VALIDATION REPORT

"LINE 5 & 6 - PFC EMISSION REDUCTION AT DUBAL IN THE UNITED ARAB EMIRATES (UAE)

REPORT NO. 2010-9113

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DET NORSKE VERITAS

VALIDATION REPORT

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Recommended for approval: Chandrashekara Kumaraswamy	Approved by: Michael Lehmann	Organisational unit: DNV Climate Change & Environmental Services
Client: Abu Dhabi Future Energy Company PJSC		Client ref.: Shashi Prakash

DET NORSKE VERITAS
CERTIFICATION 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 945 748 931 MVA

Summary:
Project Name: "Line 5 & 6 - PFC emission reduction at DUBAL"
Country: United Arab Emirates
Methodology: AM0030
Version: 03
GHG reducing Measure/Technology: PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities
ER estimate: 27 179 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 for the project activity ""Line 5 & 6 - PFC emission reduction at DUBAL" in the United Arab Emirates, as described in the PDD, version 04 of 02 June 2011, meets all relevant UNFCCC requirements for the CDM and applies the baseline and monitoring methodology AM0030, version 03, and thus requests the registration of the project as a CDM project activity.

Report No.: 2010-9113	Subject Group: Environment	**Indexing terms**
Report title: "Line 5 & 6 - PFC emission reduction at DUBAL" in United Arab Emirates.		Key words: Climate Change; Kyoto Protocol; Validation; Clean Development Mechanism
Work carried out by: Francisco Zamarron, Ramesh Ramachandran, Sasim Chattopadhyay, Narendra Metha		
Work verified by: Chandrashekara Kumaraswamy, Svetlana Shevnina		
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Abbreviations

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
DNV	Det Norske Veritas
DNA	Designated National Authority
DUBAL	Dubai Aluminium Company Limited
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IAI	International Aluminium Institute
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of approval
MASDAR	Abu Dhabi Future Energy Company
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PCR	Process Change Request
PDD	Project Design Document
PFC	Perfluorocarbon
PP	Project Participant
tCO_2e	Tonnes of CO_2 equivalents
UNFCCC	United Nations Framework Convention on Climate Change
GWP	Global Warming Potential

1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the project activity ""Line 5 & 6 - PFC emission reduction at DUBAL" in the United Arab Emirates. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism, 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 the United Arab Emirates (UAE) and there is no Annex I Party identified as yet. The UAE fulfils the participation criteria and has approved the project and authorized the project participant Abu Dhabi Future Energy Company PJSC. The DNA from the United Arab Emirates confirmed that the project assists in achieving sustainable development.

The objective of the project activity is to reduce PFC emissions from anode effects during aluminium production through the installation of a new algorithm in the Automatic Control System (ACS) controlling alumina feeding in 480 pots located in pot lines Numbers 5 and 6 of Dubai Aluminium Company Ltd (DUBAL) located in Emirate of Dubai, United Arab Emirates.

The project correctly applies the baseline and monitoring methodology AM0030, version 03, "PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities". As a result, the project results in reductions of CO_2 emissions those 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 27 179 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 ""Line 5 & 6 - PFC emission reduction at DUBAL" in the United Arab Emirates, as described in the PDD version 04 dated 02 June 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0030, version 03. Hence, DNV requests the registration of the project as a CDM project activity.

Chennai and Oslo, 2011-06-10

Ramesh

Ramesh Ramachandran,
CDM Validator
DNV Chenai, India

Michael Lehmann

Michael Lehmann
Director of Services and Technologies
Det Norske Veritas Certification AS

2 INTRODUCTION

Abu Dhabi Future Energy Company PJSC has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the ""Line 5 & 6 - PFC emission reduction at DUBAL" project in the United Arab Emirates (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 AM0030 (version 03). The validation was based on the recommendations in the Validation and Verification Manual /31/.

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/ Abu Dhabi Future Energy Company PJSC: *CDM-PDD for project activity ""Line 5* & 6 - PFC emission reduction at DUBAL*" in the United Arab Emirates*, Version 01 dated 11 February 2010, version 3 of 13 January 2011 and version 04 dated 02 June 2011

/2/ DUBAL memorandum for 'summary of events on CIT-3095, AEF reduction in lines 5 & 6' dated 26 January 2006

/3/ J Marks & Associates: *Final report on the measurement of PFC Emissions at DUBAL D18 and D20 reduction lines*, 25 March 2007

/4/ CDM Emission Reductions Purchase Agreement signed between DUBAL and Mubadala Development Company PJSC on the 23 July 2007

/5/ DUBAL, Parameter Change Request (ref. PCR 223/2007); relative to trials dated the 31 December 2007

/6/ DUBAL, Parameter Change Request (ref. PCR 013/2008) relative to trials dated the 11 February 2008

/7/ DUBAL: *Memorandum Report AK/AEF/2008*, relative to the results of the first trials, 14 February 2008

/8/ DUBAL, Parameter Change Request (ref. PCR 075/2008); relative to successful trials dated the 18 May 2008

/9/ DUBAL, Interim report relative to the testing conducted from the 10 to the 22 of July 2008 , 23 July 2008

/10/ DUBAL, Parameter Change Requests: ref. PCR 091/2008, dated the 6 July 2008; ref. PCR 097/208, dated the 23 July 2008; ref. PCR 114/2008, dated the 25 August 2008 and ref. PCR 160/2008, dated the 21 October 2008 and relative to the new AE Quench control logic implementation

/11/ DUBAL: *Feasibility Report Reducing Anode Effects in Aluminium Smelting Technology at DUBAL*, January 2009

/12/ International Aluminium Institute: letter entitled *Line 5&6 – PFC emission reduction at DUBAL*, 4 February 2010

/13/ Abu Dhabi Future Energy Company PJSC, NPV calculation spreadsheets dated 6 December 2010

/14/ DUBAL, stakeholders consultation letter sent to Dubai Municipality (ref. AJMK/ro/vf/139) on the 17 of November 2009

/15/ Financial dossier prepared by Dubal in December 2009 with the 2005-2008 primary data used in the NPV Investment comparison analysis.

/16/ Emirates Environmental Group, Response sent to the Stakeholder consultation on the 20 May 2010

/17/ Employees responses to the Stakeholder consultation : Ahmed Hasan Ali Mohamed on the 25 November 2009; Rania B Tayeh on the 6 December 2009

/18/ Dubai Municipality, Response sent to the Stakeholder consultation on the 09 December 2009 and on the 7 February 2010

/19/ DUBAL 2009 Facts and Figures Report, January 2010

/20/ Line 5 Monthly production data relative to 2009 dated 03 May 2010

/21/ Line 5, monthly AEF and AED data relative to 2005, 2006, 2007, 2008 and 2009 dated 26 April 2010

/22/ Line 6, monthly AEF and AED data relative to 2005, 2006, 2007, 2008 and 2009 dated 26 April 2010

/23/ Abu Dhabi Future Energy Company PJSC, Emission Reduction calculation spreadsheets dated 6 December 2010 and 13 January 2011

/24/ MCA Auditing, Report on the Financial Analysis of DUBAL PFC CDM Project; 27 September 2010

/25/ DUBAL, Quality Specification dated 06 December 2010

/26/ E-mails exchanged between Abu Dhabi Future Energy Company PJSC and DUBAL relative to miscellaneous aspects of CDM registration application dated the 30 September 2009, 18 November 2009, 8 October 2009 and 24 December 2009

/27/ E-mail exchanged between Abu Dhabi Future Energy Company PJSC and DOEs dated the 19 November 2009

/28/ Light Metals 2009, "Evolution of CD20 reduction cell technology towards higher amperage plan at DUBAL"

/28b/ Light Metals 2007, "Experience and Challenges with amperage increase in Hydro Aluminium potlines"

/28c/ RioTinto Alcan 2011, "AP30/40 The world's benchmark reduction technology"

/29/ DUBAL Minutes of Meeting relative to 2010 power and potline customer care dated the 04 January 2011

3.1.2 Letters of approval

/30/ Environment Agency of Abu Dhabi (DNA of United Arab Emirates): Letter of approval dated 16 March 2010

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

/31/ CDM Executive Board: *Validation and Verification Manual.* Version 1.2

/32/ CDM Executive Board: *Baseline and monitoring methodology AM0030*, version 03

/33/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, Version 05.2

/34/ CDM Executive Board: *Guidelines on the demonstration and assessment of prior consideration of the CDM*, version 03

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

/35/ DUBAL, PFC emissions 2007_calculation DUBAL line 5&6, December 2010

/36/ International Aluminium Institute: *Anode effect Survey: 2007 Results* , 9 February 2009 and 2009 Results, 5 July 2010

/37/ Dubai Municipality Environment Department: *Guidelines for Preparation of Environmental Impact Statements for New Industrial Premises*, without issuing date

/38/ International Monetary Fund: IMF UAE Report No. 09/124 , April 2009

/39/ Article entitled Aluminium: "A catalyst for new growth in Qatar" published in the supplement of the Qatalum in February 20101

/40/ Aluminum Monthly Price Statistics
http://www.indexmundi.com/commodities/?commodity=aluminum&months=60

/41/ Natural Gas Monthly Price Statistics
http://www.indexmundi.com/commodities/?commodity=natural-gas&months=60

/42/ Aluminium International Today; January/February 2009 issue

/43/ JOM journal, number 52/2000 article entitled "Prebake cell technology: a global review"

/43b/ Abbu Dhabi Environment Agency, Environmental Legislation
http://www.ead.ae/en/portal/environmental.laws.aspx

/43c/ US Environmental Protection Agency (EPA), Regulatory requirements applicable to potlines at primary aluminium reduction plants during startup under 40 CFR part 63, subpart LL

The main changes between the versions of the PDD pertain to the identification of project activity alternatives, emission reduction calculations, the net present value calculation, the redefinition of the project staring date. More detailed information regarding the nature of the changes can be found in Table 3 at the end of this report.,

3.2 Follow-up interviews with project stakeholders

On the 21 April 2010 DNV visited the DUBAL installations and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/44/	2010-04-21	Almarzouqi Mohamed	DUBAL Environmental Manager	➢ Environmental impacts of the proposed project
/45/	2010-04-21	Sanjeev Sharma	DUBAL Head of	

			Environmental Department	
/46/	2010-04-21	Kumar Arvind	DUBAL Project Manager	➢ Project construction status ➢ Project management
/47/	2010-04-21	Ali Alzarouni	DUBAL v.p. smelter operations	➢ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval)
/48/	2010-04-21	Kamel Alaswad	General Manager	
/49/	2010-04-21	Ronald Otte	DUBAL EHS Manager	➢ Applicability of selected methodology ➢ Consulting process for stakeholder's comments
/50/	2010-04-21	Yunus Dohadwala	DUBAL Business Development Manager	➢ Investment risks and barriers
/51/	2010-04-21	Shuvendu Bose	Abu Dhabi Future Energy Company PJSC CDM Implementation Manager	➢ Baseline determination of the project ➢ Issues related to the additionality
/52/	2010-04-21	Beatrix Schmnelling	Abu Dhabi Future Energy Company PJSC CDM Implementation Manager	➢ Common practice analysis
/53/	2010-04-21	Shashi Prakash	Abu Dhabi Future Energy Company PJSC CDM Team Leader	
/54/	2010-04-21	Joseph D'Souza	DUBAL Industrial Engineer	➢ Emission reduction monitoring plan and project management
/55/	2010-04-21	Maryam Mohamed Aljallef	DUBAL Senior Manager Process Control	➢ Emission reductions calculation

3.3 Resolution of outstanding issues

The objective of this phase of the validation is 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 ""Line 5 & 6 - PFC emission reduction at DUBAL" in the United Arab Emirates 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 c**orrective 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	TA 9.1 competence
Project manager	Zamarron	Francisco	Italy	✓						
Technical team leader (CDM validator)	Rama-chandran	Ramesh	India		✓		✓	✓		
GHG auditor	Zamarron	Francisco	Italy		✓	✓	✓			
GHG auditor	Chattopadhyay	Sasim	India		✓		✓			
Sector Expert	Metha	Narendra	India		✓	✓	✓			✓
Technical reviewer	Kumaraswamy	Chandra-shekara	India						✓	
Person with sectoral competence assisting technical reviewer	Shevnina	Svetlana	Russia						✓	✓

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 04 dated 02 June 2011 /31/.

