MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Catalytic N2O destruction project in the tail gas of the Nitric Acid Plant of Abu Qir Fertilizer Co.
Reference number of the project activity	0490
Version number of the monitoring report	Version 1
Completion date of the monitoring report	26/11/2012
Registration date of the project activity	07/10/2006
Monitoring period number and duration of this monitoring period	Monitoring period number: 25 Duration: 09/10/2012 – 25/11/2012
Project participant(s)	CARBON Egypt Ltd.; KOMMUNALKREDIT PUBLIC CONSULTING GmbH; Energie AG Oberösterreich; RWE Power AG;
Host Party(ies)	Arab Republic of Egypt
Sectoral scope(s) and applied methodology(ies)	Sectoral scope 5: Chemical industries Applied methodology: AM0028 Version 1 ("Catalytic N2O destruction in the tail gas of Nitric Acid Plants")
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	140,171 tCO_2e (48 days)
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	47,907 tCO_2e (48 days)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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(a) Carbon Egypt has implemented a project for GHG emission reduction by catalytic N_2O destruction in Abu Qir, Egypt. The project is categorized as large scale project under sectoral scope 5: "Chemical Industry". The Host Party for the project activity is the Republic of Egypt.
The Project Activity includes development, design, engineering, procurement, finance, construction, operation and maintenance of a system for catalytic reduction of N_2O. The EnviNOx® process used in the Abu Qir II nitric acid plant is based on the catalytic reduction of NO_x (NO and NO_2) with ammonia (NH_3) and of nitrous oxide (N_2O) with a hydrocarbon. The hydrocarbon used is natural gas of which the main constituent is methane (CH_4). The reactions take place over two iron zeolite catalyst beds.

(b) In this project, CARBON Egypt installed the EnviNOx® system for catalytic reduction of NOx and N_2O additionally to the equipment at the nitric acid manufacturing plant. The project activity reduces the GHG emissions, which would otherwise be released to the atmosphere, if the project was not implemented. The implementation of the N_2O destruction project at AFC involves that natural gas, a mixture of hydrocarbons of which the main constituent is methane (CH_4), is employed as a reducing agent for N_2O removal.

(c) The EnviNOx® system was installed in September 2006 and the catalytic reduction process of N_2O started its operation in October 2006.

(d) Total emission reductions achieved in this monitoring period: **47,907 tCO_2e**

A.2. Location of project activity

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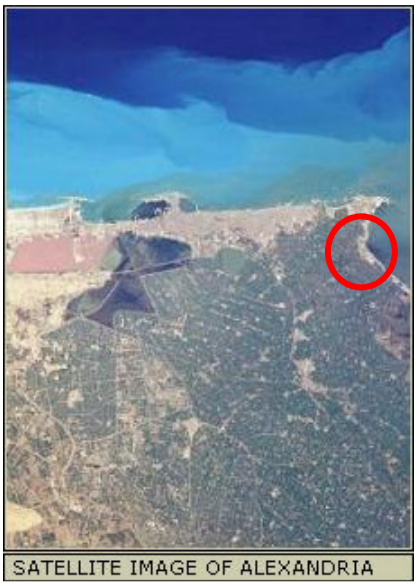
(a) Host Party(ies): Arab Republic of Egypt
(b) Province: AI-Iskandariyah Province (Alexandria Province)
(c) Town: Abu Qir
(d) GPS coordinates: N31.272513° E30.09755°

Figure 1: Satellite Image of Alexandria



SATELLITE IMAGE OF ALEXANDRIA

AFC, the largest fertilizer company in Egypt, is located about 15 km east of downtown Alexandria, in a rural area, approximately 5 km outside the small town of Abu Qir. Abu Qir is situated north-east of Alexandria, bordering the suburbs of Alexandria. AFC is located on the shores of the Mediterranean Sea. The company has road and rail access as well as a nearby ship loading terminal.

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Arab Republic of Egypt (Host)	CARBON Egypt Ltd.	No
Republic of Austria	KOMMUNALKREDIT PUBLIC CONSULTING GmbH Energie AG Oberösterreich	No
Federal Republic Germany	RWE Power AG	No

Project applicant, developer and sponsor is **CARBON Egypt Ltd.** (furthermore called "CARBON"). CARBON Egypt Ltd. is registered under the laws of the Arab Republic of Egypt. The company is a subsidiary of CARBON Projektentwicklung GmbH, Austria and RWE Power AG.
CARBON Projektentwicklung GmbH was founded as a limited liability company located and registered in Austria under Austrian law in order to develop, finance and operate high quality JI/CDM Projects. CARBON Projektentwicklung GmbH has vast experience with CDM-Project development in Africa, Latin America and Asia and is specialized on the catalytic N_2O destruction in the tail gas of nitric acid plants.

Kommunalkredit Public Consulting GmbH (KPC) was appointed for the Programme Management on behalf of the Austrian Ministry of Agriculture and Forestry, Environment & Water Management. The Programme is operational since August 2003.

Energie AG Oberösterreich (Energie AG) is the leading infrastructure group in the region of Upper Austria. Energie AG with its subsidiary companies works in the fields of energy, water and disposal, both in Austria and abroad.

The RWE Group is one of Europe's leading integrated electricity and gas companies. **RWE Power AG** is the continental power generation company within the RWE Group and Germany's biggest power producer. RWE Power has a diverse generation portfolio including lignite, hard coal, nuclear energy, gas and renewable sources such as hydro, wind and biomass. RWE invests and participates actively in projects under the Clean Development Mechanism and Joint Implementation. The RWE team combines a track record in global commodities and emissions trading as well as risk management with broad experience and a deep understanding of specific risks inherent in CDM and JI projects.

Host Country is the Arab Republic of Egypt. The Arab Republic of Egypt ratified the Kyoto Protocol in January 2005. The other Party involved in the Project at the time of registration is the Republic of Austria. Subsequent to the registration of the Project, Federal Republic Germany has been added as a Party involved in the Project.

Focal point:
The project participants agreed that CARBON Projektentwicklung GmbH, Austria serves as focal point of communication with the Executive Board and the UNFCCC Secretariat.

A.4. Reference of applied methodology
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(a) AM0028 "Catalytic N2O destruction in the tail gas of Nitric Acid Plants" (Version 1)[1]
(b) The applied methodology refers to the "Tool for demonstration and assessment of additionality" in its latest version. The tool was used for demonstrating additionality and baseline scenario selection in the PDD, but has not been used after project registration. At the time of requesting registration for this project activity, version 02 (EB22, Annex 08) of the tool was in place.[2]

A.5. Crediting period of project activity

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Type of the crediting period:	Renewable
Starting date of the first crediting period:	15/09/2006
End date of the first crediting period:	14/09/2013
Length of the first crediting period:	7 years

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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(a) **Description of the installed technology, technical processes and equipments:**

The Project Activity includes development, design, engineering, procurement, finance, construction, operation and maintenance of a system for catalytic reduction of N_2O. The EnviNO_X® process used in the Abu Qir II nitric acid plant is based on the catalytic reduction of NO_x (NO and NO_2) with ammonia (NH_3) and of nitrous oxide (N_2O) with a hydrocarbon. The hydrocarbon used is natural gas of which the main constituent is methane (CH_4). The reactions take place over two iron zeolite catalyst beds.

