

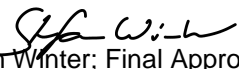


**Validation report form for renewal of crediting period for
CDM project activities**

(Version 03.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Catalytic N ₂ O destruction project in the tail gas of three Nitric Acid Plants at Hu-Chems Fine Chemical Corp. UNFCCC ID: 0765
Number and duration of the next crediting period	CP-No.: 3 22/01/2021 to 21/01/2028 (incl. both days)
Version number of the validation report	01.2
Completion date of the validation report	20/01/2021
Version number of PDD to which this report applies	05.1
Project participants	Hu-Chems Fine Chemical Corp. (Republic of Korea) RWE Power AG (Germany) Carbon Climate Protection GmbH (Austria)
Host Party	Republic of Korea
Applied methodologies and standardized baselines	ACM0019 version 04.0 (N ₂ O abatement from nitric acid production) Standardized baselines: N/A
Mandatory sectoral scopes	Scope 5: / Technical Area: 5.2
Conditional sectoral scopes, if applicable	N/A
Estimated amount of annual average GHG emission reductions or GHG removals by sinks in the next crediting period	1,209,597 tCO ₂ e
Name and UNFCCC reference number of the DOE	TÜV NORD CERT GmbH UNFCCC reference number: E-0022
Name, position and signature of the approver of the validation report	 Stefan Winter; Final Approver

SECTION A. Executive summary

Carbon Climate Protection GmbH has commissioned the TÜV NORD JI/CDM Certification Program to carry out validation of the request for renewal of crediting period (RCP) for the project:

“Catalytic N₂O destruction project in the tail gas of three Nitric Acid Plants at Hu-Chems Fine Chemical Corp.”

with regard to the relevant requirements for CDM project activities.

The project has been registered on 22/01/2007 under the UNFCCC registration No. 0765. The PPs have chosen a renewable crediting period where the first crediting period has started on 22/01/2007 and expired on 21/01/2014, the second crediting period has started on 22/01/2014 and expires on 21/01/2021.

The objective of this RCP validation is the review by an independent entity whether the project is still compliant with the applicable sections of:

- the CDM project standard^{/PS/}
- the CDM project cycle procedure^{/PCP/}
- the updated applied UNFCCC Methodology ACM0019 version 04.0 (N₂O abatement from nitric acid production)^{/ACM0019/}
- the methodological tool 03 “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” (version 03.0)^{/TOOL03/}
- the methodological tool 08 “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0)^{/TOOL08/}
- the methodological tool 11 “Assessment of the validity of the original / current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1)^{/TOOL11/}.

As per the requirements of the CDM Validation and Verification Standard^{/VVS/}, the validation is based on

- the registered and/or latest updated version of the PDD (including revisions of the monitoring plan)^{/PDD/},
- the validation opinion on the post registration changes^{/PRC/},
- the updated emission reduction calculation spread sheet^{/XLS/},
- further supporting documents made available to the validator as well as information collected during the on-site interviews.

Furthermore publicly available information, such as the host country legislation, was considered as far as available and required.

The project reduces GHG emissions by removing the N₂O from nitric acid production which will be otherwise emitted to the atmosphere in the baseline scenario. The installations include 3 systems for catalytic reduction of N₂O i.e. the EnviNOx[®]-systems at three nitric acid plants, Hu-Chems II, Hu-Chems III and Hu-Chems IV.

Table A-1: Project Location

No.	Project Location
Host Country	Republic of Korea
Region:	Jeonam-do
Project location address:	7-6, Wollae-dong, Yeosu-si
Latitude:	34.848686 N
Longitude:	127.743198 E

Hu-Chems II and III

The design capacity of Nitric Acid production for both plants is 116,800 t HNO₃/a each. A catalytic reduction process is installed in Hu-Chems II and III Nitric Acid Plants. The EnviNOx[®] reactor is located between the existing SCR DeNOx reactor and the tail gas turbine. The current tail gas

temperature at this stage of the process is around 360°C for high rates of N₂O removal. LPG (effectively propane) and ammonia are utilized as reducing agents for N₂O and NO_x respectively.

Hu-Chems IV

The design capacity of the Nitric Acid production is 467,200 t HNO₃/a. A catalytic N₂O decomposition process is installed at Hu-Chems IV Nitric Acid Plant. The EnviNOx[®] reactor is located upstream of the tail gas turbine. The current tail gas temperature is above 425°C. The prior existing SCR DeNO_x unit (SCR = Selective Catalytic Reduction) installed for NO_x reduction has been removed during the implementation of the project activity, with the new EnviNOx[®] reactor taking on the function of the SCR DeNO_x unit.

The capacities of the project plants Hu-Chems II, III and IV are included in table A-2.

Table - A-2: Design capacities

Plant Name	Hu-Chems II	Hu-Chems III	Hu-Chems IV
Design capacity	116,800 t HNO ₃ /a	116,800 t HNO ₃ /a	467,200 t HNO ₃ /a

The conclusions of this report shows that the project, as it was described in the project documentation, is in line with all criteria applicable for the RCP validation.

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/Doc review	On-site inspection	Interview(s)	Validation findings
1.	Team Leader	EI	Winter	Rainer	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Technical Expert	EI	LI	Yongjun	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

B.2. Technical reviewer and approver of the validation report for RCP

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Stöhr	Christina	TÜV NORD CERT GmbH
2.	Approver/Technical reviewer	IR	Stefan	Winter	TÜV NORD CERT GmbH

SECTION C. Means of validation

C.1. Desk/document review

During the desk/document review all documents initially provided by the client and publicly available documents relevant for the validation were reviewed. The main documents are listed below:

- the last revision of the PDD including the monitoring plan^{/PDD/},
- the last revision of the validation report^{/VAL/},

- the latest approved PDD^{/PDD-R/},
- the approved post registration change^{/PRC/},
- the periodic verification reports and MRs^{/VER/},
- the emission reduction calculation spreadsheet^{/XLS/}.

Other supporting documents, such as publicly available information on the UNFCCC website and background information such as documentation by third parties, host party legislation etc. were also reviewed. A complete list of all reviewed documents is shown in Appendix 3 to this report.

C.2. On-site inspection

The validation team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for RCP.

The validation team has performed an on-site visit to confirm selected information and to resolve issues identified in the document review.

The main topics of the on-site visit are summarized in below table(s).