4.1 Participation requirements

The project participant is Abu Dhabi Future Energy Company PJSC of United Arab Emirates which meets all relevant participation requirements.

A letter of approval (LoA) /30/ was issued by the DNA of the United Arab Emirates on the 16 March 2010, authorizing Abu Dhabi Future Energy Company PJSC as project participant and confirming that the project assists in achieving sustainable development.

The letter of approval was received from the project participant. DNV does not doubt the authenticity of the letter of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /31/ .

4.2 Project design

The objective of the project activity is to reduce PFC emissions from anode effects during aluminium production through the installation of a new algorithm in the Automatic Control System (ACS) controlling alumina feeding in 480 pots located in pot lines Numbers 5 and 6 of Dubai Aluminium Company Ltd (DUBAL) located in Emirate of Dubai, United Arab Emirates. The project location coordinates are latitude 25° 02’35’’N and longitude 55°.07’ 15” E.

Pot line Number 5 started operations in September 1996 and pot line Number 6 in May 1999 /19/. During the site visit it has been checked that both lines use center work pre-bake cell technology with point feeder systems (PFPB). There is no physical difference between the pot lines before and after project installation. The only existing difference is the new algorithm in the Automated Control System feeding the alumina in the two lines involved

Before considering implementing a mitigation Anode effect program, DUBAL has already in place a PFC emission monitoring system. A study was conducted by J Marks & Associates in March 2007 /3/ with the scope to estimate PFC emissions at DUBAL site. As a result of the study it was concluded by Abu Dhabi Future Energy Company PJSC Management that there were room for improvement in PFC reductions and decided to put it into place with the CDM revenues support.

In July 2007, DUBAL Management signed the ERPA with Abu Dhabi Future Energy Company PJSC /4/ and during the period from December 2007 till February 2008 the first series of trials were conducted with the scope to create the adequate algorithm. The trials were not successful and a second series of trials were conducted from June 2008 until July 2008. In this occasion the trials were successful and on the 6 of July 2008 the new alumina feeding logic passed to the industrialised stage for the two lines.

According to the methodology AM0030 /32/, only PFC emissions from anode effects are included in the project boundary.

The expected operational lifetimes of the proposed project activity is 16 years for line 5 and 19 years for line 6. These lifetimes are based on the current age of the lines – 14 years for line 5 and 11 years for line 6 – and the expected 30 years total life estimated according to specialised press /39/. A fixed crediting period of 10 years has been chosen by the PP, starting on 1 June 2011. The emission reductions have been calculated resulting in an annual average of 27 179 tCO_2.eq and 271 790 tCO_2.eq over the ten-year crediting period.

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 project applies the approved baseline and monitoring methodology *AM0030*, version 03 /32/ - *PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities.* The proposed project activity meets the methodology applicability criteria as it has been demonstrated to ensure that:

- the measures contemplated in the project are aimed to reduce the PFC emissions in aluminium smelting facilities that use center work pre-bake cell technology with bar brake (CWPB) or point feeder systems (PFPB). In fact during the site visit DNV has checked that the technology used in the two lines included in the project activity is PFPB and during the interviews conducted with DUBAL personnel and management /44/ to /55/ that the measures contemplated in the project are aimed to reduced PFC emissions as it can be demonstrated by the result of the study carried out in March 2007 /3/ in which it is stated that there is potential for emission reductions in line 5 and 6 and, as a consequence, the emission reduction agreement signed with Abu Dhabi Future Energy Company PJSC in July 2007 /4/.
- Both, line 5 and 6, have started operations before the 31 December 2002. In fact it has been cheked by DNV that line 5 started operations in September 1996 and line 6 started operations in May 1999, as verified from the report under reference /19/
- At least three years of historical data are available regarding current efficiency, anode effect and Aluminium production of the two lines before the starting date of the project activity /21/ /22/
- The existing number of potlines and pots within the system boundary is not increased during the crediting period which is shorter than the end of the lifetime of existing potlines . During the site visit to DUBAL DNV checked that there is no possibility to expand the lines as there is not physical space to do so.
- It is demonstrated that, due to historical improvements carried out, the facility achieved an operational stability associated to a PFC emissions level that allows increasing the Aluminium production by simply increasing the electric current in the pots.

The correlation, between aluminium production and electricity consumption is presented in section B.2 of the PDD. The correlation is based on data from July 2005 to June 2008 that is to say, three years prior to the implementation of the project activity (6 July 2008).

The assessment of the project's compliance with the applicability criteria of AM0030 (version 03) 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 emissions sources included in the project boundary are:

	Source	Gas	Included?	Justification/Explanation
Baseline	Anode effects in Pots	CF_4	Yes	According to the methodology AM0030, only PFC emissions from anode effects are included in the project boundary.
		C_2F_6	Yes	
	Carbon anode reaction	CO_2	No	These additional GHG emissions are not included in the methodology.
	Use of Na_2CO_3	CO_2	No	
	Use of cover gas	SF_6	NO	
	Internal transport	CO_2	NO	
		CH_4	NO	
		N_2O	NO	
	Electricity consumption	CO_2	NO	Electricity consumption is typically reduced to some extent, but it is not the trigger of this type of project activities. Thus, the emissions related to electricity consumption are excluded from further considerations, as a conservative assumption.
		CH_4	NO	
		N_2O	NO	
Project Activity	Anode effects in Pots	CF_4	Yes	According to the methodology AM0030, only PFC emissions from anode effects are included in the project boundary.
		C_2F_6	Yes	
	Carbon anode reaction	CO_2	No	These additional GHG emissions are not included in the methodology.
	Use of Na_2CO_3	CO_2	No	
	Use of cover gas	SF_6	NO	
	Internal transport	CO_2	NO	
		CH_4	NO	
		N_2O	NO	
	Electricity consumption	CO_2	NO	Electricity consumption is typically reduced to some extent but it is not the trigger of this type of project activities. Thus, the emissions related to electricity
		CH_4	NO	
		N_2O	NO	

				consumption are excluded from further considerations, as a conservative assumption.

According to the approved baseline and monitoring methodology AM0030 /32/, there are not leakages.

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 AM0030 (version 03).

4.5 Baseline determination

According to the approved baseline and monitoring methodology AM0030 /32/, project participants shall identify the most plausible baseline scenario among all realistic and credible alternatives and, for that purpose, the latest approved version of the "Tool for the demonstration and assessment of additionality" /33/ should be used to assess which of these alternatives should be excluded from further consideration.

The following possible baseline scenarios have been identified:

- Scenario 1: The proposed project activity not undertaken as a CDM project activity. This scenario can be divided in two possible alternatives:
  - Alternative 1 - the algorithm is implemented without CDM financing keeping the aluminium production at pre-project production levels and with the benefit of the electricity consumption reductions that the implementation of the algorithm implies
  - Alternative 2 - the algorithm is implemented without CDM financing but increasing the aluminium production by the correspondent amount, calculated according to the pre-project operational stability, to the electricity consumption reductions by algorithm implementation.
- Scenario 2: All other plausible and credible anode effect mitigation alternatives to the project activity that deliver outputs with comparable quality, properties, and application areas. This scenario can be divided also in two possible alternatives:
  - Alternative 3 - Control measures (automatic and manual control system improvements)
  - Alternative 4 - Quality measures (changing the type of alumina).
- Scenario 3 - Alternative 5: the algorithm is not implemented but the aluminium production is increased, with respect to the pre-project production, for the same amount that in Alternative 2. Alternative 6: The continuation of the current situation

in which neither anode effect mitigation measures nor business-strategy practices are undertaken keeping the aluminium production at pre-project levels is another feasible scenario.

The alternatives 1 and 2 in Scenario 1 are not feasible because they are not economically attractive and face barriers that prevent their implementation. These barriers, as well as the economic assessment, are described below in the report.

Regarding the alternative 3, DNV has verified during the site visit that DUBAL has in the past introduced control and quality measures with the main objective of optimising aluminium production efficiency and, as secondary objective, mitigating anode effects. In fact a core technical group was formed on 7 March 2005 with the scope of optimising aluminium production through rationalising alumina feed strategies and other control practices. The measures introduced by the technical group and the results achieved are described in a DUBAL memorandum dated 26 January 2006 /2/ The main control actions taken were: 1) to rationalise the feed strategy identifying the best parameters set to be applied to all pots of both lines. 2) to reduce the delay to commence quenching in both lines 3) other control practices such as anode cover practices, changes in deadband limits, etc. The 2005 performance data resulting from these actions was analysed during the site visit. The analysed data show that operational stability was achieved reducing anode effects duration by 33% with respect to 2004 data.

Changing the type of alumina (Alternative 4) used is not an alternative to the project participant. DUBAL's suppliers have already high quality alumina specifications /25/ to meet and to increase the quality requirements would not secure the alumina intake to keep the current levels of production.

DUBAL production has already achieved operational stability low anode effect frequency and has no incentive to introduce further measures unless the improvement increases the aluminum production enough to cover the investment costs. In these conditions, for increasing aluminum production it is necessary to increase the current density. DNV has verified that the 230 kA current density by pot used by the PP in the pre-project scenario /11/ was not the maximum current density workload that the lines can absorb. In fact the increased amperage above 230 kA is feasible in CD20 technology /28/ and the rectifiers installed pre-project activity in the two lines can reach a current density of 241 kA by pot /29/. Therefore alternative 5 is feasible.

The continuation of the existing practice maintaining aluminium production at pre-project levels (alternative 6) is also a feasible alternative to the project activity and it will result in lower baseline emissions than alternative 5, because in alternative 5 the aluminium production is increased without implementing the reduction algorithm, thus generating a higher number of anode effects and, consequently, higher baseline emissions than alternative 6. Therefore, according to the methodology AM0030 /32/, alternative 6 is selected as the baseline scenario.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and 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 and

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. DNV has checked that no national and sectoral policies regarding PFC emissions has been issued by Abu Dhabi Environment Agency /43b/, and, therefore all the feasible alternatives above identified are neither forbidden nor requested by local legislation.

4.6 Additionality

According to methodology AM0030, version 03 /32/ the project additionality shall be demonstrated and assessed according to the following steps:

- Identification of alternative scenarios
- Investment Analysis
- Identify barriers that would prevent the implementation of type of the proposed project activity
- Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)
- Common Practice Analysis
- Impact of CDM registration

According to the methodology AM0030 /32/, to demonstrate that despite the benefits of increased production, the project activity is not attractive the project participants shall undertake the following analysis:

(i) Estimate the electricity that would have been required in the absence of the project activity to achieve the same amount of production as in the project activity. Calculate the NPV for this situation;
(ii) Estimate the NPV for project activity;
(iii) Show that NPV of the project activity is less than that listed in (i) above.

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

Trials conducted from December 2007 until July 2008 /5/ /6/ /7/ /8/ cannot be considered real implementation of the project activity as, should they have resulted negative, the project would not have been started. The project starting date took place when the new control logic was implemented at industrialised level with all the operational risks that such a decision could have. This happened on 6 July 2008 /9/ /10/ when the new algorithm was installed in the first 15 pots.

The project starting date is before the 2 of August of 2008, therefore according to the EB guidelines on the demonstration and assessment of prior consideration /34/ the project is considered an existing activity.

Before the project start date, the ERPA agreement was signed in July 2007 /4/. After the project start date, continuous actions by the Project participant to secure CDM status such as exchange of e-mails between the PP and DUBAL during 2009 for the PDD preparation /26/ and with DOEs for project validation /27/ and the stakeholder consultation /16/ have been checked and verified.

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

As discussed in the Section 4.5 of this report, there are four feasible alternatives to the project activity:

Alternative 1: the algorithm is implemented without CDM financing keeping the aluminium production at pre-project production levels and with the benefit of the electricity consumption reductions that the implementation of the algorithm implies.

Alternative 2: the algorithm is implemented without CDM financing but increasing the aluminium production increasing the electricity consumption by the correspondent amount, calculated according to the pre-project operational stability, to the electricity consumption reductions achieved by algorithm implementation.

Alternative 5: the algorithm is not implemented but the aluminium production is increased, to the levels of the project scenario (alternative 2). with increase in electricity consumption.