General Introduction:

Nitrous oxide (N_2O) is an unwanted, invisible and previously neglected by-product of the manufacture of nitric acid. It is formed alongside the main, desired product nitric oxide (NO) during the catalytic oxidation of ammonia in air over noble metal gauzes. The production of nitric acid takes place in three main process steps as indicated by the following reactions:

1. Ammonia (NH_3) combustion to form nitric oxide (NO)[3]:

   $4\ NH_3 + 5\ O_2 \rightarrow 4\ NO + 6\ H_2O$ (main reaction 1)

   Simultaneously nitrous oxide (N_2O), nitrogen (N) and water (H_2O) are formed as well, in accordance with the following equations:

   $4\ NH_3 + 3\ O_2 \rightarrow 2\ N_2 + 6\ H_2O$ (side reaction 1)
   $4\ NH_3 + 4\ O_2 \rightarrow 2\ N_2O + 6\ H_2O$ (side reaction 2)

   NO yield mainly depends on pressure and temperature in the ammonia oxidation process and is usually in a range of 95% to 97%.

[1] http://cdm.unfccc.int/methodologies/DB/GYXZY5ONUHEKMD9MCWY52YTTKOWZ3P/view.html
[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf/history_view
[3] Ammonia is reacted with air on noble metal catalyst in the oxidation section of nitric acid plants. Nitric oxide and water are formed in this process according to the above mentioned main equation.

2. NO is oxidised to nitrogen dioxide (NO_2):

   $2\ NO + O_2 \rightarrow 2\ NO_2$ (main reaction 2)

3. (According to the technical process) Absorption of NO_2 in water to form nitric acid (HNO_3):

   $3\ NO_2 + H_2O \rightarrow 2\ HNO_3 + NO$ (main reaction 3)
   (NO is oxidised to NO_2 according to main reaction 2)

Description of catalytic reduction process:
Although the term catalytic reduction nowadays has a more general definition in terms of the transfer of electrons, the following definition is sufficient for present purposes: catalytic reduction of N_2O occurs when reactions take place between N_2O and other substances in contact with a catalyst, such that the oxygen is removed from the N_2O molecule and forms one or more compounds with other species. The substance or substances that react with N_2O to remove oxygen are termed reducing agent. A general reaction equation for the catalytic reduction of N_2O can be given as:

$$n\ N_2O + x\ RA \rightarrow n\ N_2 + y_1\ P(1)O_A + y_2\ P(2)O_B + ...+ z_1\ Q(1) + z_2\ Q(2) + ...$$

where RA is a molecule of the reducing agent, $P(1)O_A$, $P(2)O_B$ are the compound formed by reaction with the oxygen of the N_2O and Q(1), Q(2) represent further products of the oxidation reaction, n, x, y_1, y_2, z_1, z_2 are the appropriate stoichiometric coefficients.

Project Specific description:
Principles of the EnviNO_X® process
The reactions take place over two iron zeolite catalyst beds. The first bed contains an iron zeolite that is especially effective in catalysing the reduction of NO_x with ammonia according to such reactions as:

$$6\ NO_2 + 8\ NH_3 \rightarrow 7\ N_2 + 12\ H_2O$$
$$6\ NO + 4\ NH_3 \rightarrow 5\ N_2 + 6\ H_2O$$
$$NO + NO_2 + 2\ NH_3 \rightarrow 2\ N_2 + 3\ H_2O$$
$$4\ NO + O_2 + 4\ NH_3 \rightarrow 4\ N_2 + 6\ H_2O$$

Effectively all the NO_x is removed. Furthermore some destruction of N_2O occurs.

Equations showing reduction N_2O with methane:
The second and main bed contains an iron zeolite that is particularly efficient in catalysing the reduction of nitrous oxide with methane.

$$CH_4 + 3\ N_2O \rightarrow CO + 2\ H_2O + 3\ N_2$$
$$CH_4 + 4\ N_2O \rightarrow CO_2 + 2\ H_2O + 4\ N_2$$

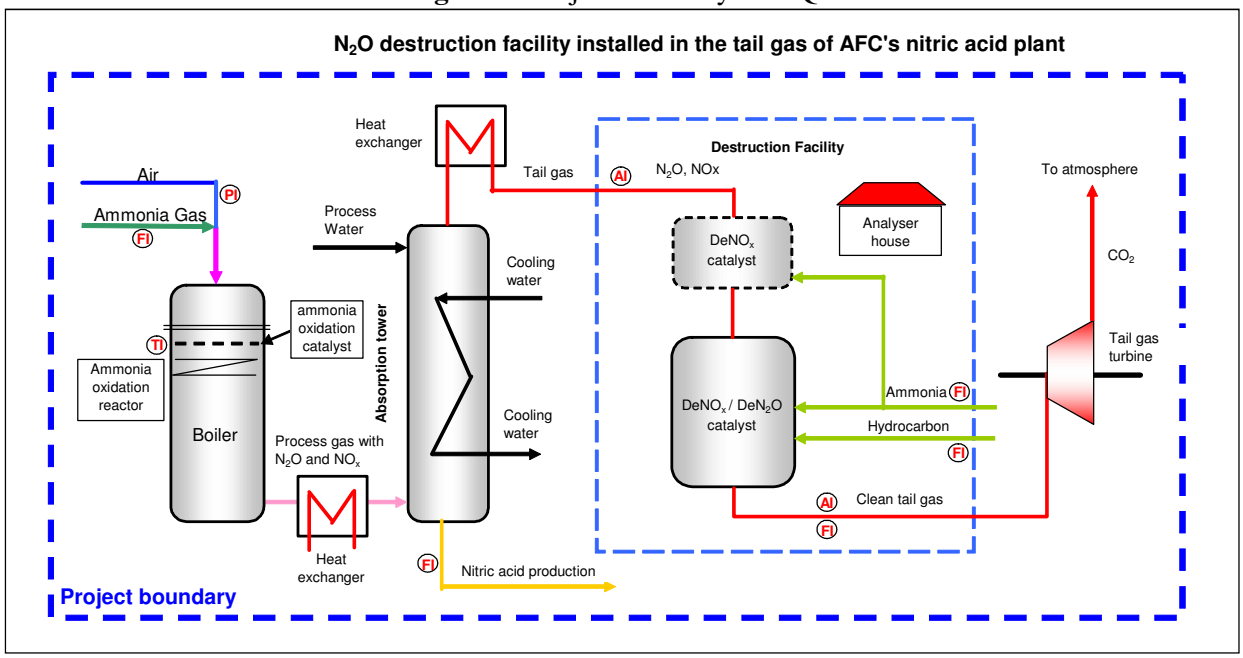
Technology employed by the project activity:
In this project, CARBON Egypt installed the EnviNO_X® system for catalytic reduction of NO_x and N_2O additionally to the equipment at the nitric acid manufacturing plant. The project activity reduces the GHG emissions, which would otherwise be released to the atmosphere, if the project was not implemented. The implementation of the N_2O destruction project at AFC involves that natural gas, a mixture of hydrocarbons of which the main constituent is methane (CH_4), is employed as a reducing agent for N_2O removal.

Location of the project activity:
The EnviNO_X® system was installed at the nitric acid plant on site of Abu Qir Fertilizer Co. S.A.E., furthermore called “AFC”.

Location of the EnviNO$_X$®-System:
The EnviNO$_X$®-Reactor (21R004) is located between tail gas heater IV (21E013) and the tail gas turbine (21MT02) which is the position with the highest tail gas temperature in the nitric acid production process at AFC.

The following figure shows the spatial extend of the project boundary.

Figure 2: Project boundary Abu Qir II



At Abu Qir II nitric acid plant, the EnviNO$_X$®-Systems is installed between the tail gas heaters and the tail gas turbine. The DeNO$_x$-unit was removed.