Duration of on-site inspection: 27/11/2019				
No.	Activity performed on-site	Site location	Date	Team member
1	Opening meeting	Jeonam-do 7-6, Wollae-dong, Yeosu-si	27/11/2019	Mr. Rainer Winter Mr. Yongjun LI
2	On-site inspection/ Interview with PP Representatives and Operation Staff / Discussion with project consultant			
3	Documents check			
4	Discussion on findings			
5	Close Meeting			

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Kim	Hyun Soo	Hu-Chems Fine Chemical Corp Team manager	27/11/2019	<ul style="list-style-type: none"> - Project history - Project technology and installations - Monitoring and measurement equipment and system - Remaining lifetime of equipment - Crediting period - Baseline study assumptions - Additionality assessment - Roles & responsibilities of the project participants - National legislation - ER calculation - Ex-ante parameters - Changes of parameters 	Mr. Rainer Winter Mr. Yongjun LI
2	YOU	Chang-young	Hu-Chems Fine Chemical Corp	27/11/2019	<ul style="list-style-type: none"> - Project history - Monitoring and measurement equipment and system - Remaining lifetime of equipment - Crediting period - Baseline study assumptions 	Mr. Rainer Winter Mr. Yongjun LI

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
					<ul style="list-style-type: none"> - Roles & responsibilities of the project participants - National legislation - ER calculation - Ex-ante parameters - Changes of parameters 	
3	Bichler	Sonja	Carbon Climate Protection GmbH	27/11/2019	<ul style="list-style-type: none"> - Project history - Monitoring and measurement equipment and system - Crediting period - Baseline study assumptions - ER calculation - Ex-ante parameters - Changes of parameters 	Mr. Rainer Winter Mr. Yongjun LI
4	Ashour	Fatehy	Carbon Climate Protection GmbH	27/11/2019	<ul style="list-style-type: none"> - Project history - Monitoring and measurement equipment and system - Crediting period - Baseline study assumptions - ER calculation - Ex-ante parameters - Changes of parameters 	Mr. Rainer Winter Mr. Yongjun LI

C.4. Sampling approach

C.4.1 Sampling approach by the PP

<input checked="" type="checkbox"/>	No sampling approach has been used by the PP				
<input type="checkbox"/>	A sampling approach has been taken for the following monitored parameter(s):				
	Name of the Parameter	Sampling approach ¹⁾	Sampling Type ²⁾	Population	Sample Size

¹⁾Sampling Approaches:

SiRS: Simple Random Sampling
 StRS: Stratified Random Sampling
 SS: Systematic Sampling
 CS: Cluster Sampling
 MSS: Multi-stage Sampling

²⁾Sampling Types:

PS: Parameter Sampling

C.4.2 sampling approaches by the validation team

<input checked="" type="checkbox"/>	No sampling approach has been used by the VT to validate the fixed parameters				
<input type="checkbox"/>	A sampling approach has been applied by the VT for the following fixed parameter(s):				
	Parameter	Sampling approach ¹⁾	Sampling Type ²⁾	Population	Sample Size

¹⁾Sampling Approaches:

SiRS:	Simple Random Sampling
StRS:	Stratified Random Sampling
SS:	Systematic Sampling
CS:	Cluster Sampling
MSS:	Multi-stage Sampling

²⁾Sampling Types:

AS:	Acceptance Sampling
PS:	Parameter Sampling
COM:	Full data check at higher data aggregation levels and sampling at original data levels

C.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Area of validation findings	No. of CL	No. of CAR	No. of FAR
Compliance with PDD form	0	0	0
Application and selection of methodologies and standardized baselines	1	0	0
Validity of original baseline or its update	0	0	0
Estimated emission reductions or net anthropogenic removals	0	2	0
Validity of monitoring plan	1	0	0
Crediting period	0	0	1
Project participants	0	0	0
Post-registration changes	0	0	0
Others (please specify)	0	0	0
Total	2	2	1

SECTION D. Validation findings**D.1. Compliance with PDD form**

Means of validation	<p>A draft revised PDD was submitted to the validation team by the project participants. By means of the UNFCCC website it has been checked whether the latest applicable PDD template CDM-PDD-FORM has been used.</p> <p>Further it has been checked whether the latest instructions for filling out the PDD template have been followed. Every section has been checked against the respective guidance.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PDD/ • /PDD-T/ • /unfccc/ • /VVS/ • /PS/ 	
Findings	<input checked="" type="checkbox"/>	The latest reporting template CDM-PDD-FORM as listed on the UNFCCC website has been used for the PDD.
	<input checked="" type="checkbox"/>	The latest instructions for filling out the PDD have been followed. No adverse finding has been identified in the course of this validation.
	<input type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: n/a
Conclusion	<input checked="" type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	<input type="checkbox"/>	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	<p>The latest version of the PDD form has been applied.</p> <p>It is confirmed that the information transferred to the newer version of the PDD form is materially the same as that in the latest approved PDD.</p>	

D.2. Application and selection of methodologies and standardized baselines

Means of validation	<p>By means of comparison of the PDD with</p> <ul style="list-style-type: none"> (i) the applied CDM methodology (ii) all applicable CDM Meth tools and (iii) if applicable, a standardized baseline <p>the verification team has checked whether the updated PDD is in compliance with the requirements of the applied methodology& tools.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PDD/ • /ACM0019/ • /TOOL03/ • /TOOL08/ • /TOOL11/ • /unfccc/ 			
Findings	<input checked="" type="checkbox"/>	The updated PDD is completely in accordance with the approved methodology applicable for the CDM project		
		The breakdown of PDD accordance of the referenced tools is as follows:		
	<input checked="" type="checkbox"/>	1	Title (of the tool)	TOOL 08 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" /TOOL08/
			Version	03.0
			PDD compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A (for MP)
	<input checked="" type="checkbox"/>	2	Title (of the tool)	TOOL 03 "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" /TOOL03/
			Version	03.0
			PDD compliance	<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A
	<input checked="" type="checkbox"/>	3	Title (of the tool)	TOOL 11 "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" /TOOL11/
			Version	03.0.1
PDD compliance			<input checked="" type="checkbox"/> full compliance <input type="checkbox"/> findings have been raised <input type="checkbox"/> N/A	
<input type="checkbox"/>	The breakdown of PDD accordance of the applicable SB is as follows:			
	1	Title (of the SB)	n/a	
		Version	-	
		MP compliance		
<input checked="" type="checkbox"/>	In this context the following CARs, CLs, FARs have been raised:			
	CL2: A clarification should be provided that the project is further exempted from the Korean Emission Trading Scheme.			
Conclusion	<input type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.		
		The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.		
		<p>For both the methodology and applicable tools it is confirmed that all applicable references in the updated PDD are correct and all applicable tools have been correctly identified in the updated PDD.</p> <p>All applicability conditions of the updated methodology are considered to be still met.</p>		