Alternative 6: The continuation of the existing practice before the project activity

4.6.3 Investment analysis

Choice of approach

Alternative 5 does not imply any new investment the project participant has chosen, according to the tool for the demonstration and assessment of the additionally /33/, investment comparison analysis using as financial indicator the Net Present Value (NPV)

The NPV of alternative 5 – which corresponds to requirement (i) of sub-step 3a of the additionality section in methodology AM0030 /32/ - will be calculated. The NPV of alternative 2 - which corresponds to requirement (ii) of sub-step 3a of the additionality tool contemplated in methodology AM0030 /32/ will be calculated. For alternative 6 (baseline scenario) the NPV is equal to zero as the NPV of the feasible project alternatives is calculated using the investment and income differences with respect to the baseline.

Consequently, the project activity, according to methodology AM0030 /32/, is additional if the NPV of alternative 2 is less that the one for alternative 5.

Discount rate selection

According to the 'Tool for the demonstration and assessment of the additionality' /33/ the discount factor can be any one of the following:

a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;

b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;

c) A company internal benchmark (weighted average capital cost of the company), only in the particular case referred to above in paragraph 5. The project developers shall

demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark;

d) Government/official approved benchmark where such benchmarks are used for investment decisions;

e) Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified.

The PP has calculated the NPVs considering the commercial lending rate, option a) in the tool, as it is not available a well defined and verifiable company internal benchmark. The lowest lending rate during 2007 and 2008 in the UAE was 9 % /38/. It is DNV opinion that this is an appropriate reference as it is allowed in the additionality tool and it shows the minimum return than DUBAL should expect from this investment and the NPV is used for comparative purposes.

Input parameters

The data used by the PP for the parameters reported in the financial analysis are covering the period of time from Jan 2007 until June 2008, except for the "annual electricity consumption" and "aluminium production". For these two parameters the data are covering 3 years prior to the implementation of the project activity as requested by methodology AM0030 /32/. The data used in the financial analysis was reported by the PP in a dossier dated 2009 /15/.

The dossier and the relative NPV calculations have been verified by both DNV and a third party qualified chartered accountant who has issued a report /24/ stating the following:

In connection with this engagement, we have performed the followed procedures:

i) Met with officials of DUBAL to gain an understanding of the captioned project ("Project") from a financial perspective.
ii) Visited the plant to witness the functioning of a pot to be able to relate to the nomenclature used in the report and the computations.
iii) We worked through the calculations constituting the Net Present Value (NPV) computations to ascertain from the contributing departments the relevance and the source of the data forming part of the calculations, such as metal production, power generation, power consumption, power saving, Research & Development costs, information technology project costs, laboratory analysis time study and relevant management information systems (MIS) reports.
iv) Traced the compiled data into the Microsoft Excel computations, and performed arithmetic checks and formulae checks on the supporting excel sheets and on the sheets leading up to the Net Present Value of the three scenarios enumerated .

Based on the procedures carried out by us as described above, we report that:
i) the items declared as forming part of the expenditure charged to the project, should in fact be so charged,
ii) the calculation and method of calculation of Net Present Value as shown are correct considering a discounting factor of 9% per annum.

A description of the data used by the PP in the NPV calculation is provided in the following paragraphs :

Pre-project annual electricity consumption: The pre-project yearly electricity consumption of 4 280 687 MWh has been determined, according to the application requirements of methodology AM0030 /32/, as the average of the last three years consumptions before the project start date (from July 2005 until June 2008). The yearly electricity consumptions have been determined using the production reports included in the verified dossier /15/.

Pre-project annual aluminium production: The pre-project yearly aluminium production of 306 001 tons has been determined, according to the application requirements of methodology AM0030 /32/, as the average of the last three years productions before the project start date (from July 2005 until June 2008). The yearly aluminium production has been determined using the production reports included in the verified dossier /15/ .

Aluminium sales price: The pre-project aluminium sales price used by the PP in the financial analysis was 2 917 US$ / ton-Al sourced from the Dubal dossier /15/ that has been audited by third party qualified chartered accountant /24/. In addition, DNV has checked that the aluminium price in June 2008, previous month to the investment decision taken in July 2008, was 2 968 US$ /40/ ton-Al, therefore the price used by the PP in the financial analysis is deemed to be suitable.

Annual electricity savings for the implementation of the algorithm: The value of 1 133.44 MWh per year has been obtained measuring the power losses before (from Dec 2007 to June 2008) and after (May 2009 to July 2009) the project activity (from July 2005 until June 2008). /15/

Electricity cost rate: The pre-project electricity cost rate used by the PP in the financial analysis was 28 US$ / MWh sourced by Dubal dossier that has been audited by third party qualified chartered accountant /24/. The cost rate have been verified by DNV checking Dubal SAP data Management System /15/. The electricity is produced internally, and DNV can confirm that the value used by the PP is the sum of two components: the fuel costs (23 US$ / MWh) and the power plant operating cost (5 US$ / MWh), therefore the price used by the PP in the financial analysis is deemed to be suitable.

Annual increase in aluminium production: The value of 72 tons has been obtained multiplying the annual electricity savings of 1 133.44 MWh by the 0.0635 slope of the correlation line obtained to demonstrate production stability (from July 2005 until June 2008). /21//22/ .

Electricity cost of aluminium production during pre-project: This cost resulted to be 344 US$/t and it has been determined from DUBAL internal accounting of the first 6 months of 2007. DUBAL accounts have been audited by third party qualified chartered accountants' /15//24/

Other costs of aluminium production during pre-project: This cost resulted to be 1 286 US$/t and it has been determined from DUBAL internal accounting of the first 6 months of 2007. DUBAL accounts have been audited by a third party qualified chartered accountant's /15//24/

Electricity price escalation rate: This rate resulted to be 5 % (considering monthly prices for 2006 and 2007) based on the natural gas monthly price statistics /41/

Aluminium price escalation rate: This rate resulted to be 2.5 % (considering monthly prices for 2006 and 2007) based on the aluminium monthly price statistics /40/

Algorithm Development Costs: This cost resulted to be 59 895 US$ (June 2008 data) and it has been determined from DUBAL internal accounting which has been audited by a third party qualified chartered accountant's/15//24/

O&M costs: This cost resulted to be 3 865 US$ (June 2008 data) and it has been determined from DUBAL internal accounting which has been audited by a third party qualified chartered accountants/15//24/

Project life and Salvage value: The average life of an aluminium potline of DUBAL characteristics is 40 years. DUBAL has considered a life of 30 years. As the potlines 5 and 6 are 20 year old it has been assumed that the remaining life of the lines is 10 years.

There is no income tax in the UAE.

All parameters used in the Financial Analysis where determined within one year prior to the decision to proceed with the project activity (i.e. the start date of the project of 6 July 2008). Given this relative short period of time between the Financial Analysis and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed and that it is thus reasonable to assume that the financial analysis has been the basis of the decision to proceed with the project implementation.

Calculation conclusion

The NPV comparison using a 9% hurdle rate has been made with respect the pre-project scenario. The calculations are illustrated in excel files /13/

Results	**Alternative 1**	**Alternative 2**	**Alternative 5**
NPV before tax (US$) at 9% rate and without CDM revenues	358 047	936 417	1 024 071
NPV before tax (US$) at 9% rate and with CDM revenues	2 832 904	3 411 274	1 024 071

Without CDM revenues, the NPV of alternative 5 is the most favourable. However if CDM revenues are taken into consideration, alternative 2 is the most financially attractive.

- The NPV for the project activity without CDM revenues and with an increase in the yearly aluminium production of 72 tons (alternative 2) is 936 417 US$

- The amount of electricity that would have been required in the absence of the project activity to achieve the same increase in yearly aluminium production as in alternative 2 is 1 133.44 MWh
- The NPV for increasing aluminium production by 72 tons without implementing the project activity (alternative 5) has resulted to be 1 024 071 US$
- So the NPV of the alternative 2 is less than those for alternative 5.

In the CDM revenues are taken into consideration, alternative 2 is the most attractive one for the project developer.

Sensitivity analysis

A sensitivity analysis has been carried out taking into consideration the variation of the following key parameters:

- Annual Electricity Consumption

A ±10% variation of the annual consumption of electricity has been analysed resulting that, in both cases, the NPV of alternative 5 (1 024 071 US$) would be higher than the NPV of alternative 2 (936 417 US$).

- Electricity Cost Rate

A ±10% variation of the annual consumption of electricity has been analysed resulting that, in both cases, the NPV of alternative 5 (1 024 071 US$) would be higher than the NPV of alternative 2 (936 417 US$).

- Annual Aluminium production

A ±10% variation of the annual production of aluminium has been analysed resulting that, in both cases, the NPV of alternative 5 (1 024 071 US$) would be higher than the NPV of alternative 2 (936 417 US$).

- Annual Production Cost of electricity

A ±10% variation of the annual electricity production cost has been analysed resulting that, in the case of a +10% variation, the NPV of alternative 5 (989 266 US$), would be higher than the NPV of alternative 2 (901 621 US$) whereas if the variation is -10%, the NPV of alternative 5 (1 058 876 US$) would be higher than the NPV of alternative 2 (971 212 US$)

- O&M Costs

A ±10% variation of the annual O&M Costs has been analysed resulting that, in both cases, the NPV of alternative 5 (1 024 071 US$) would be higher than the NPV of alternative 2 (939 202 US$ in the +10% case and 933 632 US$ in the -10% case)

- Algorithm Development Costs

A ±10% variation of the annual Algorithm Development Costs has been analysed resulting that, in both cases, the NPV of alternative 5 (1 024 071 US$) would be higher than the NPV of alternative 2 (942 406 US$ in the +10% case and 930 427 US$ in the -10% case)

- Other annual production costs

A ±10% variation of the annual production costs different from electricity and O&M Costs has been analysed resulting that in the case of a +10% variation, the NPV of alternative 5 (909 815 US$) would be higher than the NPV of alternative 2 (822 161 US$) in case the variation is -10%, the NPV of alternative 5 (1 138 327 US$) would be higher than the NPV of alternative 2 (1 050 673 US$)

- Annual electricity savings

A ±10% variation of the annual electricity savings for algorithm implementation has been analysed resulting that, in both cases, the NPV of alternative 5 (1 024 071 US$) would be higher than the NPV of alternative 2 (936 426 US$ in the +10% case and 936 408 US$ in the -10% case).

- Annual Electricity price rate escalation

A ±10% variation in the escalation of the annual electricity price has been analysed resulting that, in the case of a +10% variation, the NPV of alternative 5 (1 012 727 US$) would be higher than the NPV of alternative 2 (925 076 US$) in case the variation is -10%, the NPV of alternative 5 (1 035 047 US$) would be higher than the NPV of alternative 2 (947 390 US$)

- Annual Aluminium price rate escalation

A ±10% variation in the escalation of the annual electricity price has been analysed resulting that, in the case of a +10% variation, the NPV of alternative 5 (984 330 US$) would be higher than the NPV of alternative 2 (896 676 US$) in case the variation is -10%, the NPV of alternative 5 (1 064 480 US$) would be higher than the NPV of alternative 2 (976 825 US$).

All the above listed scenarios have been checked and verified by DNV and show that the NPV of alternative 2 is always lower that those for alternative 3. Therefore the project satisfies all the additionality requirements contemplated in methodology AM0030 /32/.

4.6.4 Barrier analysis

Two barriers have been identified: Barrier due to business strategy and barrier due to prevailing practice. Both barriers are complementary to the investment analysis.

1) Business strategy barrier

DUBAL Management /48/ stated to DNV during the site visit that anode effect mitigation is not a priority as it has little influence in the increase of the production or the reduction of electricity consumption and can be risky from the production stand point. The only management commitment to anode effect mitigation is DUBAL participation to the IAI voluntary initiative in which by 2020 all IAI members shall operate with PFC emissions per tonne of production no higher than the 2006 global median level for their technology type. In 2006 the median PFC emission was 0.24 tCO2eq/ton of aluminium /36/. DNV has verified that the PFC emissions from lines 5&6 was already 0.24 tCO2eq/ton in 2007 /35/, therefore the project activity was not undertaken with the scope to meet IAI voluntary initiative objectives but to exceed them.

However, a change in the feeding algorithm can lead to production losses as it was experienced during the first trial conducted in December 2007 which results /7/ were checked by DNV. For these reasons DUBAL Management was hesitant about the feasibility of the project. According to the management /48/ interviewed by DNV, the main reason to persue the project activity were the CDM revenues.