(b) **Information on the implementation of the project activity:**

The project has been fully implemented and is operated as per the registered PDD with all physical features (technology, project equipment, and monitoring and metering equipment) in place, monitoring is done according to the applied methodology (AM0028v1) and the registered monitoring plan.
The EnviNOx® system was installed in September 2006 and the catalytic reduction process of N_2O started its operation in October 2006.

(c) **Information on the actual operation of the project activity:**

During the monitoring period under consideration several observations have been made. Those events have been analyzed in detail as described hereunder.

Observations at Nitric Acid plant

Table 1: Shutdown periods of Nitric Acid plant

Start		End		Description
Date	Time	Date	Time	
08/10/2012*)	02:00	05/11/2012	20:30	Leakage in the Ammonia Oxidation Reactor

Under the condition of nitric acid plant shutdown, relevant hours of nitric acid plant (and consequently EnviNOx) shutdown periods have not been considered in overall calculations of Emission Reductions. For the respective hours no Emissions Reductions will be claimed. This approach ensures the most conservative way to determine Emissions Reductions, concrete resulting in zero Emissions Reductions for respective hours of nitric acid plant shutdown.

*) The nitric acid plant was in shutdown at the beginning of the Monitoring Period.

Observations at EnviNOx® system

Table 2: Observations at EnviNO_X® system

Start		End		Description
Date	Time	Date	Time	
12/11/2012	10:00	14/11/2012	15:00	Quarterly Inspection Check by EMERSON Germany

Preventive Maintenance (Quarterly Inspection Check) at analysers (12/11/2012 – 14/11/2012)
The calibration/maintenance activities (quarterly Inspection Visit) were carried out on-site by EMERSON Germany and had included (but not limited to) check and clean the filter, check the pressure regulator, check the sample handling system, check the solenoid valve, check the analyzer with internal diagnostic menus, leak test at sample system, clean sample lines with distilled water and manual calibration of the analyzer.
The phase of analyzer out of operation for maintenance lasted for a number of hours during preventive maintenance days. On 15/11/2012 Emerson checked the analyzer system as a whole without any analyzer out of operation hours.

The service reports issued by EMERSON Germany are submitted for verification.

Evidence on destruction facility operational at normal efficiency

The following applied approach is fully in compliance with AM0028 vers1 and the registered Monitoring Plan for the project activity.
The destruction facility itself was operational at normal efficiency for:
12/11/2012 to 14/11/2012,
due to following conditions:

a) Nitric Acid plant was in normal operation for the relevant periods. This was demonstrated by the following parameters:
   i. AOR temperature: → no relevant variations
   ii. AOR pressure: → no relevant variations
   iii. Ammonia Input: → no relevant variations
   iv. Nitric acid production: → no relevant variations

b) The EnviNOx® system was in normal operation for the relevant periods and achieves normal efficiency. This was demonstrated and documented by the following parameters:
   i. No significant variations in the EnviNO$_X$® parameters (a) tail gas flow rate, (b) N_2O concentration, (c) NO_X concentration.
   ii. Ammonia input required for NO_X reduction: The EnviNO$_X$® system was supplied with the required amount of ammonia for the whole period.
   iii. Natural gas input required for high efficient N_2O reduction: The EnviNO$_X$® system was supplied with the required amount of natural gas for high efficient N_2O emission reductions for the whole period.
   iv. Temperature increase over the EnviNO$_X$® reactor: As the N_2O reduction taking place in the EnviNO$_X$® reactor is exothermic and causes a temperature rise, this temperature increase over the EnviNO$_X$® reactor provided evidence that the reactions have taken place and the EnviNO$_X$® system has reached normal performance.

c) Correlation Check: Based on the documents described above it was clearly demonstrated by correlation to the missing parameter that the nitric acid plant and the EnviNO$_X$® system have been operated under normal conditions and have reached normal efficiency. The applied approach is fully in compliance with AM0028 vers1 and the registered Monitoring Plan for the project activity.
Supporting documents and numerous additional clarifying tables and charts to underline above mentioned demonstrations were prepared and submitted for verification.

d) In order to ensure a conservative determination of emission reductions for these days recalculation is based on correlation and minimum historical efficiency of the EnviNO$_X$® system and guarantees a conservative determination of project emissions (underestimation of emission reductions).

e) The check of operating parameters before and after analyser down time compared with values prior and after the analyser was out of operation or out for maintenance clearly showed that those values are within the same range.

Corrected details sheet including above mentioned recalculations were prepared and submitted for verification.
Note: The efficiency of the EnviNO$_X$® system has reached again the "normal" level of about 99.4% after the maintenance activities performed by ENTRAG (identical performance as prior to the check). This provides evidence that the EnviNO$_X$® system was working at "normal" efficiency during the period of maintenance activities, as the EnviNO$_X$® system is characterized by the stability of the catalyst performance. The manufacturer confirmed that after initial activation of the catalyst any change – if it takes place – occurs slowly and monotonically.
A supporting document by the manufacturer is submitted for verification.

Calibration and Maintenance
All measuring and analytical instruments are being calibrated as defined in the approved CDM Project Design Document: "Catalytic N_2O destruction project in the tail gas of the Nitric Acid Plant of Abu Qir Fertilizers Co.", version 2 (b), 20 June 2006. The plant operator AFC has a Quality Management System (ISO 9001:2008) where maintenance methods are incorporated. All relevant instruments like project relevant AOR instruments and EnviNO_X® instruments have been calibrated accordingly.

As Carbon Egypt works on improvements in terms of reliability, availability and maintainability of the EnviNO_X® system together with its technology and service providers continuously, a general check of the systems was ordered and finally performed during the scheduled shutdown of the Abu Qir Nitric Acid plant (21/04/2012 – 25/04/2012).
The maintenance activities included inter alia a comprehensive check of the analyser system by EMERSON Germany and the exchange of the field instruments of the EnviNO_X® system also carried out by EMERSON Germany.
Furthermore, EMERSON Process Management Germany has installed new server and computer which enhance the system reliability and redundancy.
In addition to that, EMERSON Germany and ENTRAG performed a loop test for the entire EnviNO_X® field instruments on 26/04/2012 and 31/10/2012 respectively.

Table 3: Health and Inspection visits during the Monitoring Period

Date	Action	Service provider
October 2012	Monthly health check, system diagnostic	ENTRAG
November 2012	Quarterly Inspection visit	EMERSON Germany

(d) **Events or situations with impact on the applicability of the methodology:** No such events or situations occurred during the covered monitoring period.

B.2. Post registration changes
B.2.1. Temporary deviations from registered monitoring plan or applied methodology
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No temporary deviations from the registered monitoring plan or the applied methodology have been applied during this monitoring period.

B.2.2. Corrections
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No corrections have been applied during this monitoring period, neither to any previous monitoring periods.

B.2.3. Permanent changes from registered monitoring plan or applied methodology
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No permanent changes from the registered monitoring plan or applied methodology have been applied during this monitoring period, neither to any previous monitoring periods.

B.2.4. Changes to project design of registered project activity

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No changes to project design of the registered project activity have been applied during this monitoring period, neither to any previous monitoring periods.

B.2.5. Changes to start date of crediting period

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No changes to the start date of the crediting period have been applied during this monitoring period, neither to any previous monitoring periods.

B.2.6. Types of changes specific to afforestation or reforestation project activity

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Not applicable.