D.3. Validity of original baseline or its update

Means of validation	<p>In order to check the validity of the original baseline or its updates the validation team has applied the following stepwise approach as per TOOL 11/^{TOOL11/}:</p> <p>Step 1: Assessment of the validity of the current baseline for the next crediting period</p> <p>Step 1.1: Check of assessment of compliance of the current baseline with relevant mandatory national and/or sectoral policies</p> <p>Step 1.2: Check of assessment of the impact of circumstances</p> <p>Step 1.3: Check of assessment of whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.</p> <p>Step 1.4: Check of assessment of the validity of the data and parameters</p> <p>Step 2: Check of the update to the current baseline and the data and parameters</p> <p>Step 2.1: Check of the update of the current baseline</p> <p>Step 2.2: Check of the update of the data and parameters</p> <p>All necessary documentation has been either provided by the client or the validation team has acquired appropriate information required for independent assessment. For a detailed list of reviewed documentation please refer to Appendix 3.</p>
Findings	<p>Step 1: Check of assessment to the validity of the current baseline for the next crediting period</p> <p>The baseline scenario of the project as per the latest approved PDD can be described as follows:</p> <p><i>"The baseline scenario is identical to the scenario existing prior to the start of implementation of the project activity, which is the emission of N₂O to the atmosphere with no N₂O abatement measure being implemented".</i></p> <p>The baseline is still in line with the latest version of the applied methodology. As per project standard this scenario is not subject to re-assessment and is thus deemed to be applicable for the next crediting period.</p> <p>The baseline itself i.e. the calculation of baseline emissions has been checked regarding the continued validity of underlying assumptions and parameter values. The assessment steps are described in the following subsections.</p> <p>Step 1.1: Check of assessment to compliance of the current baseline with relevant mandatory national and/or sectoral policies</p> <p>The baseline of the PDD has been assessed to be compliant with the national legislation and policies applicable for the project activity at the time of validation. The local legal requirements and policies relevant for the project baseline has been checked, it could be concluded that the baseline is still in line with all applicable legislations and policies.</p> <p>The validation team has independently reviewed the host country legislation as well as current policies, such as</p> <ul style="list-style-type: none"> - Korean Clean Air Conservation Act/^{CACA/} and - Legislation about Assignment and Trading of GHG Emission ^{/TMS/}. <p>On the basis of this analysis the validation team confirms that the baseline is still in compliance with the currently applicable national legislation and other national and/or sectoral policies. Therefore the baseline did not need to be adjusted due to changes in this respect.</p> <p>Step 1.2: Check of assessment to the impact of circumstances</p> <p>As the baseline scenario might be affected by changed circumstances, e.g. market conditions, market prices etc. the PP has checked the baseline against such changes that have occurred since validation. This is of special importance if the baseline scenario is the continuation of the pre-project scenario.</p> <p>In the current case no such changes have been identified by the project participants as changed market conditions are not likely to impact the PA.</p>

The validation team has independently checked whether there are changes in circumstances which have an impact on the baseline, such as searching the website of national government^{/HCA/} and interview with the PP^{/11/}.

No such changes have been identified and thus it is deemed appropriate not to revise the baseline due to changes in circumstances.

Step 1.3: Check of assessment to whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

No baseline equipment has been changed. Furthermore no other reasons for a possible investment – other than possible legal requirements – have been identified.

Thus the validation team came to the conclusion that no changes to the baseline are required due to the likeliness of investments in equipment which impacts the baseline.

Step 1.4: Check of assessment of the validity of the data and parameters

The parameters which have been determined ex-ante in the registered PDD are basically still valid. The following changes were required as per applied methodology:

Parameter	Previous value				Updated value				Reference		
EF_{new,y} Baseline N ₂ O emission factor for nitric acid production in year y (related to 100 per cent pure acid)	Year	Emission factor (kg N₂O/t HNO₃)			Year	Emission factor (kg N₂O/t HNO₃)			Applied methodology		
	2014	3.50			2021	2.50					
	2015	3.40			2022	2.50					
	2016	3.20			2023	2.50					
	2017	3.00			2024	2.50					
	2018	2.80			2025	2.50					
	2019	2.70			2026	2.50					
	2020	2.50			2027	2.50					
	2021	2.50			2028	2.50					
	EF_{default,y} Default emission factor according to the operating pressure of the ammonia burner in year y (related to 100 % pure acid)	Year	Emission factor (kg N₂O/t HNO₃)			Year	Emission factor (kg N₂O/t HNO₃)			Applied methodology	
		LP	MP	HP		LP	MP	HP			
2014		5.3	8.2	12.4	2021	3.9	6.8	11.0			
2015		5.1	8.0	12.2	2022	3.7	6.6	10.8			
2016		4.9	7.8	12.0	2023	3.5	6.4	10.6			
2017		4.7	7.6	11.8	2024	3.3	6.2	10.4			
2018		4.5	7.4	11.6	2025	3.1	6.0	10.2			
2019		4.3	7.2	11.4	2026	2.9	5.8	10.0			
2020		4.1	7.0	11.2	2027	2.7	5.6	9.8			
2021		3.9	6.8	11.0	2028	2.5	5.4	9.6			
LP: Low Pressure MP: Medium Pressure HP: High Pressure											
GWP Global warming potential of N ₂ O valid for the commitment period		298 t CO ₂ e/t N ₂ O				298 t CO ₂ e/t N ₂ O This is considered to be a preliminary value as the CMP has only stipulated this value for application during the 2 nd commitment period – and a CMP decision on which GWP ist to be applied post 2020 is pending.					UNFCCC
Operating pressure Operating pressure of the ammonia burner	Hu-Chem II:	872 kPa (HP)			Hu-Chem II:	872 kPa (HP)			Hu-Chems		
	Hu-Chem III:	872 kPa (HP)			Hu-Chem III:	872 kPa (HP)					
	Hu-Chem IV:	335 kPa (MP)			Hu-Chem IV:	335 kPa (MP)					
EF_{historical}	Hu-Chem II:	12.09			Hu-Chem II:	12.09			Hu-Chems		
	Hu-Chem III:	11.26			Hu-Chem III:	11.26					

	Historical baseline emission factor of the nitric acid plant [kg N ₂ O/ t HNO ₃]	Hu-Chem IV: 5.70	Hu-Chem IV: 5.70	
	P _{product,max}	Hu-Chem II: 116,800 t Hu-Chem III: 116,800 t Hu-Chem IV: 467,200 t	Hu-Chem II: 116,800 t Hu-Chem III: 116,800 t Hu-Chem IV: 467,200 t	Hu-Chems
	All other ex-ante parameters, as determined from the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” are (natural) constants and not subject to any changes.			
	Step 2: Check of the update to the current baseline and the data and parameters Step 2.1: Check of the update to the current baseline As per step 1 above, it is confirmed that the current baseline does not need to be updated.			
	Step 2.2: Check of the update to the data and parameters Refer to results of step 1.4.			
Conclusion	<input checked="" type="checkbox"/>	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context: At the time of the RCP validation there is an uncertainty regarding the GWP to be applied post 2020 as a corresponding CMP decision is still pending. In this context FAR 1 has been raised.		
	<input type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.		
	<input type="checkbox"/>	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.		
The baseline scenario of the project as per the latest approved PDD is still basically valid for the 3 rd crediting period. However, with regards to the applicable GWP FAR 1 needs to be addressed at issuance stage. All other data and parameters determined ex-ante are still valid.				