2) Prevailing practice barrier

According to the International Aluminium Institute (IAI) /12/ DUBAL would be the first aluminium facility in applying this type of algorithm in the gulf Region. This is additional evidence that the implementation of the project activity is not financially attractive and goes beyond the voluntary commitments of aluminum producers participating to IAI PFC emissions reduction initiatives.

4.6.5 Common practice analysis

It has been considered for the common practice analysis existing similar initiatives to the project activity. By similar is understood aluminium plants operating in the Gulf area and using the same aluminium production technology.

According to the Aluminium International Today /42/ in the Gulf area the following aluminium plants are operative:

- Aluminium Bahrain (ALBA)
- Dubai Aluminium (DUBAL)
- Qatar aluminium
- Sohar aluminium (Oman)
- Emirates aluminium (EMAL)

There are also 3 aluminium plants under construction in Saudi Arabia.

From the above plants, ALBA is using Aluminium Pechiney AP- 30 380 kA five side-riser, point-feed prebake cell technology /43/ with an anode effect rate of 0.2 /28c/, Qatar Aluminium is using Norsk Hydro HAL-275 275kA technology /42/ with an anode effect rate of 0.09 /28b/. Sohar Aluminium is using Rio Tinto Alcan AP-35 350kA technology /42/ with an anode effect rate of 0.16 /28c/, EMAL is using Dubal DX-350 364,5 KA cell /42/ with an anode effect rate of 0.02 /28/. These technologies are different from the Comalco-DUBAL CD-200 230kA side-riser, point-feed prebake cell technology /43/ with an anode effect rate of 0.32 /28/ used at DUBAL in the Potline amperages and in the anode effects rate performances.

These differences imply that the type of automatic control system required to achieve anode effect reductions is different from technology to technology and therefore it is DNV opinion that the project activity can be considered first of its kind.

4.6.6 Impact of CDM

From all the reasons described above, the project activity becomes feasible if carbon revenues are obtained. Without CDM support the most likely scenario is to increase aluminium production, with respect to the pre-project production, without algorithm implementation

(Alternative 5). Therefore, it is concluded that the proposed CDM project activity is additional.

4.7 Monitoring

The approved baseline and monitoring methodology AM0030, version 03 /32/ has been applied.

The project monitoring plan is in compliance with the monitoring methodology AM0030 (version 03).

During the site visit, DNV has checked that the project owner operates according to certified management system standards so it is DNV's opinion, that the project participant is able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

The approved monitoring methodology requires monitoring the following parameters:

- Average Baseline Anode Effect Frequency;
- Average Baseline Anode Effect Duration;
- Baseline CF4 slope coefficient;
- The weight fraction of C2F6/CF4
- Average value of PFC Emission per tonne of aluminium produced

In the baseline, the anode effect frequency was 0.32 AE/cell day for line 5 and 0.324 AE/cell day for line 6 and the anode effect duration was 0.77 minutes for line 5 and 0.69 minutes for line 6. If the average value of the anode effect frequency and duration are calculated as if line 5 and 6 were a single line (combined line), the resulting combined values were 0.32 AE/cell day and 0.73 minutes . DNV has verified that these values have been sourced from DUBAL historical data from January 2007 until May 2008 /21//22/

The period of measurement is starting one year after measures were introduced by the technical group in January 2006 with the scope of optimising aluminium production through rationalising alumina feed strategies and other control practices as described in the alternative 3 baseline scenario. It is generally accepted in industry / 43c/ that a 6 month period is sufficient for achieving complete stabilization of the pots. Therefore it is DNV opinion that the data use for determining the ex ante emissions correspond to a period of pot stabilization.

The slope coefficients were 0.129 ($kgCF_4$ /tAl)/(AE min/cell day) and 0.02232 (kgC_2F_6 /tAl)/(AE min/cell day) for both lines 5 and 6. The resulting weight fraction has turned out to be 0.173 kg C_2F_6/kg CF_4. DNV has verified that these values have been sourced from the PFC emissions measurements performed by J Marks & Associates in 2007 /3/

The average value of PFC Emission per tonne of aluminium produced was 0.24 tCO_2e/tAl. /35/ which is lower than the 0.26 tCO_2e/tAl according to the 2009 IAI Survey on the Aluminium Industry /36/.

DNV has verified the correctness of these values from the original sources.

4.7.2 Parameters monitored ex-post

The approved monitoring methodology requires the monitoring the following parameters:

- Aluminium Production
- Average Project Anode Effect Frequency;
- Average Project Anode Effect Duration;
- Project CF_4 slope coefficient;
- The weight fraction of C_2F_6/CF_4
- Average value of PFC Emission per tonne of aluminium produced according to most recent published IAI Survey
- Emission Factor CF_4
- Emission Factor C_2F_6

After the implementation of the project activity, the anode effect frequency was 0.19 AE/cell day for line 5 and 0.18 AE/cell day for line 6 and the anode effect duration was 0.81 minutes for line 5 and 0.83 minutes for line 6. If the average value of the anode effect frequency and duration are calculated as if line 5 and 6 were a single line (combined line), the resulting combined values were 0.18 AE/cell day and 0.82 minutes. DNV has verified that these values have been sourced from DUBAL historical data from May 2009 until July 2009 /21//22/

The slope coefficients used were 0.129 ($kgCF_4$ /tAl)/(AE min/cell day) and 0.02232 (kgC_2F_6 /tAl)/(AE min/cell day) for both lines 5 and 6. and sourced from the PFC emissions measurements performed by J Marks & Associates in 2007 /3/

The period of measurement is starting one year after the implementation of the project activity in July 2008 so the pots had reached complete stabilization as explained in the determination of the baseline emissions. Therefore it is DNV opinion that the data use for determining the ex post emissions correspond to a period of pot stabilization.

4.7.3 Management system and quality assurance

During the site visit it has been assessed that all required parameters contemplated in methodology are currently monitored by the Automatic Control System and that PCF emission estimate studies /3/ have been carried out in the past by independent third parties which also allow to determine the slopes values. DUBAL conduct operations according to a certified ISO 9001 Management System

4.8 Algorithms and/or formulae used to determine emission reductions

To monitor smelter emissions, the PP has used tier 3 IPCC Method as the anode effects are not manually terminated and due to the fact that the new feeding algorithm contemplates to use aggressive fast kill anode effects, the slope method has been used.

The slope method uses a regression analysis to estimate a linear relationship between anode effect (AE) and PFC emissions.

$$AE = AEF \times AED$$

Where:

AE	=	Anode effect (min/cell.day)
AEF	=	Number of anode effects per cell.day, measured as per details provided in the monitoring section
AED	=	Anode effect duration in minutes (min), measured as per details provided in the monitoring section

The emission factor (EF) is then estimated as follows:

$$EF_{CF4} = Slope \times AE$$

$$EF_{C2F6} = EF_{CF4} \times F_{C2F6/CF4}$$

Where:

EF_{CF4}	=	Emission factor of CF_4 (kg CF_4/t Al
EF_{C2F6}	=	Emission factor of C_2F_6 (kg C_2F_6/t Al)
$Slope$	=	Slope coefficient (kg PFC/t Al)/(AE-minute/cell.day)
AE	=	Anode Effect (min/cell.day) estimated as per equation 3
$F_{C2F6/CF4}$	=	Weight fraction of C_2F_6/CF_4 (kg C_2F_6/kg CF_4)

To develop an accurate estimate of the slope, simultaneous measurements of CF_4 or C_2F_6 emissions and anode effect data over an appropriate period of time are collected.

Baseline Emissions

The baseline emissions (BE) are given by the equation:

$$\overline{\overline{BE}}\ (tCO_2e/tAl) = \left(\frac{EF_{CF_4} \cdot GWP_{CF_4} + EF_{C_2F_6} \cdot GWP_{C_2F_6}}{1000} \right)$$

$$If : \overline{\overline{BE}} \leq BE_{IAI}, BE = \overline{\overline{BE}}.P_{Al}$$

$$If : \overline{\overline{BE}} \rangle BE_{IAI}, BE = BE_{IAI}.P_{Al}$$

Where:

EF_{CF_4}	=	Emission factor of CF_4 (kg CF_4/t Al), discounted by the uncertainty range as specified by the IAI/USEPA Protocol
$EF_{C_2F_6}$	=	Emission factor of C_2F_6 (kg C_2F_6/t Al), discounted by the uncertainty range as specified by the IAI/USEPA Protocol.
GWP_{CF_4}	=	Global Warming Potential of CF_4
$GWP_{C_2F_6}$	=	Global Warming Potential of C_2F_6
$\overline{\overline{BE}}$	=	Baseline emissions per tonne of Aluminium produced (t CO_2e/t Al) calculated according to the equation above reported

BE_{IAI}	=	Average value of "PFC emission per tonne of Aluminium produced" according to the most recent published IAI Survey for the current technology (t CO_2e/tAl). Baseline should be updated every year with the most recent values published by IAI.
P_{Al}	=	Total aluminium production of the company (t Al/year)
BE	=	Baseline Emissions (t CO_2e/year) calculated according to the equation above reported

As explained in section 4.7.1 of the report, the Baseline Emissions have been calculated both as the sum of each individual line and, as per DUBAL approach, in a combined way /23/., resulting in 75 071 tCO_2e (40 422 tCO_2e for line 5 + 34 649 tCO_2e for line 6) in the first case and 74 991 tCO_2e in the second one.

Project Emissions

The project emissions (PE) are given by using the same equation of the baseline emission but with emission factors CF_4 and C_2F_6 resulting after the project activity:

$$PE\ \ (tCO_2e/year) = \left(\frac{EF_{CF_4} \cdot GWP_{CF_4} + EF_{C_2F_6} \cdot GWP_{C_2F_6}}{1000} \right) \cdot P_{Al}$$

Where:

EF_{CF_4}	=	Emission factor of CF_4 (kg CF_4/t Al)
$EF_{C_2F_6}$	=	Emission factor of C_2F_6 (kg C_2F_6/t Al)
GWP_{CF_4}	=	Global Warming Potential of CF_4 = 6,500
$GWP_{C_2F_6}$	=	Global Warming Potential of C_2F_6 = 9,200
P_{Al}	=	Total aluminium production of the company (t Al/year)
PE	=	Project emissions (t CO2e/year) calculated according to the equation above reported

At the moment of issuing the PDD for the project activity ex-post data was available. As explained in section 4.7.2 of the report, the annual Project Emissions have been calculated both as the sum of each individual line and, as per DUBAL approach, in a combined way /23/, resulting in 47 819 tCO_2e (24 962 tCO_2e for line 5 + 22 857 tCO_2e for line 6) in the first case and 47 812 tCO_2e in the second one.

Therefore the project emissions that have been adopted in this PDD, 4 correspond to the ex post parameters and this approach has been accepted by DNV as it is deemed to be more accurate.

Emission Reductions

According to methodology , no leakage is expected to occur in this type of projects.Therfore, the emission reductions, ER, by the project activity is given by:

$$ER = BE - PE \quad (1)$$

Where:

ER	=	Emission Reductions (tCO_2e/year)
BE	=	Baseline Emissions (tCO_2e/year)
PE	=	Project Emissions (tCO_2e/year)

The annual emission reductions have been calculated both as the sum of each individual line and, as per DUBAL approach, in a combined way /23/

Production Lines	**Baseline Emissions** [tCO_2]	**Project Emissions** [tCO_2]	**Emission reductions** [tCO_2]
Line 5	40 422	24 962	15 460
Line 6	34 649	22 857	11 792
Total line 5 and 6	**75 071**	**47 819**	**27 252**
Combined line 5 and 6	**74 991**	**47 812**	**27 179**

Based on the calculations and results presented in the sections above, it is DNV opinion that , based on DUBAL pre-project activity data, the more accurate estimation of the emission reduction is deemed to be 27 179 tCO_2e per year for the selected crediting period.

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

DNV has checked /37/ that under UAE environmental regulations the project does not fall under the Environmental Impact Assessment. In any case no negative environmental impacts are expected from the project activity.