SECTION C. Description of monitoring system

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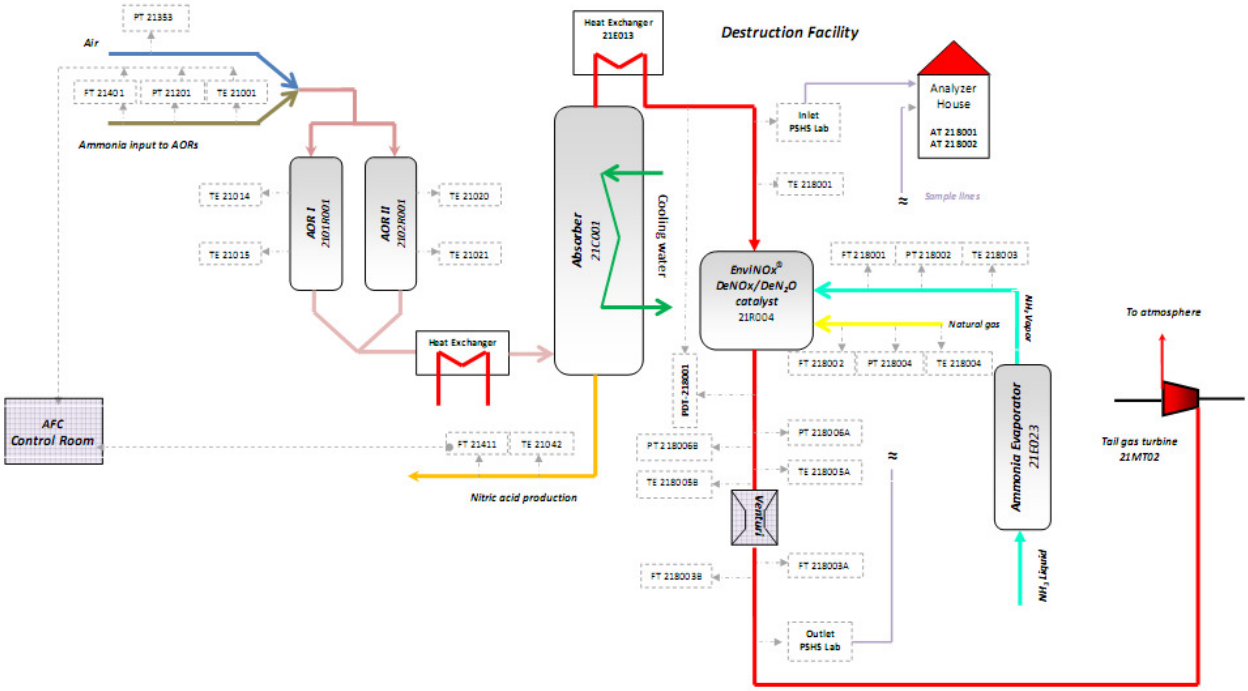
1. Information Flow / Data collection procedures:

The instruments transmitters continuously provide a 4 – 20 mA analogue signal according to range and units configured. These signals are transmitted to I/O cards (analogue input/output cards) and collected by the Delta V Processor. Resulting digital values are made available in the network to be further processed (e.g. in controller blocks, calculation of other variables) and are stored as 10 seconds raw data in the protected continuous historian server (CHS).

Modifications of the Delta V, which are protected by security levels by the supplier, are tracked by a Version Control Tool.

Figure 3: Line diagram showing all relevant monitoring points



The reporting module of the Delta V system automatically generates aggregated daily reports based on the stored raw data from the continuous historian server. Daily reports contain following kinds of data relevant for calculation of claimed emission reductions:

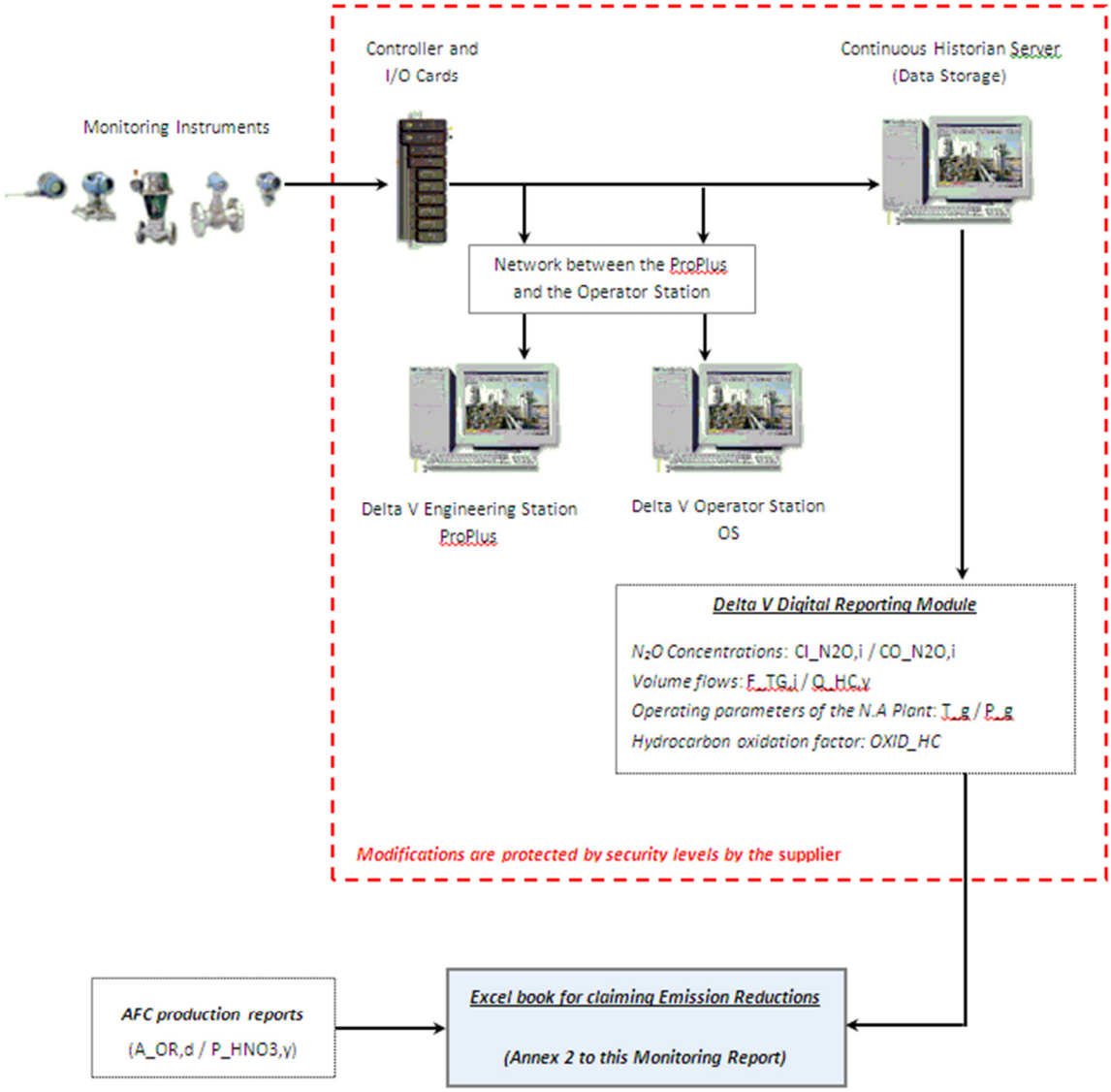
- Concentrations of N_2O at the inlet and outlet of the EnviNOx® system (CI_N2O,i / CO_N2O,i)
- Volume Flows (F_TG,i / Q_HC,y)
- Hydrocarbon oxidation factor (OXID_HC)
- Operating parameters of the nitric acid plant (T_g / P_g)