D.4. Estimated emission reductions or net anthropogenic removals

Means of validation	<p>For validation of the estimated GHG emission reductions the client has provided the validation team with the following documentation:</p> <ul style="list-style-type: none"> - Latest version of PDD/PDD/ - ER calculation spreadsheet^{t/XLS/}. <p>Further, the validation team has downloaded the applicable version of the CDM methodology and all referenced methodological tools from the UNFCCC website^{/unfccc/}.</p> <p>By checking of the PDD, it is confirmed that the calculation of ERs is done as per the applied methodology (ACM0019 ver. 04.0) and “TOOL08 “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 03.0) and TOOL03 “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” (version 03.0) by following steps:</p> <p>Baseline emissions BE_y:</p> <p>All 3 nitric acid plants used AM0028 in the first crediting period and the baseline emissions for the 3rd crediting period are calculated by applying the methodology ACM0019 v.04.0 under “Case 1” (Case 2 has not to be considered) including specific formulae for calculation of:</p> <p>(All abbreviations are described section D.3 and D.5.)</p>
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$$BE_y = \left(\frac{\min\{P_{production,y}; P_{product,max}\} \times EF_{existing,y}}{\max\{P_{production,y} - P_{product,max}; 0\} \times EF_{new,y}} \right) \times \frac{(h_y - h_{r,y})}{h_y} \times GWP_{N_2O} \times 10^{-3}$$

Calculation of N₂O emission factor EF_{N_2O} :

The N₂O emission factor for nitric acid plants that used AM0028 or AM0034 in the 1st crediting period ($EF_{existing,y}$) will be calculated as follows:

$$EF_{existing,y} = \min\{EF_{historical}; EF_{default,y}\}$$

Calculation of $h_{r,y}$ for Case 1:

AM0028 has been used in the 1st crediting period for the calculation of hours, when the abatement system was by-passed, underperforming or failed, $h_{r,y}$ (Case 2 has not to be considered).

$$F_{N_2O,tail\ gas,h} > EF_{existing,y} \times P_{NA,h}$$

Project emissions PE_y :

Project emissions include N₂O emissions, which have not been destroyed by the project activity and, in case of the installation of a tertiary N₂O abatement facility, CO₂ emissions resulting from the operation of the N₂O abatement facility. Project emissions are calculated as follows:

$$PE_y = PE_{N_2O,y} + PE_{CO_2,tertiary,y}$$

Considering the project activity includes three separate nitric acid plants and thus three N₂O destruction facilities and individual monitoring systems the total project emissions are calculated as:

$$PE_y = PE_{y,I} + PE_{y,II} + PE_{y,IV}$$

Calculation of project emissions of N₂O from the project plant ($PE_{N_2O,y}$)

The amount of N₂O emissions from the project activity are the emissions from the N₂O contained in the tail gas stream of the plant which is released to the atmosphere.

$$PE_{N_2O,y} = \sum_1^{h_y - h_{r,y}} F_{N_2O,tail\ gas,h} \times GWP_{N_2O} \times 10^{-3}$$

Determination of N₂O emissions from tail gas stream $F_{N_2O,tail\ gas,h}$

The amount of N₂O emissions from the tail gas stream of the project plant has been determined by using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", following provisions apply:

(a) Throughout the crediting period, the N₂O concentration and volume or mass flow of the tail gas are monitored continuously. The monitoring system is installed and maintained in line with the European Norm 14181;

(b) The monitoring system provides separate hourly average values for the N₂O concentration and the volume or mass flow of the tail gas based on two seconds (or shorter) interval readings that are recorded and stored electronically.

(c) The correction factors derived from the calibration curve of the QAL2 audit for the monitoring components as determined during the QAL2-test in accordance with EN14181 are applied to both the N₂O concentration and the volume or mass flow of the tail gas.

(d) If data for either the N₂O concentration or the volume or mass flow of the tail gas are not available for more than 1/3 of any hour while the plant was in operation, the value for that hour are replaced with the maximum value of N₂O concentration or volume or mass flow of the tail gas observed during the monitoring period. If data for neither the N₂O concentration nor the volume or mass flow of the tail gas are available for more than 1/3 of any hour while the plant was in operation, the maximum value of mass flow of N₂O calculated during the monitoring period is applied to any such hour. Values observed during five operating hours before and after a plant start-up and shut-down are not used for the determination of the maximum values;

(e) As the N₂O concentration and the volume or mass flow of the tail gas and by-pass are automatically converted to normal conditions by the AMS during the monitoring process, the parameters P_t and T_t do not need to be monitored.

The mass flow of GHG i (F_{i,t}), where i = N₂O, is determined by applying the formulae:

$$F_{i,t} = V_{t,db} * v_{i,t,db} * \rho_{i,t}$$

$$\rho_{i,t} = P_t * MM_i / R_u * T_t$$

If it can be demonstrated that the moisture content of the gaseous stream (C_{H₂O,t,db,n}) is less or equal to 0.05 kg H₂O/m³ dry gas the volume flow V_{t,db} can be treated as dry. The N₂O concentration v_{i,t,db} is measured under dry conditions.

Determination of the moisture content (C_{H₂O,t,db,n})

Based on the measurements performed during the 2nd crediting period, the moisture content of the gaseous stream (C_{H₂O,t,db,n}) of all plants is considered to be less than 0.05 kg H₂O/m³ dry gas and therefore the gas is considered to be dry. For the 3rd CP the same shall be confirmed by measuring the moisture content as part of the QAL2/AST measurement programme.

Calculation of Project emissions from the operation of the tertiary N₂O abatement facility (PE_{CO₂,tertiary,y})

This emission source only needs to be estimated, if a tertiary N₂O abatement facility is installed under the project activity, and if fossil fuels are used to operate the facility or re-heat the gas after the facility, which applies only to plants Hu-Chems II & III, where propane (supplied as LPG) is used as reducing agent in the tertiary N₂O abatement facilities (no fossil fuel is used in plant Hu-Chems IV). Thus, for plant Hu-Chems IV the value for PE_{CO₂,tertiary,y} is set to zero.

Determination of PE_{FC,j,y}

The CO₂ emissions from fossil fuel combustion in process j are calculated as below

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} * COEF_{i,y}$$

	$COEF_{t,y} = w_{c,i,y} * 44/12$ <p>Leakage</p> <p>According to applied methodology, any leakage emissions sources are deemed to be negligible, the leakage is considered as 0.</p> <p>Emission reductions</p> <p>Emission reductions are calculated as follows:</p> $ER_y = BE_y - PE_y$ <p>The estimated amount of GHG emission reductions of the project is 8,467,178 tCO₂e during the 3rd crediting period (7 years) from 22/01/2021 to 21/01/2028 (both days included), resulting in estimated average annual emission reductions of 1,209,597 tCO₂e.</p> <p>The ER calculation sheet has been duly checked. Further it has been checked whether the results have been correctly transferred to the updated PDD for determination of ex-ante ER. The validation team has further checked the updated PDD against the latest version of the applicable methodology incl. the referenced methodological tools for consistency. Special focus was laid on the changes against the previous crediting period.</p>	
Findings	<input type="checkbox"/>	The calculation of ERs is done as per the applied methodology (ACM0019 version 04.0). The calculation in the Excel spreadsheet and the corresponding calculation tables in the PDD have been checked and no mistakes have been identified. The estimation of emission reductions for the 3 rd crediting period is deemed plausible and conservative.
	<input checked="" type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <ul style="list-style-type: none"> - CAR1: The description of EF_{default,y}, "source of data" is incorrect, with regards to the final values. - CAR2: The parameter $h_{r,y}$ has not been correctly considered in the calculation of project emissions.
Conclusion	<input type="checkbox"/>	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	<input checked="" type="checkbox"/>	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	<p>All changes due to the upgraded methodology and the re-assessment of the baseline have been considered appropriately and are assessed to be in line with the CDM PS. The calculation in the ER spreadsheet and the corresponding calculation tables in the PDD have been checked and no mistakes have been identified. The calculation of emission reductions for the 3rd crediting period is plausible and conservative. Thus the applicable requirements in the "CDM project standard for project activities", and the valid version of the methodology are deemed to be met.</p>	