4.10 Comments by local stakeholders

The project activity is implemented at DUBAL in the existing facility which is located in the industrial zone in Jebel Ali area in Dubai. The stakeholders identified for the project activity are:

a. Dubai Municipality
b. Employees working in the plant
c. Government/Environmental agency of UAE
d. International Aluminium Institute

The PP has send to the above listed stakeholders a consultation letter /14/ in November 2009 and received responses on the same

All stakeholders have responded and DNV has verified /16//17//18/ that section E.2 of the PDD reports a summary which is aligned with the comments received all of them positive.

DNV considers the local stakeholder consultation has been carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 11 February 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 13 February 2010 to 14 March 2010. (http://cdm.unfccc.int/Projects/Validation/DB/U2VD38QMEY19L071TX5EXZCU07ST41/view.html)

One comment was received and is given (in unedited form) in the below text box.

Comment by:
☐ Accredited NGO ☐ Party ☒ Stakeholder
Inserted on: 23 February 2010
Subject: General Comment

Comment: "This is a good project, contributing to the reduction of PFC emissions. PFC has very high GWP. This project should be registered as CDM."

Submitted by: Sanjeev Sharna

How DNV has considered the comment received in its validation:

The only comment received is above reported. It is a positive comment which did not require particular actions by the PP.

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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	~~*CAR 1*~~ 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	OK
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* *I*	*What type is the project?* ☒ *Project in existing facility or utilizing existing equipment(s)* ☒ *Large scale project* ☐ *bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year* ☐ *individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e per year* ☐ *Greenfield project* *How was the design of the project assessed?* ☒ *Physical site inspection* ☐ *Reviewing available designs and feasibility studies*		*OK*

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

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	*DR CC*	This is not a Greenfield project but the project activity is located inside Dubai Aluminium Company Ltd (DUBAL)		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 CC	During the site visit have been visited both line 5 and line 6		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	In DNV's opinion the description reported in the PDD sufficiently covers all relevant elements of the project activity and provides the reader with a clear understanding of the project activity		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 CC	The project primarily aims to reduce PFC emission from anode effect through the installation of a new alumina feeding algorithm in the Automatic Control System (ACS) in 480 pots located in potlines 5 and 6 of Dubai Aluminium Company Ltd (DUBAL). Therefore there is no physical difference between the pots before and after project installation. The only existing difference is the new algorithm in the ACS of the two lines involved		OK
A.2.6	Does the project design engineering reflect current good practices?	/1/	DR	According to the Feasibility Study Report, the project activity reflects current good practices in anode effect mitigation.		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	There is not any transfer of technology from Annex I Parties involved. The new algorithm in the ACS of the two lines involved would, according to the Feasibility Study conducted, mitigate anode effects.		OK

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 Participation requirements (VVM para 51-54, 123-125)					
A.3.1 Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			OK
	UAE (host)				
a) Party has ratified the Kyoto Protocol	☒ Yes ☐ No				
b) Party has designated a Designated National Authority	☒ Yes ☐ No				
c) The assigned amount has been determined	☒ Yes ☐ No				
A.3.2 Do the letters of approval meet the following requirements?	/1/ /10/ /36/	DR			OK
	UAE (host)				OK
a) LoA confirms that Party has ratified the Kyoto Protocol	☒ Yes ☐ No				
b) LoA confirms that participation is voluntary	☒ Yes ☐ No				
c) The LoA confirms that the project contributes to the sustainable development of the host country?	☒ Yes ☐ No				
d) The LoA refers to the precise project activity title in the PDD	☒ Yes ☐ No				
e) The LoA is unconditional with respect to (a) to (d) above	☒ Yes ☐ No				
f) The LoA is issued by the respective Party's DNA	☒ Yes ☐ No				
g) The LoA was received directly by the DNA or the 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 Letter of Approval issued by Abu Dhabi Environment Agency on the 29 of January 2010 does not include the Dubai Aluminium Company Limited as the authorised project participant. In*	~~CAR 1~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			addition the name of the project participant "Abu Dhabi Future Energy Company" reported in the LoA does not match precisely with the name reported in the PDD		
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/	DR CC	*The geographical coordinates reported in the PDD are incomplete as they do not report the coordinate values up to the minutes (') and the seconds (") accuracy level.*	~~CL 1~~	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 not counted towards the financial obligations of these Parties?	/1/	DR I	The Project has been entirely financed through Equity.		OK
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 version thereof?	/1/	DR	The Project Activity applies approved methodology AM0030 "PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities",ver. 3.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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: *Primarily aimed at measures that reduce the PFC emissions in Aluminium smelting facilities that use center work pre-bake cell technology with bar brake (CWPB) or point feeder systems (PFPB)*?	/1/	DR CC	By visiting the 480 pots in potlines 5 and 6 located in DUBAL, DNV has verified that the new alumina feeding algorithm in the Automatic Control System (ACS) is aimed at measures that reduce the PFC emissions in Aluminium smelting facilities that use center work pre-bake cell technology with point feeder systems (PFPB).		OK
B.2.2	How was it validated that project complies with the following applicability criteria: *At Aluminium smelting facilities that started operations before 31 December 2002*?	/1/ /19/	DR CC	DNV has checked that lines 5 and 6 have started operations in September 1996 and May 1999 respectively. This has been verified from DUBAL 2009 Facts and Figures Report, January 2010		OK
B.2.3	How was it validated that project complies with the following applicability criteria: *There are at least three years of historical data are available regarding current efficiency, anode effect and Aluminium production of the industrial facility from 31 December 2002 onwards or, in case of project activities with a starting date before 31 December 2005, from 3 years prior to the implementation of the project activity onwards, until the starting date of the project activity*?	/1/ /21/ /22/	DR CC I	During the site visit DNV has verified data regarding current efficiency, anode effect and aluminium production is available for 2007, 2008 and 2009. from the monthly AEF and AED data relative to 2005, 2006, 2007, 2008 and 2009 dated 26 April 2010		OK
B.2.4	How was it validated that project complies with the following applicability criteria: *The existing number of potlines and pots within the system boundary is not increased during the crediting period. The methodology is only applicable up to the end of the lifetime of existing potlines if this is shorter than the crediting period*?	/1/	DR I	DNV has checked with DUBAL Management the eventual expansion plans of the two pot lines included in the Project Activity and that in the two lines there are not any more physical space for future expansions, increase in number of pots is not envisaged.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.5	How was it validated that project complies with the following applicability criteria: *It is demonstrated that, due to historical improvements carried out, the facility achieved an "operational stability associated to a PFC emissions level" that allows increasing the Aluminium production by simply increasing the electric current in the pots*?	/1/		*Further evidence should be provided by the PP showing that the facility has achieved an operational stability associated to a PFC emissions level that allows increasing the Aluminium production by simply increasing the electric current in the pots.*	~~CL 2~~	OK
B.2.6	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/	DR	*Further evidence should be provided by the PP showing that the facility has achieved an operational stability associated to a PFC emissions level that allows increasing the Aluminium production by simply increasing the electric current in the pots.*	~~CL 2~~	OK
B.3	**Project boundary (VVM para 77-79)**					
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 CC	The boundaries are defined in accordance with the methodology and limited by the 480 pots forming pot-lines number 5 and 6 of DUBAL.		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	According to the methodology AM0030, only PFC emissions from anode effects are included within the project boundary.		OK
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 CC	The Project Activity does not involve any other emission sources that might question the applicability of the methodology		OK
B.4	**Baseline scenario determination (VVM para 80-87, 103-105)**					
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/	DR	The broad plausible baseline scenarios have been identified in accordance with the applied methodology. Option 1: The proposed project activity not	~~CAR 2 & CL3~~	OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				undertaken as a CDM project activity and Option 2 : All other plausible and credible anode effect mitigation alternatives to the project activity that deliver outputs with comparabl quality, properties and application areas. (viz., control and quality measures. Option 3: No implementation of any anode effect mitigation measure. Refer to discussions under B4.2 -B4.4		
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR	Alternative 2 has been discarded from considering as a plausible baseline scenario, because according to the PP all other plausible and credible control and quality measures have already been implemented. *The project participant is requested to provide evidence relative to the control and quality measures already implemented in the past years to demonstrate that this project activity alternative can be eliminated.*	~~CL 3~~	OK
B.4.3	What is the baseline scenario?	/1/	DR	The baseline scenario is to continue using the current automatic control system without implementing any anode effect mitigation measure. The baseline is determined through anode effect performance data from December 2007 to June 2008, prior to the installation of the algorithm with the intention to reduce the emissions of PFC. Kindly also refer discussions under B 4.2 & B 4.4	~~CAR 2 &CL3~~	OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	*In determination of possible baseline scenarios all three cases identified in the financial*	~~CAR 2~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				analysis should be included in the list of baseline alternatives to ensure consistency between the procedure to identify the most plausible baseline scenario and the determination of additionality in line with the Version 3 of AM0030. In addition all likely scenarios under the alternative of "no implementation of any anode effect mitigation measure" as required by the methodology needs to be clearly elaborated in the PDD.		
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	*Kindly refer discussions under B 4.2 to B4.4*	~~CL 3~~	OK
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 I	There are no regulations on PFC emissions in UAE.		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 data sources used by the PP in order to determine the baseline scenario should be clearly referred in the PDD*	~~CL 4~~	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.	/1/	DR	*The baseline determination is not adequately documented for the reasons already indicated in the previous boxes.*	~~CAR 2~~ ~~CL 3~~ ~~CL 4~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	• The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity					
B.5	**Additionality determination (VVM para 93-119)**					
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/	DR	The addittionality has been demonstrated following version 05.2 of the "Tool for the demonstration and assessment of additionality".		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR I	There are no regulations on PFC emissions in UAE .		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	*All the underlying assumptions (energy saving rate, electricity escalation, O&M cost escalation, aluminium price escalation, ..etc) need to be substantiated in the PDD*	~~CL 7~~	OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	Additionality of the project activity has been demonstrated through both investment analysis and Barrier analysis		OK
	Prior consideration of CDM (VVM para 96-102)					
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/	DR	The main evidence is that before undertaking any action that could imply financial commitment the PP signed the ERPA with Abu Dhabi Future Energy Company PJSC on July 2007		OK
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 CC	The project starting date is 23 July 2008, i.e., before August 2008.		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	/1/	DR I	It has been stated that prior to start of the the project, the project participant has taken the following initiatives with the purpose to secure		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
project activity?			CDM status: 28 of June 2007 – the CER purchase agreement between Mubadala Development Company PJSC and DUBAL was signed December 2007 – first anode effect reduction trail starts February 2008 - first anode effect reduction trail concludes without success June 2008 – second anode effect reduction trail starts July 2008 – second anode effect reduction trail concludes with success 29 July 2008 – initiates the industrial implementation *The Project Participant is requested to reconfirm the sequence of activities and correctness of dates as reported in Table B.1 along with supporting documentary evidence to ensure consistency..*	~~CL 5~~	OK
B.5.8 When did the construction of the project activity start?	/1/	DR	*The project activity start date is mentioned as 23 July 2008 in the PDD, It has to be clearly justified and elaborated that this date is the earliest date at which either the implementation or construction or real action of the project activity begins in line with the CDM Glossary of Terms.*	~~CL 6~~	OK
B.5.9 When was the project commissioned?	/1/	DR	The industrial implementation of the new algorithm in lines 5 and 6 happened on the 29 July 2008		OK
B.5.10 Does the timeline of the project confirm that continuous	/1/	DR	*Further the PP should substantiate the activities*	~~CL 5~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	actions in parallel with the implementation were taken to secure CDM status?			*taken up after July 2008 till commencement of validation to ensure continuation of CDM actions..*		
	Investment analysis (VVM para 106-112) *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/	DR	All alternatives in which is contemplated an increase in aluminium production generate revenues different from CDM and this is reflected in the investment comparison analysis reported at pages 15 -17 of the PDD.		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	Alternative 3 does not involve new investment and this is reflected at pages 15 -17 of the PDD.		OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	The project participant has chosen investment comparison analysis using the Project NPV as financial indicator		OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR			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/	DR	The after tax Project NPV is the financial indicator used by the project participant.		OK
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/	DR	***All the underlying assumptions (energy saving rate, electricity escalation, O&M cost escalation, aluminium price escalation, ..etc) need to be substantiated in the PDD***	~~CL 7~~	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/	DR I	There is no income tax in the UAE		OK
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken	/1/	DR	***The period chosen for the NPV assessment has been limited to the proposed crediting period of***	~~CL 9~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	into account? Is working capital returned in the last year of operation?			***the CDM project activity(10 years) instead of the project expected operational lifetime(20 years)*** ***The NPV assessment has not been elaborated for consideration of salvage value and working capital.***		
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	There is not a government approved FSR as a basis for the investment analysis.		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/	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 7~~	OK
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/	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 *One of the project activity alternative is the increase of aluminium production. In the financial analysis has been assumed an increase in aluminium production equal to the savings of electricity consumption without giving any*	~~CL 7~~ ~~CL 10~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				justification for it.		
B.5.22	How were the investment 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/	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 investment costs were validated:*	~~*CL 7*~~	OK
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/	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:*	~~*CL 7*~~	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/ /13/	DR I	☐ 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 NA		OK
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/ /13/	DR I	*The spreadsheet relative to case 2 (Introduction of the algorithm /energy efficiency + production increase) to does not include the electricity saving revenue.*	~~*CAR 3*~~	OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or	/1/ /13/	DR I	The parameters considered in the sensitivity analysis are: aluminium price, electricity price		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	implementation been identified? Has possible correlation between the parameters been considered?			and the discount rate. *The O&M Costs have not been taken into consideration in the Sensitivity Analysis*	~~CL 11~~	
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/ /13/	DR I	*The sensitivity analysis conducted by the PP does not cover a ± 10 % variation for all the above indicated parameters.*	~~CL 12~~	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/	DR	No benchmark analysis has been used for this project activity.		OK
	Barrier analysis (VVM para 113-116)					
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	Two barriers have been identified: Barrier due to business strategy and barrier due to prevailing practice. Both barriers are complimentary to the investment analysis.		OK
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	N.A.		OK
B.5.31	How does CDM alleviate the investment barriers?	/1/	DR	N.A.		OK
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	N.A.		OK
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	N.A.		OK
B.5.34	How does CDM alleviate the technological barriers?	/1/	DR	N.A.		OK
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	N.A.		OK
B.5.36	How were the barriers due to prevailing practice assessed to be real? Are the barriers due to prevailing practise	/1/ /12/	DR CC	The PP claims that the International Aluminium Institute (IAI) has issued an statement saying		