Relevant parameters as above (Concentrations, Volume Flows, Oxidation factor, Operating parameters of the nitric acid plant) are exported from the digitally available daily reports to excel sheets for presentation of required parameters and calculation of baseline emissions (BE_y / BE_N2O,y / SE_N2O / QI_N2O,y), project emissions (PE_y / PE_ND,y / PE_DF,y / PE_HC,y / HCE_C,y / HCE_NC,y / PE_N2O,y), and emission reductions (ER_y) according to the formulae as required.
Daily production of the nitric acid plant (P_HNO3,y) and ammonia flow to the AOR (A_OR,d) are obtained from AFC recordings and their respective log sheets and transferred to these excel sheets, which are attached as *Annex 2* to this monitoring report. Details on source of data can be found directly at the respective parameter tables in *Section D.*

Special clarification regarding parameters QI_N2O,y and PE_N2O,y

Following the guidance by the CDM Issuance Team related to the incompleteness in the first information and reporting check of monitoring period #13 (01/01/2010 – 31/03/2010), calculation of the quantity of N_2O at the inlet of the destruction facility (QI_N2O,y) and N_2O not destroyed by the destruction facility (PE_N2O,y) is conducted daily. This calculation is based on recorded daily values (presented in the DeltaV daily reports) of the volume flow (F_TG,i) as well as the concentrations (CI_N2O,i and CO_N2O,i) so that formulae applied are implemented in the excel books (*Annex 2*). Formulae of calculation are shown in the spreadsheet cells for ease of assessment, whenever possible. *The values calculated in that file are used for claiming emission reductions.*

Figure 4: Information flow diagram



This approach and all implemented formulas in the Delta V system fully comply with the approved Monitoring Methodology AM0028 Version 1 "Catalytic N_2O destruction in the tail gas of Nitric Acid Plants" and the registered project documentation (Monitoring Plan and respective PDD), considering additional guidance by the CDM Issuance Team.

2. Roles and responsibilities of personnel

Project Operator is **Abu Qir Fertilizer Co. S.A.E**. (furthermore called "AFC"), the biggest Fertilizer Company in Africa. AFC was founded as a joint stock company located and registered in the Alexandria Province under Egyptian law in 1976 and is the market leader with a market share of close to 70% of the local Egyptian fertilizer market. With closely to 3000 employees AFC is among the major job providers in Alexandria area. The company is ISO 9001:2008 and ISO 14001:2009 certified and one of the most important companies of the Egyptian industry.
The EnviNO_X® system is incorporated into AFC's ISO 9001:2008 and ISO 14001:2009 standards.

The operating personnel of the EnviNO_X® system has been trained by the technology provider UHDE and the supplier of the digital process control system (Delta V, EMERSON process management).

Carbon Egypt is responsible for monitoring and reporting of data under the CDM Project. In terms of performing general supervision and cross-checks of monitoring and reporting data Carbon Austria supports Carbon Egypt. Carbon Austria gives their final approval on the supporting documents as well as the CDM-MR before submitting to the respective DOE for quarterly verification.

Figure 5: Organizational Chart 1: Structure onsite at Abu Qir

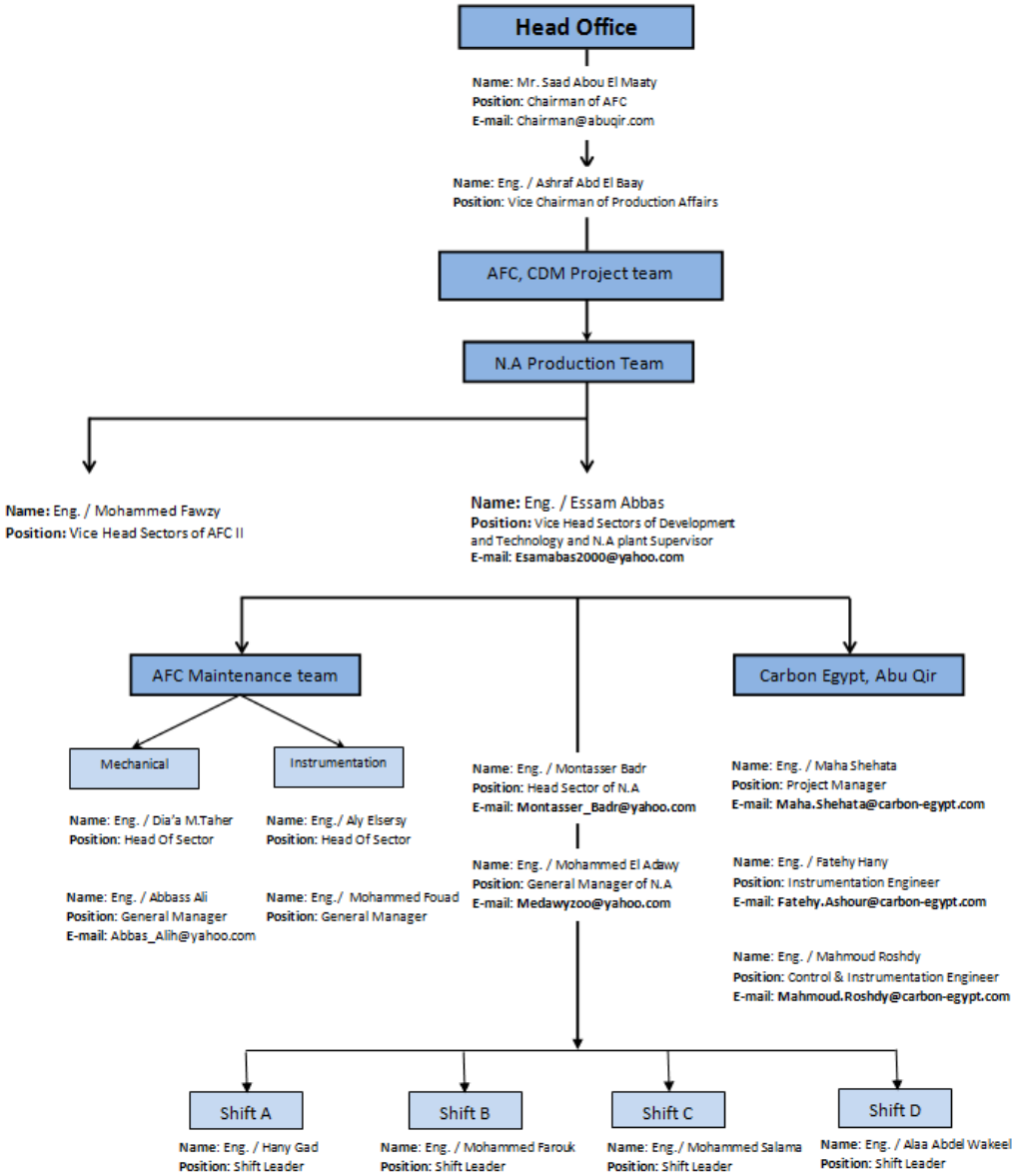
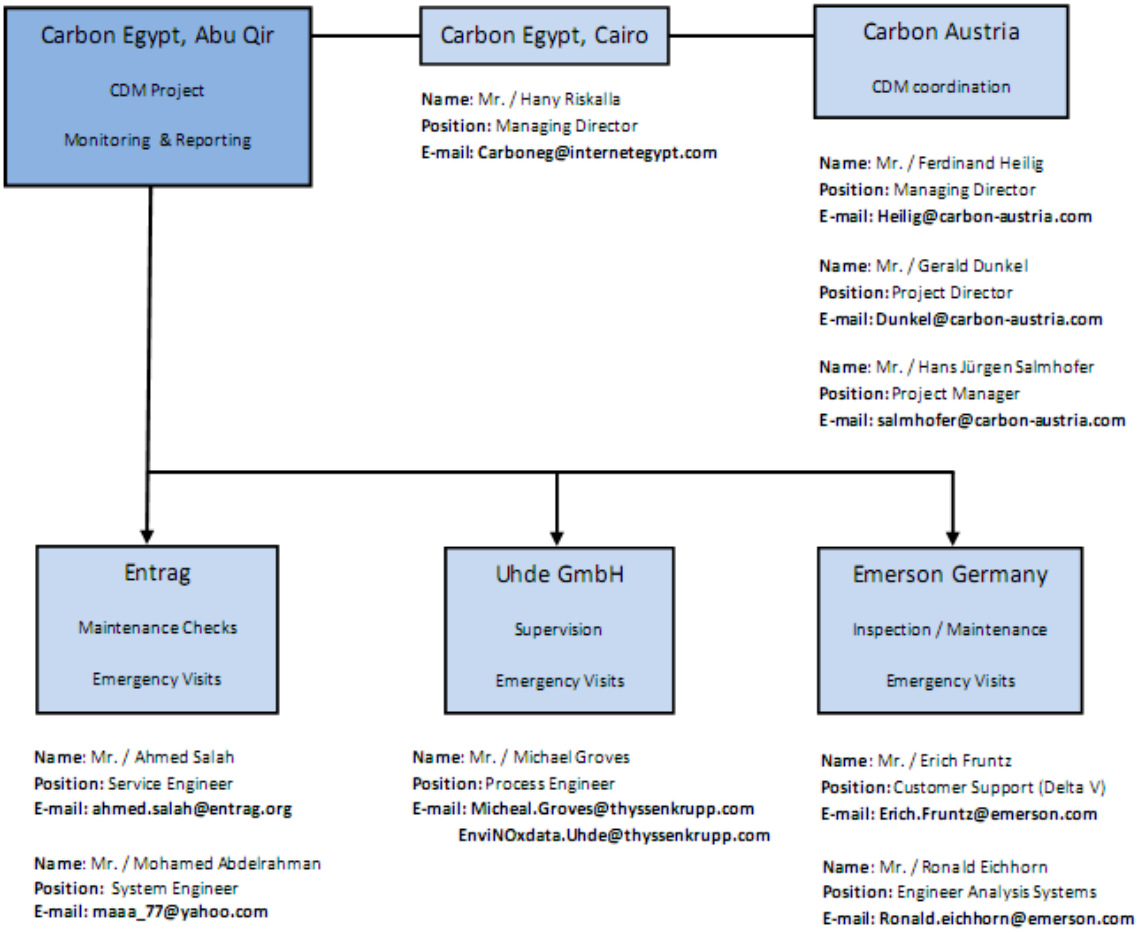