D.5. Validity of monitoring plan

Means of validation	The validation team has checked the monitoring plan of the updated PDD against the required changes due to the update of the baseline and other methodological changes. Further, changes due to editorial updates of the applicable templates have been checked.
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The monitoring plan in the PDD has been updated to comply with the latest applicable version of the monitoring methodology (ACM0019 version 04.0). The monitored parameters in the 3rd crediting period are summarized as following:

Parameter of Hu-Chems II	Description	Value (ex-ante)
$P_{\text{production},y,\text{II}}$	Nitric acid produced in year y	102,000 t HNO ₃
$h_{y,\text{II}}$	Number of hours of operation in year y	8,520 h
$h_{r,y,\text{II}}$	Number of hours (h) in year y where the abatement system is by-passed, underperforming or failed	63 h
$V_{t,\text{db},\text{II}}$	Volumetric flow of the gaseous stream in time interval t on a dry basis	46,300 m ³ dry gas/h
$V_{i,t,\text{db},\text{II}}$	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis	9.10×10^{-5} m ³ gas i/m ³ dry gas
$C_{\text{H}_2\text{O},t,\text{db},n,\text{II}}$	Moisture content of the gaseous stream at normal conditions, in time interval t	9.667 g H ₂ O/m ³ dry gas (estimation based on latest measurements performed during CP2)
$FC_{i,j,y,\text{II}}$	Quantity of fuel type i combusted in process j during the year y	380 t/y
$w_{c,i,y,\text{II}}$	Weighted average mass fraction of carbon in fuel type i in year y	0.82 tC/mass unit of the fuel
Parameter of Hu-Chems III	Description	Value (ex-ante)
$P_{\text{production},y,\text{III}}$	Nitric acid produced in year y	99,000 t HNO ₃
$h_{y,\text{III}}$	Number of hours of operation in year y	8,376 h
$h_{r,y,\text{III}}$	Number of hours (h) in year y where the abatement system is by-passed, underperforming or failed	88 h
$V_{t,\text{db},\text{III}}$	Volumetric flow of the gaseous stream in time interval t on a dry basis	46,500 m ³ dry gas/h
$V_{i,t,\text{db},\text{III}}$	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis	9.60×10^{-5} m ³ gas i/m ³ dry gas
$C_{\text{H}_2\text{O},t,\text{db},n,\text{III}}$	Moisture content of the gaseous stream at normal conditions, in time interval t	9.0 g H ₂ O/m ³ dry gas (estimation based on latest measurements performed during CP2)
$FC_{i,j,y,\text{III}}$	Quantity of fuel type i combusted in process j during the year y	380 t/y
$w_{c,i,y,\text{III}}$	Weighted average mass fraction of carbon in fuel type i in year y	0.82 tC/mass unit of the fuel
Parameter of Hu-Chems IV	Description	Value (ex-ante)
$P_{\text{production},y,\text{IV}}$	Nitric acid produced in year y	410,000 t HNO ₃
$h_{y,\text{IV}}$	Number of hours of operation in year y	8,376 h
$h_{r,y,\text{IV}}$	Number of hours (h) in year y where the abatement system is by-passed, underperforming or failed	3 h
$V_{t,\text{db},\text{IV}}$	Volumetric flow of the gaseous	180,000 m ³ dry gas/h

		stream in time interval t on a dry basis	
	$V_{i,t,db,IV}$	Volumetric fraction of greenhouse gas i in a time interval t on a dry basis	$6.35 \cdot 10^{-5} \text{ m}^3 \text{ gas i/m}^3 \text{ dry gas}$
	$C_{H_2O,t,db,n,IV}$	Moisture content of the gaseous stream at normal conditions, in time interval t	$7.333 \text{ g H}_2\text{O/m}^3 \text{ dry gas}$ (estimation based on latest measurements performed during CP2)
	<p>QA/QC procedure</p> <p>Authorities and responsibilities regarding monitoring plan have been described in section B.7.3 of the updated PDD.</p> <p>Calibration will be carried out periodically according to national standards and rules. All records should be documented by the project owner.</p> <p>Data collection:</p> <p>The analogue signals are continuously transmitted to I/O cards (analogue input/output cards) and further collected by the Delta V Processor, which automatically generates aggregated daily reports (in form of excel sheets) based on the stored raw data from the continuous historian server.</p> <p>All relevant data records will be kept by the project owner during the crediting period and two years after DOE's verification.</p> <p>Data management and quality control measures have been confirmed with PP through interviews.</p> <p>The validation team has concluded that</p> <ul style="list-style-type: none"> - all necessary changes have been appropriately reflected in the updated PDD, - the monitoring plan in the PDD is in compliance with the applied monitoring methodology, - the monitoring arrangements described in the PDD can be implemented and are feasible within the project design. <p>The installation and operation of the monitoring devices/instruments, including its location and accuracy have been checked.</p>		
Findings	<input type="checkbox"/>	<p>The validation team has duly assessed all required changes due to the upgraded methodological requirements and the re-assessment of the monitoring plan. The validation team has concluded that</p> <ul style="list-style-type: none"> - all necessary changes have been appropriately reflected in the updated PDD, - the monitoring plan in the updated PDD is in compliance with the applied monitoring methodology, - the monitoring arrangements described in the updated PDD can be implemented and are feasible within the project design. 	
	<input checked="" type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <p>CL1: The version of applied European Norm (EN 14181) should be updated.</p>	
Conclusion	<input type="checkbox"/>	<p>No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.</p>	
	<input checked="" type="checkbox"/>	<p>The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.</p> <p>All necessary changes have been appropriately reflected in the updated PDD, the monitoring plan in the updated PDD is in compliance with the applied monitoring methodology, and the monitoring arrangements described in the updated PDD can be implemented and are feasible within the project design.</p>	