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	substantiated by a source independent of the project participants?		I	that the project activity is "first-of-its-kind" in the Gulf area. *However the IAI statement does not indicate if there are other Aluminun plants in the Gulf area that have implemented anode effect killing algorithms. The statement is limited to that the project activity is the first in the Gulf Area seeking CDM status.*	~~CL 13~~	OK
B.5.37	How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	*The PDD does not elaborate as to how the CDM alleviate the barriers due to prevailing practise*	~~CL 24~~	OK
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 I	The no anode effect mitigation measures alternative is in compliance with UAE legislation and is not prevented by the prevailing practise barrier.		OK
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	Business strategy barriers is the other barrier that has been identified by the PP. According to this barrier, DUBAL Management has not a priority on anode effect mitigation measures as the AE mitigation has little influence in the increase of the production or the reduction of electricity consumption. In addition a change in the feeding algorithm can be counter productive and it implies costs as it was experienced during the first trial conducted in December 2007 *However, the PP should substantiate why DUBAL Management decision to participate to the 2006-2020 IAI PFC emission reduction voluntary program is not in contrast with the argumentation reported in the business strategy barrier*	~~CL 14~~	OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	The CDM revenue is the element considered by		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			I	the management in their decision to implement the project activity		
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	The alternative of not to apply any anode effect mitigation measures is in compliance with UAE legislation and it is not prevented by the prevailing practise barrier.		OK
Common practice analysis (VVM para 117-119)						
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/ /12/	DR	The geographical scope of the common practice analysis is the United Arab Emirates *It is not justified why the geographical scope of the common practice analysis has been limited to the UAE*	~~CL 15~~	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/	DR	The technology scope is the implementation of an automatic control system (algorithm) aimed to reduce the frequency of the anode effects.		OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/ /12/	DR	The data source is the International Aluminium Institute (IAI)		OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/ /12/	DR	*The IAI statement does not indicate if there are other Aluminun plants in the Gulf area that have implemented anode effect killing algorithms. The statement is limited to that the project activity is the first in the Gulf Area seeking CDM status.*	~~CL 13~~	OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	According to the PP there are not any other similar projects in the Country	~~CL 13~~	OK
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	*No conclusion reached until the CL14 will be clarified.*	~~CL 13~~	OK
Conclusion						
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	*The PP should clarify further some of the issues raised during the additionality analysis before expressing an definitive conclusion*	~~*CAR 3*~~ ~~CL 13~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVM para 198-200)					
B.6.1	How was the CF_4 Slope Coefficient [(kg CF_4/t Al) / (AE min/cell day)] verified?	/1/ /23/	DR	*It is not clear the period of time at which the 0.121 slope (kgCF4 /tAl)/(AE min/cell day) is referred to and the methodology that has been used to calculate it*	~~*CL 16*~~	OK
B.6.2	How was the C_2F_6 Slope Coefficient [(kg C_2F_6/t Al) / (AE min/cell day)] verified?	/1/ /23/	DR	*It is not clear the period of time at which the 0.01936 slope (kgC2F6 /tAl)/(AE min/cell day) is referred to and the methodology that has been used to calculate it.*	~~*CL 17*~~	OK
B.6.3	How was the Weight fraction of C_2F_6/CF_4 (kg C_2F_6/kg CF_4) verified?	/1/ /23/	DR	*The weight fraction of C_2F_6/CF_4 has not been considered in the list of parameters available at validation reported at § B.6.2 of the PDD*	~~CL 18~~	OK
B.6.4	How was the Anode Effect Frequency (AEF) verified?	/1/ /23/	DR	*The frequency used (0.34 Number of AE /cells day) is referred to the period from the 1st December 2007 until the 30th June 2008 which includes the first (28-12-2007 till 08-02-2008)and second (26-06-2008 to 10-07-2008) trial periods which cannot be considered anode effect stable situations*	~~CL 19~~	OK
B.6.5	How was the Anode Effect Duration (AED) verified?	/1/ /23/	DR	*The duration used (0.68 minutes) is referred to the period from the 1st December 2007 until the 30th June 2008 which includes the first (28-12-2007 till 08-02-2008)and second (26-06-2008 to 10-07-2008) trial periods which cannot be considered anode effect stable situations*	~~CL 20~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	Baseline emissions (VVM para 88-92)					
B.6.6	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /23/	DR	The calculations have been made according to the slope method, as per meth. AM0030, using daily production data (AE frequency and duration)		OK
B.6.7	Have conservative assumptions been used when calculating the baseline emissions?	/1/ /23/	DR	*It is not clear the methodology that has been adopted for calculation the slope coefficients for CF_4 and C_2F_6*	~~CL 21~~	OK
B.6.8	Are uncertainties in the baseline emission estimates properly addressed?	/1/ /23/	DR	*The calculation of the Emission Factor uncertainties (C_2F_6/CF_4) are not described in the PDD.*	~~CL 22~~	OK
	Project emissions (VVM para 88-92)					
B.6.9	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /23/	DR	The calculations have been made according to the slope method, as per meth. AM0030, using daily production data (AE frequency and duration)		OK
B.6.10	Have conservative assumptions been used when calculating the project emissions?	/1/ /23/	DR	*It is not clear the methodology that has been calculated the slope coefficients for CF_4 and C_2F_6*	~~CL 21~~	OK
B.6.11	Are uncertainties in the project emission estimates properly addressed?	/1/ /23/	DR	*The calculation of the Emission Factor uncertainties (C_2F_6/CF_4) are not described in the PDD.*	~~CL 22~~	OK
	Leakage (VVM para 88-92)					
B.6.12	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	*N.A.*		OK
B.6.13	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	*N.A.*		OK
B.6.14	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	*N.A.*		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Emission Reductions (VVM para 88-92)					
B.6.15 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/ /23/	DR	*The emission reduction has been calculated in an aggregate way for both line 5 and 6. The PP should demonstrate that this approach is more conservative than doing it on individual line basis.*	~~CL 23~~	OK
B.7 Monitoring plan (VVM para 120-122)					
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	Yes and in particular the slope coefficients which monitoring procedures are in accordance with the USEPA and IAI "Protocol for Measurement of Tetrafluoromethane and Hexafluoroethane from Primary Aluminium Production		OK
B.7.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	*The weight fraction of C_2F_6/CF_4 has not been considered in the list of parameters available at validation reported at § B.6.2 of the PDD*	~~CL 18~~	OK
B.7.3 In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	*The Monitoring Plan does not describe the specific instrumentation in the Automatic Control System used for monitoring the specific parameters and its level of accuracy*	~~CL 25~~	OK
B.7.4 In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	*The Monitoring Plan does not describe the specific instrumentation in the Automatic Control System used for monitoring the specific*	~~CL 25~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				parameters and its level of 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	*The Monitoring Plan does not describe the calibration and maintenance procedures of the instrumentation used for monitoring the specific parameters*	~~CL 26~~	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	The Monitoring Plan does not describe the calibration and maintenance procedures of the instrumentation used for monitoring the specific parameters	~~CL 26~~	OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR			
	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/ /3/ /20/ /21/ /22/	DR CC I	*During the site visit has been assessed that all required parameters contemplated in methodology are currently monitored by the Automatic Control System and that in the past studies have been carried out by independent third parties with the scope to determine the slopes values*		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/ /3/ /20/ /21/ /22/	DR CC I	*Yes DUBAL conducts operations according to a certified ISO 9001 Quality Management System.*		OK
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/ /3/ /20/ /21/ /22/	DR CC I	*The data management and quality assurance and quality control procedures should be briefly described in the PDD.*	~~CL 27~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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	*The document / record control procedures should be briefly described in the PDD.*	~~CL 28~~	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 I	The applicability of sustainable development indicators in the UAE legislation to the project activity have been identified at page 3 of the PDD		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	No the monitoring plan does not contemplate to measure data concerning environmental, social and economic impacts as there is not legal obligation by the PP to monitor it		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	There are no conflicts between the project activity and the Country national priorities.		OK
C	**Duration of the project activity / crediting period**					
C.1.1	**Start date of project activity (VVM para 96-97, 102)**					
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/	DR	According to the PP the project starting date is the 23 of July 2008 when the mitigation algorithm was industrialised in the production after the successful testing It has to be clearly justified and elaborated that this date is the earliest date at which either the implementation or construction or real action of the project activity begins in line with the CDM Glossary of Terms.	~~CL 6~~	OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	*It is not clear on what basis the 20 years lifetime of the project activity has been reported in the PDD*	~~CL 8~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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. The PP has opted for a 10 year fixed crediting period starting from 1 June 2011 or the date of CDM registration whichever is earlier.		OK
D Environmental Impacts (VVM para 129-131)						
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/ /37/ /44/ /45/	DR I	According to Dubai Municipality Environment Department: Guidelines for Preparation of Environmental Impact Statements for New Industrial Premises, for the type of project activity there is not request to carry out an EIA		OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/ /37/ /44/ /45/	DR I	According to Dubai Municipality Environment Department: Guidelines for Preparation of Environmental Impact Statements for New Industrial Premises yes, it does		OK
D.1.3	Will the project create any adverse environmental effects?	/1/ /37/	DR I	No negative environmental impacts are expected from the project activity		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/ /37/	DR I	No negative environmental impacts are expected from the project activity		OK
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /37/	DR I	NA		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?	/1/ /37/	DR I	NA		OK
E Stakeholder Comments (VVM para 126-128)						
E.1.1	Have relevant stakeholders been consulted?	/1/ /16/ /17/	DR I	The following stakeholders have been identified and consulted: Dubai Municipality		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/18/		Plant Employees Environmental Agency UAE International Aluminium Institute *The PP is requested to elaborate as to why other potential interested parties (local residents) have not been considered in the local stakeholder consultation*	~~CL 29~~	
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /16/ /17/ /18/	DR I	The means of consultation was a letter sent to the stakeholders in November 2009 and it is considered by DNV as appropriate		OK
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/ /16/ /17/ /18/	DR I	No stakeholder consultation process is required in UAE legislation and there are not specific requirements in the Letter of Approval		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /16/ /17/ /18/	DR I	Section E.2 of the PDD reports a summary of the main comments received and DNV has verified that is aligned with the comments received		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /16/ /17/ /18/	DR I	No negative comments have been received		OK

