, above all in the field of air emissions. Among others, he developed a methodology for Environmental Risk Assessment for accidental releases of chemicals.

Francisco Chávez V.

Francisco Chavez V. holds a Technical Degree in Electricity, a Bachelor Degree in Engineering Physics with specialization in Thermodynamics and IT systems, and a Master Degree in Business Administration with special focus in Strategy, Leadership, Marketing and Project Management. He has an overall working experience of around 27 years. Prior to joining DNV having 10 years experience in hydropower and renewable energy projects, electricity systems (transmission, distribution, supply, demand, generation and rural electrification) and electricity markets, electrical equipment and installations, and 10 years of experience within the oil and gas industry, and around 5 years of business experience in several areas. During these years he has covered the areas of: Project Management, Manufacturing, Supervision, Consultancy and Advisory services, Research and Testing of prototype equipment, and Field, Maintenance and Repair work, among other.

He has experience of around 2 years in validation and verification of CDM projects/JI and other 3rd party validation/verification services. His qualification, industrial experience and

experience in CDM demonstrate him sufficient sectoral competence in: Energy generation from renewable energy sources, electricity distribution, Energy demand, Manufacturing of electrical equipment, and Oil and Gas industry.

- o0o -