D.6. Crediting period

Means of validation	<p>The validation team has checked the project history and the data of both previous crediting periods.</p> <p>The project has been registered on 22/01/2007 under the UNFCCC registration No. 0765. The PPs have chosen a renewable crediting period where the first crediting period has started on 22/01/2007 and expired on 21/01/2014, the second crediting period has started on 22/01/2014 and expires on 21/01/2021.</p> <p>The following sources of information have been used in this context:</p> <ul style="list-style-type: none"> • /PDD/ • /unfccc/ 	
Findings	<input checked="" type="checkbox"/>	<p>As the respective requirements are met, the project's 3rd crediting period may start immediately after the expiration of the 2nd crediting period, given that all other applicable criteria are met.</p>
		<p>It is further confirmed that the start date (22/01/2021) and the length of the 3rd crediting period (7 years) are in compliance with the project standard.</p> <p>However, as the 3rd crediting period starts after the end of the 2nd commitment period of the Kyoto Protocol additional guidance from CMP is required to calculate and process CERs at issuance stage.</p>
	<input checked="" type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p> <p>FAR 1: Currently, guidance from CMP is not available on especially 2 issues for calculation and processing of CERs post 2020:</p> <ul style="list-style-type: none"> a) Applicable Global Warming Potential for N₂O b) Technical modalities of CER issuance (e.g. serial numbers) <p>At issuance stage it has to be ensured that corresponding CMP guidance and related EB decisions are available and duly considered.</p>
Conclusion	<input checked="" type="checkbox"/>	<p>No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.</p>
	<input type="checkbox"/>	<p>The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.</p>
	<p>It is thus confirmed that the start date and the length of the 3rd crediting period (7 years) are in compliance with the project standard.</p> <p>However, a FAR has been raised on issues for which CMP guidance is currently pending. This FAR shall be addressed at issuance stage.</p>	

D.7. Project participants

Means of validation	<p>The validation team has checked the revised PDD/^{/PDD/} and the UNFCCC website/^{/unfccc/} especially the latest version of the Modalities of Communication/^{/MOC/} to check whether the listed project participants have duly been authorized and if communication requirements are met.</p>	
Findings	<input checked="" type="checkbox"/>	<p>The names of the project participants as listed in the revised PDD (sections A.4. and appendix 1) are consistent with those listed on the dedicated UNFCCC project website as well as in the last version of the modalities of communication/^{/MOC/}.</p>
	<input type="checkbox"/>	<p>The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:</p>
	-	
Conclusion	<input checked="" type="checkbox"/>	<p>No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.</p>
	<input type="checkbox"/>	<p>The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.</p>
	<p>The names of the project participants are consistent with those listed on the dedicated UNFCCC project website as well as in the last version of the modalities of</p>	

communication^{MOC/}.**D.8. Post-registration changes**

Type of post-registration changes (PRCs)	Confirmation (Y/N)	Validation report for PRCs	
		Version	Completion date
Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents	N	-	-
Corrections	Y	01.0	20/12/2017
Change to the start date of the crediting period	N ¹	-	-
Inclusion of a monitoring plan	N	-	-
Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents	N	-	-
Changes to the project design	N	-	-
Changes specific to afforestation and reforestation project activities	N	-	-

SECTION E. Internal quality control

Before the submission of the final RCP Validation report a technical review of the whole validation procedure was carried out. The technical reviewers are competent GHG auditors being appointed for the scope this project falls under. The technical reviewers are not considered to be part of the validation team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the validation opinion and the topic specific assessments as prepared by the validation team leader may have been confirmed or revised. Furthermore reporting improvements might have been achieved.

After the successful technical review an overall (especially procedural) assessment of the complete validation has been carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the submission for requesting the renewal of crediting period is conducted.

SECTION F. Validation opinion

Carbon Climate Protection GmbH has commissioned the TÜV NORD JI/CDM Certification Program to carry out validation of the request for renewal of crediting period (RCP) for the project: "Catalytic N₂O destruction project in the tail gas of three Nitric Acid Plants at Hu-Chems Fine Chemical Corp." the validation is based on the relevant UNFCCC requirements.

The review of the updated project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews have provided TÜV NORD JI/CDM Certification Program with sufficient evidence to validate the fulfilment of the stated criteria applicable for RCP.

In details, the conclusions can be summarized as follows:

- The current baseline of the project is in line with the national and/or sectoral policies and circumstances at the time of requesting renewal of crediting period.
- The monitoring plan is transparent and adequate and in line with the applicable monitoring methodology (ACM0019 ver. 04.0).

¹ Already before the first monitoring period, the starting date of the first crediting period has been changed. Additionally, a revision of the monitoring plan has been requested in November 2009 and has been approved by the CDM EB. No other post registration changes have been applied.

- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of **8,467,178 tCO₂e** are most likely to be achieved within the 3rd renewable crediting period of 7 years.

The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all currently applicable criteria for the renewal of the crediting period

However, as guidance from CMP on application of GWP and processing of CERs for post 2020 issuances is currently pending, a respective FAR has been raised. This FAR has to be appropriately addressed at issuance stage before CERs from the 3rd CP can be issued.

Essen, 20/01/2021




Rainer Winter
TÜV NORD JI/CDM Certification Program
Validation Team Leader

Appendix 1. Abbreviations

Abbreviations	Full texts
BAU	Business as usual
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
CP	Certification Program // Crediting Period
DNA	Designated National Authority
EB	CDM Executive Board
ER	Emission Reductions
ETS	Emission Trading Scheme
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LOA	Letter of Approval
MOC	Modalities of Communication
PA	Project Activity
PCP	CDM Project Cycle Procedure
PDD	Project Design Document
PP	Project Participant
PRC	Post-registration changes
PS	CDM Project Standard
QC/QA	Quality control/Quality assurance
RCP	Renewal of Crediting Period
UNFCCC	United Nations Framework Convention on Climate Change
VVS	CDM Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD J/CDM Certification Program

Mr. Rainer Winter


SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification)	2022-07-01
J1	Senior Assessor	2022-07-01
VCS / ISO 14064-2	Senior Assessor	2022-07-01

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal Energy Generation
1.2	Renewables
4.1	Cement and lime production
4.2	Paper
5.1	Chemical Industry
5.2	Caprolactam, nitric and adipic acid
8.1	Mining/mineral production
9.1	Aluminium and magnesium production
9.2	Iron, steel and Ferro-alloy production
11.1	Emissions of fluorinated gases
11.2	Refrigerant gas production
12.1	Chemical industry
13.1	Solid waste and wastewater

003 - Rev. 11, Date: 2019-08-09

900_301 VAB00-F20_2019-08-09_rev11 900 VAB00-F20 rev1 / 2019-10-20



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD J/CDM Certification Program

Mr. Stefan Winter


SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2020-07-27
VCS	Senior Assessor (Validation, Verification) Technical Reviewer	2020-07-27

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal energy generation
1.2	Renewables
2.1	Energy distribution
3.1	Energy demand
4.1	Cement and lime production
4.2	Paper
5.2	Caprolactam, nitric and adipic acid
9.1	Aluminium and magnesium production
9.2	Iron, steel and Ferro-alloy production
13.1	Solid waste and wastewater
13.2	Manure