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 Letter of Approval issued by Abu Dhabi Environment Agency on the 29 of January 2010 does not include the Dubai Aluminium Company Limited as the authorised project participant. In addition the name of the project participant "Abu Dhabi Future Energy Company" reported in the LoA does not match precisely with the name(reported in the PDD	A.3.3	The project proponent has received the revised approval on 16th March 2010 from the UAE DNA. PDD has been revised to incorporate the change in the name of project participants.	In the new version of the PDD, the Dubai Aluminium Company Limited is not a project participant. It has been verified Letter of Approval issued by Abu Dhabi Environment Agency on the 16 of March 2010. **CAR 1 is closed**
CAR 2- In the determination of the baseline scenario: ***1) all three cases identified in the financial analysis should be included in the list of baseline alternatives to ensure consistency between the procedure to identify the most plausible baseline scenario and the determination of additionality in line with the Version 3 of AM0030.*** ***2) all likely scenarios under the alternative of "no implementation of any anode effect mitigation measure" as required by the methodology needs to be clearly elaborated in the PDD.*** 3) ***it is requested to motivate the feasibility of Scenario 3 demonstrating that the ex-ante production load levels of lines 5 and 6 have not already reached the maximum***	B.4.4 B.4.8	In the revised PDD the baseline scenario section has been revised. The revised section incorporates the elaborated discussion on 'no implementation of any anode effect mitigation measure'.	In the revised PDD , the Baseline scenario determination now 1) includes all cases identified in the finacial analysis 2) discusses the alternatives relative to the no implementation of any anode effect mitigation measure including alternative 5 of the Financial Analysis (increase in aluminium production without anode effect mitigation) 3) gives evidence of why ex-ante production levels are below maximum capacity levels. **CAR 2 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
capacity levels			
CAR 3- Regarding the Project NPV calculation: ***1) In the Baseline emission calculation a coefficient of 0,24 tCO2e/tAl has to be used instead of 0,26 as*** $\overline{\overline{BE}} \leq BE_{IAI}$ ***and the ex-ante annual aluminium production of 306.000 tons should be used*** ***2) The Project emissions to be used in the calculation are those obtained using the ex-ante parameters and not the ex-post values.*** **3)** ***Case 2 of the financial analysis does not consider the electricity efficiency gained with the implementation of the algorithm.***	B.5.25	The Project NPV has been recalculated using the correct ex-ante parameters and the electricity saving will reduce the cost of electricity portion in case two scenario. The additional row is added in the calculation and the electricity saving is discounted in the revenue. Refer the C9 row in case 2 sheet in the excel worksheet 'Financial Analysis_without CDM'.	The calculation of the Project NPV now:_ 1) uses the tCO_2e/tAl coefficient equal to 0.24 2) uses the ex-ante project emissions 3) takes into consideration the electricity efficiency gained with the implementation of the algorithm. **CAR 3 is closed**
CL 1 - The geographical coordinates reported in the PDD are incomplete as they do not report the values of the minutes (') and the seconds (")	A.4.1	The geographical coordinates has been corrected in the revised PDD.	The revised PDD includes the geographical coordinates of the plant. **CL 1 is closed**
CL 2 - Further evidence should be provided by the PP showing that the facility has achieved an operational stability associated to a PFC emissions level that allows increasing the Aluminium production by simply increasing the electric current in the pots.	B.2.5 B.2.6	The graph showing the correlation between aluminium production and electricity consumption is presented in the revised PDD. The graph is straight line (With R^2 value more than 0.9). This shows that the production is in line with the electricity consumption and this can happen only with the operational stability.	The correlation, between aluminium production and electricity consumption is presented in section B.2 of the PDD. The correlation is based on data from July 2005 to June 2008, three years prior to the implementation of the project activity (6 July 2008). **CL 2 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 3- The project participant is requested to provide evidence relative to the control and quality measures already implemented in the past years to demonstrate that this project activity alternative can be eliminated	B.4.5 B.4.8	A core technical team were formed in year 2005 for the anode effect reduction in line 5 & 6. The feed control has been implemented which showed the reduction of 30% percent in anode effect frequency and 33% in anode effect duration. The memorandum for 'summary of events on CIT-3095, AEF reduction in lines 5 & 6' dated 26th January 2006. describes the results of the working group. The values in the figure 1 in the memorandum refer to year 2004-2005. The horizontal axis refers to weeks in 2004 and in 2005. Figure 2 covers year 2005 in totality. After this there have been no activities for the anode effect mitigation.	The memorandum provided by the PP has been analysed by DNV. It shows that in 2005 DUBAL already introduced in lines 5 and 6 control measures aimed to reach production stability reducing the anode effect frequency. **CL 3 is closed**
CL 4- The data sources used by the PP in order to determine the baseline scenario should be clearly referred in the PDD	B.4.7 B.4.8	The data source used to determine the baseline scenario has been included in the revised PDD.	Verified Annex 3 of the revised PDD in which the baseline data has been now included. **CL 4 is closed**
CL 5 - The Project Participant is requested to reconfirm the sequence of activities and correctness of dates as reported in Table B.1 along with supporting documentary evidence to ensure consistency. Further the PP should substantiate the activities taken up after July 2008 till commencement of validation to ensure continuation of CDM actions.	B.5.7 B.5.10	The PDD has been reviewed incorporating other CDM consideration actions such us: The stakeholder consultation, contract from the validators etc added in the CDM actions.	All events showing CDM consideration by the project owner are now reported in the PDD. **CL 5 is closed**
CL 6 – The project activity start date is	B.5.8	**Start date of the project activity:**	Trials cannot be considered real

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
mentioned as 23 July 2008 in the PDD. It has to be clearly justified and elaborated that this date is the earliest date at which either the implementation or construction or real action of the project activity begins in line with the CDM Glossary of Terms.	C.1.1	According to CDM glossary of terms the starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins. ……For those project activities which do not require construction or significant pre-project implementation (e.g. light bulb replacement) the start date is to be considered the date when real action occurs. In the context of the above definition, pre-project planning is not considered "real action". The project activity is of the same nature where the construction or significant pre project implementation is not required; therefore the real action date (starting date of implementation) is considered as start date of the project activity. The PDD has been revised accordingly.	implementation of the project activity as, if they were resulted negative, the project wouldn't had been started. It is accepted that the real implementation started when the control logic was installed at a industrialised production level. This happened to be on the 6 of July when the new algorithm was installed in the first 15 pots. **CL 6 is closed**
CL 7 - All the underlying assumptions (energy saving rate, electricity escalation, O&M cost escalation, aluminium price escalation, discounting rate ..etc) need to be	B.5.3 B.5.16 B.5.20 B.5.21	The PDD has been revised accordingly. Three years average data for the plant basic data has been considered for the financial calculations. The calculation has been revised. DUBAL has appointed third party	Te plant basic data is based on the last three years prior to the implementation of the project activity (6 July 2008). The input values for the Financial Analysis have been checked by MCA Auditing, who

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
substantiated in the PDD and an independent accounting assessment of the actual costs (67 570 US$) incurred for the research and development and the management fees and losses in production trails needs to be produced.	B.5.22 B.5.23	MCA auditing company for the financial evaluation. The auditors audited all the values and financial workings and provided the certificate for the same. The certificate is submitted with this response.	has issued on the 27 September 2010 a Report on the Financial Analysis of DUBAL PFC CDM Project; stating that "the items declared as forming part of the expenditure charged to the project, as shown in the PP Financial Analysis spreadsheet should in fact be so charged" **CL 7 is closed**
CL 8 - It is not clear on what basis the 20 years lifetime of the project activity has been reported in the PDD	C.1.3	The life of smelter is normally 40 years. Based on experience of the project proponent line 1-4 are operating since last 30 years. Conservatively 30 years has been considered as the lifetime of the Lines 5 & 6, in which project activity is implemented. The PDD has been revised accordingly.	The reasons for the 20 year lifetime have been now modified and described in the PDD- DNV has verified that thesr reasons are deemed to be acceptable. **CL 8 is closed**
CL 9 - The period chosen for the NPV assessment has been limited to the proposed crediting period of the CDM project activity(10 years) instead of the project expected operational lifetime(20 years). The NPV assessment has not taken into consideration the projects salvage value and working capital.	B.5.18	The audited financial working has included this point in the analysis. The crediting period is 10 years and NPV has been done for 10 years. This is as per the standards followed by DUBAL. The salvage value from the project has been estimated as the value of the benefits equivalent to 9 years has been added in the 10^{th} year for all the options. PDD has been amended accordingly.	The motivations for the residual value equal to zero do not take into consideration the incomes that will be generated (electricity reduction, increase of aluminium sales) after year 10 and until the end of the longest project life (19 years) **CL 9 is closed**
CL 10 - One of the project activity alternative is the increase of aluminium production. In the financial analysis it has been assumed an increase in aluminium production equal to the savings of electricity consumption without giving any justification	B.5.21	The electricity saving has been considered in the case 2. Please refer the C9 cell of the case 2 sheet of financial analysis.	The NPV calculations take into consideration now the energy efficiency derived from the implementation of the project activity **CL 10 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
for it			
CL 11 - The O&M Costs have not been taken into consideration in the Sensitivity Analysis	B.5.26	O & M has been considered in the sensitivity analysis.	In the revised PDD the O&M cost sensitivity analysis has been included **CL 11 is closed**
CL 12 - The sensitivity analysis conducted by the PP does not cover a ± 10 % variation for all the above indicated parameters	B.5.27	All the parameters have been considered for the sensitivity analysis.	In the revised PDD the sensitivity analysis includes the ± 10% variation **CL 12 is closed**
CL 13 - The PP claims that the International Aluminium Institute (IAI) has issued an statement saying that the project activity is "first-of-its-kind" in the Gulf area However the IAI statement does not indicate if there are other Aluminun plants in the Gulf area that have implemented anode effect killing algorithms. The statement is limited to that the project activity is the first in the Gulf Area seeking CDM status.	B.5.36 B.5.45 B.5.47	The letter from IAI has been requested because of CDM requirement. The project proponent has written a mail to IAI, requesting letter for first of its kind for CDM requirement. IAI is well aware of CDM and they have issued letter confirming the project is first of its kind, moreover they mentioned the other CDM projects of similar nature. If the project would have not been first of its kind IAI would never have confirmed this. (Mail communication is attached). Moreover the following aluminium plants are available in the region: - Aluminium Bahrain (ALBA) - Dubai Aluminium (DUBAL) - Qatar aluminium - Sohar aluminium (Oman) - Emirates aluminium (EMAL) - Saudi Arabia (3 plants)	The first-of-its-kind reasons have now be documented in the revised PDD***3*** **CL 13 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Out of the above plants only ALBA and DUBAl are the old plants and remaining are all new companies after year 2000. Therefore only ALBA and DUBAL can be compared for common practice. ALBA is using different technology than DUBAL (supporting document is attached). Therefore in the GCC region no plant is having the similar technology in the similar vintage as the project proponent and the project activity is implemented in the potline 5 & 6 and it's first of its kind.	
CL 14 –The PP should substantiate why DUBAL Management decision to participate to the 2006-2020 IAI PFC emission reduction voluntary program is not in contrast with the argumentation reported in the business strategy barrier	B.5.39	As per the IAI voluntary commitment "Based on IAI annual survey results, by 2020 IAI member companies commit to operate with PFC emissions per tonne of production no higher than the 2006 global median level for their technology type". DUBAL line 5 & 6 are already below the median IAI survey of PFPB technology and therefore dubal line 5 & 6 are already meeting the IAI voluntary objective. (page 3 of IAI PFC survey 2009) The project activity is over and above the voluntary commitment of IAI and therefore they are still facing the business strategy barrier.	The global median values have been incorporated in the revised PDD with the line 5&6 PFC emissions in year 2007. It is now clear that the global mean is same as the values of the line 5&6 before the project activity. **CL 14 is closed**
CL 15 - It is not justified why the	B.5.42	The same has been explained in the revised	The geographical scope has now been