Figure 6: Organizational Chart 2: Carbon structure and technology providers



3. Back up plans / Emergency procedures for monitoring system

Back Up Plans for measuring systems / Periodically observation of the automated monitoring system

<u>EnviNO$_X$® – automatic DCS system:</u>

The EnviNO$_X$® system is designed for automatic operation, so that activities by the operation personnel are not required for during normal operation. However, all alarms and any action taken by the operating personnel (events) are automatically logged at the engineering and the operation station (Alarm & Event List) of the DCS system. All log sheets for **Alarm & Events** are exported and therefore digital available (Excel Files) and can easily be analysed and evaluated.

Malfunction of system components is indicated on the operator (AFC) console in the control room as an alarm. Occurrence of such an alarm requires the operator to immediately take measures to remedy the problem. This is done by informing AFC instrument department and Carbon Egypt. It is then decided whether the problem can be fixed immediately by AFC or Carbon Egypt, or whether external support from ENTRAG / EMERSON Germany / UHDE is required (please refer also to above).

<u>Back Up – EnviNO$_X$® support:</u>

In addition to the quality control and quality assurance procedures according to AFC quality management system and in order to avoid possible failures of the automated monitoring system several procedures are implemented for the project activity.

Carbon Egypt has contracted the Egyptian ENTRAG Group – the Agent for EMERSON Process Management in Egypt - to execute monthly on-site **Health Checks.** EMERSON Germany has been

contracted to execute quarterly on-site **Inspection Visits**. Furthermore a **24 hours emergency service** and the **Delta V Guardian Support** are covered by the contracts.
The monthly health checks and the quarterly inspection visits are to conduct observation of the EnviNO$_X$® system, the monitoring equipment required for the CDM project and the automated monitoring system. The system components, measurement devices, calibration works and the automated monitoring system required for the monitoring of the CDM project are covered by the contracts. Health check reports and inspection visit reports are available.
The responsible project managers of Carbon Egypt are carrying out **on-site inspections** on a daily basis and AFC is carrying out a site check of the EnviNO$_X$® system once per shift.
Furthermore the AFC maintenance department is performing **weekly inspection** including an on-site check of the EnviNO$_X$® system.
Supervision is done based on the daily reports by the technology provider UHDE Germany.

Back Up – Spare Parts on Stock On-site:
As a further important part of the back-up plan to deal with events like measuring equipment out of service Carbon Egypt stocks a comprehensive range of spare part devices on-site. The spare part stock consists basically of 6-month consumables and for two year operation as recommended by the supplier. It includes inter alia filter elements, valves and pressure controllers for the sample handling system and filter elements, analysis cells (crucial part for analysers), flow sensors and several electrical parts for the analysers. The stock of spare parts is updated on a quarterly basis and the amount of spare parts to reorder is recommended by the supplier as well.

Back Up – Certified standard gases
Pressure levels of standard gases used for the regular, automatic calibration of the inlet and outlet analysers are constantly monitored during the regular inspection by AFC. Spare bottles of standard gases are purchased in proper time. Specifications of standard gases are available and submitted to the DOE for verification.

Back Up – Procedures:
In addition to the quality control and quality assurance procedures according to AFC quality management system and in order to avoid possible failures of the automated monitoring system several procedures are implemented for the project activity. The approach by Carbon Egypt was to ensure immediate response to such alarms/malfunctions respectively in the system (“*Procedures for Carbon Egypt CDM Project”).*

The following table summarizes the periodically observations of the AMS.

Table 4: AMS observation overview

Organization	Action	Frequency	Output
Delta V	Events & Alarm List	Continuously	Txt-files, Excel files
AFC	Shift inspection	3 times a day	Plant Check
CARBON Egypt	Inspection	Daily	EnviNO$_X$® Journal
AFC	Inspection	Weekly	AFC Report
ENTRAG	Health check, System diagnostic	Monthly	Health Check Report on AMS and EnviNO$_X$®
EMERSON Germany	Inspection visit	Quarterly	Inspection Report on AMS and EnviNO$_X$®
UHDE	Supervision	Daily	Plausibility Check of Daily Reporting

All resulting documents are analyzed and evaluated by Carbon Egypt. In case of any upcoming problem or failure of the EnviNO$_X$® system and/or the automated monitoring system Carbon Egypt immediately take measure to remedy the problem. The provider of the automated monitoring system is available 24 hours a day via Hotline. Furthermore ENTRAG is committed to be onsite within 24 hours.