163 - Rev. 5, Date: 2017-07-20

900_301 VAB00-F20_2017-07-20_rev5 900 VAB00-F20 rev5 / 2019-10-20



Statement of Competence
Appointment and authorization according to the procedures
of the TÜV NORD J/CDM Certification Program

Ms. Christina Stöhr

SCHEME	STATUS	VALID UNTIL
CDM	Assessor (Validation, Verification) Technical Reviewer	2020-05-05
VCS / ISO 14064-2	Assessor Technical Reviewer	2020-05-05

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal energy generation
1.2	Renewables
13.1	Solid waste and wastewater

200 - Rev. 5 Date: 2019-05-05

300_301 VAB00-F20_2019-05-05_rev 5 Date 300 VAB00-F20 rev3 / 2019-10-20

Appendix 3. Documents reviewed or referenced

No.	Author	Reference	Title	References to the document	Provider
1	PP	/CDC/	-Confirmation of Design Capacity of plants #2 and #3 from manufacturer Uhde dated 2006-07-20 -Confirmation of Design Capacity of plants #4 from manufacturer Uhde dated 2006-07-20	-	PP
2	Korean DNA	/HCA/	Letter of Approval from Republic of Korea for CARBON CDM KOREA Ltd. and Hu-Chems Fine Chemical Corp.	https://cdm.unfccc.int/filestore/S/1/L/S1LAWF49IOG8XD76EYRHP0MB3UC2Z5/Untitled%20%28uploaded%2016%20May%2014%2015%3A09%3A14%29.pdf?t=c2t8cTYwMG9lFDDTycKw130D4BkQiqD5U5uM	UNFCCC Website
3	Korea environmental ministry	/CACA/	Korean Clean Air Conservation Act	http://www.law.go.kr/	PP
4	Korea DNA	/TMS/	Legislation about Assignment and Trading of GHG Emission	-	PP
5	PP	/MI/	List of monitoring instruments	-	PP
6	German DNA	/LOA-1/	Letter of approval from Germany for RWE Power AG, dated 2006-12-19	https://cdm.unfccc.int/UserManagement/FileStorage/E9KB42YADU3S57AVWQOEAHMILXW	UNFCCC Website
7	Austria DNA	/LOA-2/	Letter of approval from Austria for Climate Protection GmbH, dated 2013-11-06	https://cdm.unfccc.int/UserManagement/FileStorage/PXECOQUMSV4IDT68LNRHA59F12WY0Z	UNFCCC Website
8	PP	/MOC/	Modalities of Communication	https://cdm.unfccc.int/Projects/DB/TUEV-SUED1163081212.47/view?cp=1	UNFCCC Website
9	PP	/PDD/	RCP Project Design document "Catalytic N2O destruction project in the tail gas of three Nitric Acid Plants at Hu-Chems Fine Chemical Corp." Version No. 05.0 dated 04/10/2019 No. 05.1, dated 06/04/2020	-	PP
10	PP	/PDD-R/	Latest Approved Project Design Document named "Catalytic N2O destruction project in the tail gas of three Nitric Acid Plants at Hu-Chems Fine Chemical Corp." (Version No.4.2, dated 18/12/2018)	https://cdm.unfccc.int/UserManagement/FileStorage/1Y7XBQVPKUDEC9OT564G3WL820IZH	UNFCCC Website
11	PP	/XLS/	RCP Emission reduction calculation spreadsheet – 3 rd Crediting Period Version Versions 1.0 and 2.0	-	PP

No.	Author	Reference	Title	References to the document	Provider
12	UNFCCC	/ACM0019/	ACM0019 ver.04.0- N ₂ O abatement from nitric acid production	https://cdm.unfccc.int/methodologies/DB/HKCO7RKOQO748WNXJNDEW3BJT9XN8L	UNFCCC
13	UNFCCC	/TOOL3/	TOOL03:Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion (version 03.0)	https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf	UNFCCC Website
14	UNFCCC	/TOOL8/	TOOL08:Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version 03.0)	https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v3.0.pdf	UNFCCC Website
15	UNFCCC	/MAIL1/	Confirmation mail/letter by the UNFCCC in response to /MAIL1/ dt. 2013-04-29	-	PP
16	PP	/PID/	Piping and Instrumentation Diagrams for plants II, III, IV	-	PP
17	Uhde	/RDS/	Reference list from DeNOx manufacturer Uhde (TKIS) for DeNOx systems installed at different Nitric Acid Plants	-	PP
18	Uhde	/RES/	Reference list from EnviNOx [®] manufacturer Uhde (TKIS) for DeNOx systems installed at different Nitric Acid Plants	-	PP
19	PP	/SF/	Evidence for expenditure for the Social Fund	-	PP
20	TÜV NORD	/CPM/	TÜV NORD JI / CDM Certification Program Manual (incl. procedures and forms)	-	TÜV NORD
21	EB	/EBMR/	EB meeting reports of - 100 th meeting - 105 th meeting	https://cdm.unfccc.int/EB/index.html	UNFCCC
22	IPCC	/IPCC/	<ul style="list-style-type: none"> IPCC Good Practice Guidance & Uncertainty Management in National Greenhouse Gas Inventories, 2000 Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual 	www.ipcc.ch	IPCC Website
23	UNFCCC	/KP/	Kyoto Protocol (1997)	-	UNFCCC
24	PP	/LOG/	Operation logs of project	-	PP
25	UNFCCC	/MA/	Decision 3/CMP. 1 (Marrakesh – Accords & Annex to decision (17/CP.7))	-	UNFCCC
26	UNFCCC	/PCP/	CDM project cycle procedure for project activities, version 02.0	https://cdm.unfccc.int/filestore/e/x/t/extfile-20181221092024741-PC_proc03v02.pdf/PC_pro	UNFCCC