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
geographical scope of the common practice analysis has been limited to the UAE		PDD.	extended to the Gulf area in the revised PDD **CL 15 is closed**
CL 16 - It is not clear the period of time at which the 0.121 slope (kgCF4 /tAl)/(AE min/cell day) is referred to and the methodology that has been used to calculate it	B.6.1	These values are from the PFC emissions measurements performed by J Marks & Associates on D18 bar broken and D20 point fed Center Work Prebake cells at the DUBAL smelter. The testing took place from 16 January to 27 January, 2007. CF_4 and C_2F_6 were measured in a continuous and real-time manner on a gas sample stream continuously extracted from the stack exhausts downstream of the gas treatment facilities by a Fourier Transform Infrared (FTIR) spectroscopic system. The small amounts of fugitive PFC emissions escaping collection in the duct system through the roof top were calculated based on the estimated collection fraction for each of the lines. The measurements were carried out according to the *US EPA Protocol for Measurement of Tetrafluoromethane and Hexafluoroethane Emissions from Primary Aluminum Production*, March 2003.	The period of time at which the slopes reported in the emission reduction calculations are now indicated in the PDD and are in line with the original source. **CL 16 is closed**
CL 17 - It is not clear the period of time at which the 0.01936 slope (kgC2F6 /tAl)/(AE min/cell day) is referred to and the methodology that has been used to calculate	B.6.2	These values are from the PFC emissions measurements performed by J Marks & Associates on D18 bar broken and D20 point fed Center Work Prebake cells at	The period of time at which the slopes reported in the emission reduction calculations are now indicated in the PDD and are in line with the original source.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
it.		the DUBAL smelter. The testing took place from 16 January to 27 January, 2007. CF_4 and C_2F_6 were measured in a continuous and real-time manner on a gas sample stream continuously extracted from the stack exhausts downstream of the gas treatment facilities by a Fourier Transform Infrared (FTIR) spectroscopic system. The small amounts of fugitive PFC emissions escaping collection in the duct system through the roof top were calculated based on the estimated collection fraction for each of the lines. The measurements were carried out according to the *US EPA Protocol for Measurement of Tetrafluoromethane and Hexafluoroethane Emissions from Primary Aluminum Production*, March 2003.	**CL 17 is closed**
CL 18 - ***The weight fraction of C2F6/CF4 has not been considered in the list of parameters available at validation reported at § B.6.2 of the PDD***	B.6.3 B.7.2	The same has been incorporated in the revised PDD.	The weight fraction of C2F6/CF4 has now been extended to the Gulf area in the revised PDD **CL 18 is closed**
CL 19 - ***The frequency used (0.34 Number of AE /cells day) in the baseline emissions is referred to the period from the 1st December 2007 until the 30th June 2008 which includes the first (28-12-2007 till 08-02-2008)and second (26-06-2008 to 10-07-***	B.6.4	The mentioned trail days in the data have been removed and data from January 2007 has been considered for the calculation.	The 0.34 frequency has now been corrected to 0.31 (line 5) and 0.32 (line 6) in the revised PDD **CL 19 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
2008) trial periods which cannot be considered anode effect stable situations			
CL 20 -*The duration used (0.68 minutes)in the baseline emissions is referred to the period from the 1st December 2007 until the 30th June 2008 which includes the first (28-12-2007 till 08-02-2008)and second (26-06-2008 to 10-07-2008) trial periods which cannot be considered anode effect stable situations*	B.6.5	The mentioned trail days in the data have been removed and data from January 2007 has been considered for the calculation.	The 0.68 duration has now been corrected to 0.76 (line 5) and 0.68 (line 6) in the revised PDD **CL 20 is closed**
CL 21 - *It is not clear the methodology used to calculate the slope coefficients for CF4 (0.121) and C2F6(0.01936)for both baseline and project emissions*	B.6.7 B.6.10	These values are from the PFC emissions measurements performed by J Marks & Associates on D18 bar broken and D20 point fed Center Work Prebake cells at the DUBAL smelter. The testing took place from 16 January to 27 January, 2007. CF_4 and C_2F_6 were measured in a continuous and real-time manner on a gas sample stream continuously extracted from the stack exhausts downstream of the gas treatment facilities by a Fourier Transform Infrared (FTIR) spectroscopic system. The small amounts of fugitive PFC emissions escaping collection in the duct system through the roof top were calculated based on the estimated collection fraction for each of the lines. The measurements were carried out according to the *US EPA Protocol for Measurement of Tetrafluoromethane and Hexafluoroethane Emissions from*	The methodology used to calculate the slope coefficients for CF4 and C2F6 is now defined in the revised PDD. **CL 21 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Primary Aluminum Production, March 2003. The same values have been used in the baseline and project emissions. After implementation of the project activity slope coefficient has not been measured yet and will be done within this year and is not. For estimation of emission reduction this value has been used.	
CL 22 - *The calculation of the Emission Factor uncertainties (C2F6/CF4) are not described in the PDD.*	B.6.8 B.6.10	Project proponent has followed the procedures mentioned in the approved methodology AM0030. The project proponent is using the tier 3 method for emission factors and moreover getting the main parameter (slope coefficient) from a third party expert which is following the USEPA/IAI protocol. The report for same has been submitted. Therefore this uncertainty is not applicable for the project activity.	According to meth AM0030 there is no need to calculate the uncertainty associated to the emission reductions calculations . the requirement is to use internal procedures that ensures low data uncertainties during monitoring process, This requirement has now been captured in the PDD. **CL 22 is closed**
CL 23 - *The emission reduction has been calculated in an aggregate way for both line 5 and 6. The PP should demonstrate that this approach is more conservative than doing it on individual line basis.*	B.6.15	The calculation of the same has been done for combined and individual basis. Although from the calculation it is showing that individual linewise emission reduction is low but in dubal both the lines are considered combined. Conservatively the emission reductions based on individual lines has been considered in emission reduction calculation.	The emission reduction has been calculated for each line and has resulted more conservative (less emission reductions) than the aggregate calculation. Therefore the separate reductions has been adopted in the revised PDD. **CL 23 is closed**
CL 24- *The PDD does not elaborate as to how*	B.5.37	The PDD has been revised accordingly to	The revised PDD includes the motivation

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
the CDM alleviate the barriers due to prevailing practise		incorporate the impact of CDM revenue.	why CDM alleviate barriers due to prevailing practice. **CL 24 is closed**
CL 25 - ***The Monitoring Plan does not describe the specific instrumentation in the Automatic Control System used for monitoring the specific parameters and its level of accuracy***	B.7.3 B.7.4	The same has been incorporated in the annex 4 of the revised PDD.	The revised PDD includes annex 4 defining the instrumentation used by the Automatic Control System used for monitoring the specific parameters and its level of accuracy **CL 25 is closed**
CL 26 - ***The Monitoring Plan does not describe the calibration and maintenance procedures of the instrumentation used for monitoring the specific parameters. In addition the monitoring plan does not include the parameters*** BE_{IAI} ***and*** $\overline{\overline{BE}}$	B.7.5 B.7.6	The same has been incorporated in the revised PDD.	The revised PDD includes annex 4 defining the calibration and maintenance procedures of the instrumentation used in the Monitoring Plan and the parameters BE_{IAI} *and* $\overline{\overline{BE}}$ have been included in the PDD **CL 26 is closed**
CL 27 - ***The data management and quality assurance and quality control procedures should be briefly described in the PDD.***	B.7.10	The same has been incorporated in the annex 4 of the revised PDD.	The revised PDD includes annex 4 describing briefly the data management and quality assurance and quality control procedures **CL 27 is closed**
CL 28 - ***The document / record control procedures should be briefly described in the PDD.***	B.7.11	The same has been incorporated in the annex 4 of the revised PDD.	The revised PDD includes annex 4 describing briefly the document / record control procedures **CL 28 is closed**

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 29 - ***The PP is requested to elaborate as to why other potential interested parties (local residents) have not been considered in the local stakeholder consultation***	E.1.1	The project activity is implemented in the existing DUBAL plant pot line 5 & 6. DUBAL is public sector company and directly governed by Dubai Government. For any project DUBAL send the information to Dubai municipality for the approval. Based on their permission the project is implemented or corrected/rejected. In case of the project activity also DUBAL followed the same procedure and submitted it to Dubai Municipality and got the approval. Moreover after this clarification the comments have been invited with a non-governmental organisation and same has been submitted with this response.	The Emirates Environmental Group letter has been checked by DNV . All the comments regarding the project activity were positive. **CL 29 is closed**

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
No forward action requests		

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Ramesh Ramachandran,Holds a Master's Degree in Environmental Engineering and a Post Graduate Diploma in Operations Management.
Possesses a combined experience of more than 15 years in the field of a) design and operation/maintenance of wastewater treatment (as part of working in wastewater design & equipment supply, firm), b) environmental consulting and c)production integrated environmental auditing. His experience also covers the fields of developing & designing EMS systems, resource/energy conservation, waste minimisation and cleaner production in various manufacturing,process and chemical industries.

In DNV he has experience of more than 5 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. He has also been involved as a Lead Auditor in Management System Audits such as ISO 9001, ISO 140001 and OHSAS 18001 standards in various industrial sectors for more than 5 years in DNV.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources , electrical distribution, waste handling and disposal and animal waste management.

Francisco Zamarron holds a 6 year Diploma in Civil Engineering and a 2 year post-graduated Master in Business Administration. He has an overall working experience of around 25 years.

Before joining DNV in 1996 he has worked as a Project Manager in the construction sector, Business Developer Manager in process automation sector mainly for the oil and gas industry and Management Consultant for small and medium organizations. From 1996 until 2005 he has conducted, on behalf of DNV, third party Management System Audits against ISO 9001, ISO 14001, EMAS and ISO 14044 Standards in a large spectrum of industrial and service sectors.

Since 2005 he has continued his professional carrier in DNV in the climate change field, with particular focus on the Kyoto Protocol Mechanisms, as a CDM Validator and EU ETS Service Responsible. He has managed the validation of many CDM and has carried out verifications and technical review of numerous EU ETS reports. Through his work experience, he has acquired sectoral competence within energy generation from renewable energy sources and construction.

He has also experience in providing technical environmental advisory services and verifying corporate greenhouse gas emissions; emission reductions and product carbon footprints

Sasim Chattopadhyay holds a Master Degree (M. Sc.) in Physics and a Master Degree (M. Tech.) in "Energy Science and Technology". Having an overall experience of around seventeen years. Prior to joining DNV having five years experience in Energy Auditing in various industries like Engineering, Jute & Textile, Cement, Iron & Steel, Chemical, Automotive etc. covering Analysis of Energy Consumption pattern, Measurement of energy/fuel consumption & environmental emission parameters and Analysis for identifying Energy Conservation Opportunities.

He has experience of around three years in validation and verification of CDM projects and around six years in Management System Certification (QMS/EMS/OHSAS/SA) services.
His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in "(1) 1.2 - Energy generation from renewable energy sources and (2) 3.1 - Energy Demand."

Naendra Metha has extensive professional experience in the aluminum sector. He has worked from 1967 to 1989 in Indian Aluminium Co. Ltd. as responsible of the Quality assurance of raw materials & finished products and from 1966 to 1967 in Vereinigte Aluminum Assisting the Chief Metallurgist in the production of aluminum cast, rolled, extruded & anodized products.

Kumaraswamy Chandrashekara holds a Bachelor's Degree in Chemical Engineering and has an overall experience of around 24 years. Prior to joining DNV, has worked for 11 years in the Chemical Process Industry covering Plant Operations, Technical Services and Process Design activities, primarily in the fertilisers and chemicals manufacturing sector. During this tenure of 11 years in the industry, responsibilities included production, process optimization, energy efficiency improvements, environmental performance, process design, energy auditing and technical auditing.

He has experience of around six years in the validation and verification of numerous CDM projects both in India and abroad. His qualification, industrial experience and experience in CDM sufficiently demonstrate his sectoral competence in the areas of chemical process industries, energy generation from renewable sources and waste handling & disposal.

Svetlana Shevnina holds an Engineer Degree in Environmental Sciences. Having an overall experience of around seven years. Prior to joining DNV having around two years experience in metal production industry covering management of aluminium production plant environmental effects and environmental (including JI) projects.

She has experience of around 3 years in validation and verification of numerous CDM and JI projects, both in Russia and abroad.

Her qualification, industrial experience and experience in CDM/JI demonstrate her sufficient sectoral competence in Metal production.