Systematic measures for QA for monitoring data during analyser down times

- Back Up Plans (please refer to the above)

- Check against operating parameters

  In order to ensure the quality of the monitored data during analyser downtimes Carbon Egypt contracted EMERSON Germany and ENTRAG for regular maintenance & calibration services and applied the CDM/QA procedure according to the Project Design Document of "Catalytic N_2O Destruction Project in the Tail Gas of the Nitric Acid Plant of Abu Qir Fertilizer Co."

  The procedure how to proceed in cases of analyser down times is a five-step approach:

  a) Nitric Acid plant in normal operation:
  If there is a down time of concentration measurements Carbon Egypt provides suitable operating parameters to demonstrate that the nitric acid plant is operating under normal conditions.
  b) EnviNOx® system in normal operation:
  Carbon Egypt provides suitable operating parameters to demonstrate that the EnviNOx® system is operating under normal conditions and has reached normal efficiency.
  c) Correlation check:
  The estimation of emission reductions is based on correlation methods, applying the parameter with the highest historical correlation to the missing parameter.
  d) Recalculation:
  In order to ensure a conservative determination of emission reductions for hours with analyser downtimes recalculation is based on parameters with applicable historical correlation to the missing parameter (e.g. efficiency of the EnviNOx® system; the reactor inlet or outlet temperature; the flow of N_2O reducing agent to the reactor;) and consequently guarantees a conservative determination of emission reductions.
  Conservativeness is ensured by using minimum historic efficiency of the system and taking into consideration the most conservative value between the correlation result and the values 24 hours before and after the respective event.
  e) Check parameters before and after analyser down time:
  Operating parameters are compared with values prior and after the analyser was out of operation or out for maintenance to ensure that those values are within the same range.

This multi-step approach guarantees a conservative estimation of Emissions Reductions during AMS downtimes.

SECTION D. Data and parameters
D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	**EF_HC**
Unit	**tCO_2/t**
Description	Hydrocarbon CO_2 emission factor
Source of data	According to PDD
Value(s) applied	**3.0 tCO_2/t**
Purpose of data	Calculation of project emissions
Additional comment	The hydrocarbon CO_2 emission factor is given by the molecular weights and the chemical reaction when hydrocarbons are converted. In order to apply a conservative approach the HC emission factor for natural gas as reducing agent is set at 3.0 tCO_2/t.

Data/Parameter	**Type_HC**
Unit	**NA**
Description	Type of hydrocarbon
Source of data	According to PDD / Hydrocarbon supplier
Value(s) applied	**Natural Gas**
Purpose of data	Calculation of project emissions
Additional comment	The EnviNOx® system in Abu Qir has been designed to be operated with natural gas as reducing agent. All reference made in this monitoring report with respect to hydrocarbons should be understood as natural gas, unless otherwise explicitly mentioned.

Data/Parameter	**T_g,hist**
Unit	**°C**
Description	Historical operating temperature range of the ammonia oxidation reactor
Source of data	According to PDD
Value(s) applied	Burner I / Burner II **850 : 910 °C**
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**P_g,hist**
Unit	**Pa**
Description	Historical operating pressure range of the ammonia oxidation reactor
Source of data	According to PDD
Value(s) applied	**$2.0*10^5$ Pa to $4.5*10^5$ Pa (equivalent 2.0 to 4.5 barg)**
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**G_sup,hist**
Unit	**-**
Description	Historical supplier of the ammonia oxidation catalyst
Source of data	According to PDD
Value(s) applied	**Umicore**
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	G_com,hist
Unit	%
Description	Historical composition of the ammonia oxidation catalyst
Source of data	According to PDD
Value(s) applied	90% Pt 10% Rh
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	P_HNO3,hist
Unit	t
Description	Design capacity
Source of data	According to PDD
Value(s) applied	700,800 t
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	A_OR,hist
Unit	tNH_3/day
Description	Max. historical ammonia flow rate to the ammonia oxidation reactor
Source of data	According to PDD
Value(s) applied	545 tNH_3/d
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	IPCC default emission factor
Unit	$kgN_2O/tHNO_3$
Description	Conservative IPCC default value
Source of data	According to PDD / AM0028 v1
Value(s) applied	4.05 $kgN_2O/tHNO_3$
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	GWP_N2O
Unit	tCO_2e/tN_2O
Description	Global warming potential of N_2O
Source of data	According to PDD / AM0028 v1
Value(s) applied	310 tCO_2e/tN_2O
Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data/Parameter	GWP_CH4
Unit	tCO_2e/tCH_4
Description	Global warming potential of methane
Source of data	According to PDD
Value(s) applied	21 tCO_2e/tCH_4
Purpose of data	Calculation of project emissions
Additional comment	-

D.2. Data and parameters monitored

"Annual" or "Yearly" is sometimes mentioned as the "Recording frequency", as it is defined in the methodology (AM0028v1) and the Monitoring Plan and meaning the respective parameter during or related to a year "y". It shall be considered, that "Annual", "Yearly" and the year "y" is understood as the monitoring period covered by this report (09/10/2012 to 25/11/2012), unless otherwise described in a table.

Data/Parameter	**BE_y**
Unit	tCO_2e
Description	Baseline emissions
Measured/Calculated /Default	Calculated
Source of data	Monitoring system Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**48,588 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**PE_y**
Unit	**tCO_2e**
Description	Project emissions
Measured/Calculated /Default	Calculated
Source of data	Monitoring system Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**680 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following

	AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**PE_ND,y**
Unit	**tCO_2e**
Description	Project emissions from N_2O not destroyed
Measured/Calculated /Default	Calculated
Source of data	Monitoring system Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**599 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**PE_DF,y**
Unit	**tCO_2e**
Description	Project emissions from destruction facility
Measured/Calculated /Default	Calculated
Source of data	Monitoring system Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**81 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following

	AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**PE_N2O,y**
Unit	**tN_2O**
Description	N_2O not destroyed by facility
Measured/Calculated /Default	Calculated
Source of data	Monitoring system Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**1.9 tN_2O** An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Daily
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report. Furthermore, please refer to the *special clarification regarding parameters QI_N2O,y and PE_N2O,y* under *Section C – 1 (Information Flow / Data collection procedures)* of this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**F_TG,i**
Unit	**Nm^3/h**
Description	Volume flow tail gas at N_2O destruction facility
Measured/Calculated /Default	Measured
Source of data	Flow meter / Monitoring System Flow metering system automatically records volume flow adjusted to standard temperature and pressure. Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**216,536 Nm^3/h** **(105,019,832 Nm^3)**