No.	Author	Reference	Title	References to the document	Provider
				c03v02.pdf?t=bFV8cThpZDRsfDCrFNZ6bMnQHlv89eS8ZnoN	
27	UNFCCC	/PDD-T/	Project Design Document Form (CDM-PDD-FORM) – Version 11.0 including Attachment: Instructions for filling out the project design document form for CDM project activities	https://cdm.unfccc.int/filestore/e/x/t/extfile-20190531085438892-PDD_form05v11.pdf/PDD_form05v11.pdf?t=SEt8cThpZDY2fDAsa8i2KwKZb-YnluzgZpa8	UNFCCC
28	UNFCCC	/PS/	CDM project standard for project activities, version 02.0	https://cdm.unfccc.int/filestore/e/x/t/extfile-20181221092046529-Reg_stan04v02.pdf/Reg_stan04v02.pdf?t=TXp8cThpZDd2fDBeMwmJWjUEWeGte6GXj0BK	UNFCCC
29	TUV NORD	/VAL/	Validation Report for CDM project “CATALYTIC N2O DESTRUCTION PROJECT IN THE TAIL GAS OF THREE NITRIC ACID PLANTS AT HU-CHEMS FINE CHEMICAL CORP dated 07/11/2013	https://cdm.unfccc.int/UserManagement/FileStorage/X0Q693RP72HAMZWDL8IYGSB15JEFCCK	UNFCCC
30	TUV NORD	/PRC/	Validation opinion on post-registration change	https://cdm.unfccc.int/UserManagement/FileStorage/91KYEQN5I8SX2OHGUB30RJZC67D4VF	UNFCCC
31	DOEs	/VER/	Periodic verification reports and Monitoring reports	https://cdm.unfccc.int/Projects/DB/TUEV-SUED1163081212.47/view	UNFCCC
32	UNFCCC	/VVS/	CDM Validation and Verification Standard for project activities, version 02.0	https://cdm.unfccc.int/sunsets/cms/storage/contents/store-d-file-20181221092105818/Reg_stan06v02.pdf	UNFCCC
33	UNFCCC	/unfccc/	UNFCCC	https://cdm.unfccc.int	UNFCCC
34	UNFCCC	/TOOL11/	Methodological tool “Assessment of the validity of the original / current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1)	https://cdm.unfccc.int/Reference/tools/index.html	UNFCCC
35	IPPC	/BREF/	IPPC BREF Document “Large Volume Inorganic Chemicals - Ammonia, Acids and Fertilisers” (August 2007)	https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/lvic_aaf.pdf	IPPC
36	DOE	/PHO/	On-site photos	-	DOE
37	Local authority	/CC/	Calibration Certificates	-	PP
32	PP	/RAA/	Filled CDM-RAA-FORM dated 14/01/2021	-	PP

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. CL from this validation

CL ID	1	Section no.	D.5	Date: 27/11/2019
Description of CL				
The version of applied European Norm (EN 14181) should be updated.				
Project participant response				Date: 16/12/2019
<i>The PP has updated the respective section in the revised PDD (version 05.1) which now refers to the latest version of the EN14181.</i>				
Documentation provided by project participant				
<input checked="" type="checkbox"/> Changes in the PDD		Section(s):		New version No.: 05.1
<input type="checkbox"/> Changes in XLS		Worksheet(s):		New version No.:
<input type="checkbox"/> Other:				
DOE assessment				Date: 23/12/2019
The PDD 05.1 refers to the latest version of EN 14181 now.				
Conclusion <i>Tick the appropriate checkbox</i>		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed		

CL ID	2	Section no.	D.2	Date: 27/11/2019
Description of CL				
A clarification should be provided that the project is further exempted from the Korean Emission Trading Scheme.				
Project participant response				Date: 18/12/2019
<p>The PPs checked once again the regulations of the host country and came up with the following:</p> <ol style="list-style-type: none"> Article 42 (5) of the <i>Framework Act on Low Carbon, Green Growth</i> requires the Korean government to establish and manage GHG targets for industrial facilities. In this respect, the Ministry of Knowledge & Economy confirmed in an official letter to HUCHEMS that facilities with a CDM project are excluded. The <i>Enforcement Decree of the Act on the Allocation and Trading of GHG Emission Permits</i> provides the general regulation for the Korean Emission Trading Scheme (ETS) relevant for all ETS phases. Article 38 (3) of this enforcement decree states that the Minister of Environment shall consider GHG reductions achieved through a CDM project. With respect to CDM project #0765, the Minister of Environment performed a feasibility assessment and with the official letter from March 17th, 2016 it was approved that the CDM project #0765 satisfies the standards and is therefore excluded from the Korean ETS. Furthermore, according to Article 2 of the <i>Enforcement Decree of the Act on the Allocation and Trading of GHG Emission Permits</i> the Minister of Strategy and Finance and the Minister of Environment are jointly requested to establish a master plan for each phase of the Korean ETS. The latest available master plan was issued for the 2nd phase, and it explicitly exempts facilities with a CDM project from the Korean ETS (exclusion from emission allocation calculation and from the target of emission submission). In addition, the <i>Clean Air Conservation Act</i> doesn't include a limit for N₂O. <p>Therefore, the PPs concluded that facilities with a CDM project are further exempted from the Korean ETS based on current legal situation.</p>				
Documentation provided by project participant				
<input checked="" type="checkbox"/> Changes in the PDD		Section(s):		New version No.: 05.1
<input type="checkbox"/> Changes in XLS		Worksheet(s):		New version No.:
<input type="checkbox"/> Other:				
DOE assessment				Date: 23/12/2019
The validation team has checked the additional evidence and concludes that there are no indications that the exemption from the KETS would be limited in time.				
Conclusion <i>Tick the appropriate checkbox</i>		<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed		

Table 2. CAR from this validation

CAR ID	1	Section no.	D.4	Date: 27/11/2019
Description of CAR				
The description of $EF_{\text{default},y}$, "source of data" is incorrect, with regards to the final values.				
Project participant response				Date: 16/12/2019
The description of $EF_{\text{default},y}$ was updated and corrected in the PDD v. 05.1.				
Documentation provided by project participant				
<input checked="" type="checkbox"/> Changes in the PDD	Section(s):		New version No.: 05.1	
<input type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.:	
<input type="checkbox"/> Other:				
DOE assessment				Date: 23/12/2019
The required changes have been carried out in the PDD correctly.				
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed			

CAR ID	2	Section no.	D.4	Date: 27/11/2019
Description of CAR				
The parameter $h_{r,y}$ has not been correctly considered in the calculation of project emissions.				
Project participant response				Date: 16/12/2019
The calculation of the project emissions was revised in the Excel file and in the PDD v. 5.1 accordingly.				
Documentation provided by project participant				
<input checked="" type="checkbox"/> Changes in the PDD	Section(s):		New version No.: 05.1	
<input checked="" type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.: 2.0	
<input type="checkbox"/> Other:				
DOE assessment				Date: 23/12/2019
The required changes in the PDD and the ER calculation have been carried out correctly.				
Conclusion <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> Additional action should be taken (finding remains open) <input checked="" type="checkbox"/> The finding is closed			

Table 3 FARs from this validation

FAR ID	1	Section no.	-	Date: 20/01/2021
Description of FAR				
Currently, as for certain issues guidance from CMP is not available the PP is required to:				
(i) apply any GWP values that may be adopted by the CMP for the period from 1 January 2021 in its monitoring reports for any emission reductions achieved by the project activity in that period; and				
(ii) update its project design document in accordance with any requirements of the CMP guidance."				
Project participant response				Date: -
Documentation provided by project participant				
<input type="checkbox"/> Changes in the PDD	Section(s):		New version No.:	
<input type="checkbox"/> Changes in XLS	Worksheet(s):		New version No.:	
<input type="checkbox"/> Other:				
DOE assessment				Date: -
-				
Conclusion <i>Tick the appropriate checkbox</i>	<input checked="" type="checkbox"/> To be checked during the next periodic verification			

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none">• Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN) and version 02.0 of the “CDM project cycle procedure for project activities” (CDM-EB93-A06-PROC);• Make editorial improvements.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Renewal of crediting period Keywords: crediting period, project activities, validation report		