	(Standard temperature: 273.15K, standard pressure: 1,013.25 hPa) An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.
Monitoring equipment	Venturi tube, designed and manufactured in accordance with ISO 5167-4:2003 **Meter location:** Located in the tail gas line, downstream of the EnviNO_X® reactor (21R004). Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **FT 218003A/B** Type: Differential pressure transmitters Accuracy class: ± 0.075% of calibrated span Calibration frequency: 2 years Serial number: 8657986 / 8657987 Date of factory calibration: 30/11/2011 Validity: 29/11/2013 **TE 218005A/B** Type: Temperature transmitters Accuracy class: ± 0.1% of calibrated span in accordance with IEC 584 Calibration frequency: 2 years Serial number: 2420014 / 2420015 Date of factory calibration: 24/02/2012 Validity: 23/02/2014 **PT 218006A/B** Type: Pressure transmitters Accuracy class: ± 0.075% of calibrated span Calibration frequency: 2 years Serial number: 8657989 / 8657990 Date of factory calibration: 30/11/2011 Validity: 29/11/2013
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Every 10 seconds Recording: Daily
Calculation method (if applicable)	-
QA/QC procedures	The plausibility of measured values was checked with the values of the redundant instruments. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for*

	monitoring data during analyser down times.
Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data/Parameter	**CO_N2O,i**
Unit	**tN_2O/ Nm^3**
Description	N_2O concentration at destruction facility outlet
Measured/Calculated /Default	Measured
Source of data	Non-dispersive infrared (NDIR) photometry analyser Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**$5.36*10^{-8}$ tN_2O/Nm^3** (Standard temperature: 273.15K, standard pressure: 1,013.25 hPa) An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.
Monitoring equipment	**Meter location:** Sample take-off is located in the tail gas line, downstream of the $EnviNO_X$® reactor (21R004) and leads (via sample gas line) to the locked analyser house (located closely to the EnviNOx® reactor), where analysers and standard gases for calibrations are installed. Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **AT 218002** Type: NDIR Analyser Accuracy class: ± 1% (zero/span) Serial number: CLD: 600561462896 MLT: 990561462895 Calibration frequency: Zero calibration daily (automatically) Span calibration every other day (automatically) Date of last calibration: Done on daily basis Validity: Confirmed by complying with accuracy safeguarding instructions from Emerson Process Management
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Every 10 seconds Recording: Daily
Calculation method (if applicable)	-
QA/QC procedures	The plausibility of measured values was checked with the values of the periodic measurements by means of Gas Chromatography. Accuracy-safeguarding instructions from Emerson Process Management, the manufacturer of the equipment, related to regular self-calibration and quality of used standard gases, are followed. The analysers need a calibration on a regular basis. This adjustment procedure is done automatically and can be triggered manually from the operating console or automatically on a time basis (Zero calibration: daily, span calibration: every two days). Certified (Certificates confirming stability of standard gas during

	monitoring period and 1% uncertainty) standard gases are used for self calibration. Sample line testing is done annually by applying certified standard gas at the beginning of the sample line. Latest tests have been successfully conducted on 16/05/2011 and 26/04/2012. Entrag has been mandated to conduct monthly analyser and DeltaV-system health checks. Furthermore Emerson Germany has been mandated to conduct quarterly inspection checks to ensure good instrument condition. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**M_i**
Unit	**H**
Description	Measuring Interval
Measured/Calculated /Default	Measured
Source of data	Data management system (DeltaV)
Value(s) of monitored parameter	**10 sec** Readings/calculations of relevant parameters are done on a 10 seconds basis. Please also refer to the *special clarification regarding parameters QI_N2O,y and PE_N2O,y* under *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Monitoring equipment	Time stamps are generated by the DeltaV system, synchronized by a GPS clock.
Measuring/Reading/ Recording frequency	Measuring: Continuously (N_2O concentration and tail gas flow) Reading: Every 10 seconds (N_2O concentration and tail gas flow) Recording: Daily (N_2O concentration and tail gas flow)
Calculation method (if applicable)	-
QA/QC procedures	The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Entrag has been mandated to conduct monthly analyser and DeltaV-system health checks. Furthermore Emerson Germany has been mandated to conduct quarterly inspection checks to ensure good instrument condition. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the*

	automated monitoring system and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data/Parameter	**PE_NH3,y** **Q_NH3,y** **EF_NH3**
Unit	**tCO_2e** **tNH_3** **tCO_2e/tNH_3**
Description	Emissions from ammonia use in destruction facility N_2O destruction facility: Project Ammonia Input Ammonia production GHG emission factor
Measured/Calculated /Default	-
Source of data	-
Value(s) of monitored parameter	According to AM0028 v1 emissions from this source have been excluded in the PDD, as an SCR DeNOx unit has already been installed prior to the project activity, hence **value for PE_NH3,y is zero.**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	-
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**PE_HC,y**
Unit	**tCO_2e**
Description	Emissions from hydrocarbon use in destruction facility
Measured/Calculated /Default	Calculated
Source of data	Monitoring System Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**81 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.

Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**HCE_C,y**
Unit	**tCO_2e**
Description	Converted hydrocarbon emissions
Measured/Calculated /Default	Calculated
Source of data	Monitoring System Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**50 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**HCE_NC,y**
Unit	**tCO_2e**
Description	Non-converted methane emissions
Measured/Calculated /Default	Calculated
Source of data	Monitoring System Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**31 tCO_2e**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Annual (please refer to explanation under section D.2.)
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.

Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**Q_HC,y**
Unit	**Nm³**
Description	Hydrocarbon input (reducing agent)
Measured/Calculated /Default	Measured
Source of data	Measuring device (please refer to monitoring equipment below) The natural gas used as reducing agent is measured by standard flow meter. Flow is converted to standard conditions based on temperature and pressure measurement. Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**23,214 Nm³** (Standard temperature: 273.15K, standard pressure: 1,013.25 hPa) An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.
Monitoring equipment	**Meter location:** Located in the natural gas line, upstream of the EnviNO_X® reactor (21R004). Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **FT 218002** Type: Natural gas flow meter Accuracy class: ± 1.6% in accordance with VDI/VDE 3513 Calibration frequency: 2 years Serial number: 011008523.001 Date of factory calibration: 16/12/2011 Validity: 15/12/2013 **TE 218004** Type: Temperature transmitter Accuracy class: ± 0.1% of calibrated span Calibration frequency: 2 years Serial number: 2420017 Date of factory calibration: 23/02/2012 Validity: 22/02/2014 **PT 218004** Type: Pressure transmitter Accuracy class: ± 0.075% of calibrated span Calibration frequency: 2 years Serial number: 8657991 Date of factory calibration: 30/11/2011 Validity: 29/11/2013
Measuring/Reading/ Recording frequency	Measuring:: Continuously Reading: Every 10 seconds Recording: Daily
Calculation method	-

(if applicable)	
QA/QC procedures	The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**ρ_HC**
Unit	**t/m³**
Description	Hydrocarbon density
Measured/Calculated /Default	Default
Source of data	Default value / Hydrocarbon supplier certificate
Value(s) of monitored parameter	**$7.8*10^{-4}$ t/m³** (Standard temperature: 273.15K, standard pressure: 1,013.25 hPa) For calculation of project emissions, a conservative hydrocarbon density value of **$7.8*10^{-4}$ t/m³** is applied (as traceable in the excel books, *Annex 2*). According to supplier certificates, actual density of the delivered hydrocarbon is below the applied density. Thus, applied density is conservative.
Monitoring equipment	Composition of the delivered hydrocarbon is measured by the supplier and provided on specific certificates. Based on the measured composition available from the hydrocarbon certificate, the actual hydrocarbon density is calculated and compared with the applied default value.
Measuring/Reading/ Recording frequency	Measuring, Reading and Recording frequencies for the applied density are not applicable, as a conservative default value is used. In order to assure the conservativeness of the applied default value a certificate from the hydrocarbon supplier is requested on a quarterly basis.
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**OXID_HC**
Unit	**%**
Description	Hydrocarbon oxidation factor
Measured/Calculated /Default	Measured
Source of data	Measuring device (please refer to monitoring equipment below) The hydrocarbon oxidation factor is based on continuous measurements of

	the hydrocarbon input and the hydrocarbon outlet. Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**91.8 %**
Monitoring equipment	Please refer to monitoring equipment for **Q_HC,y** (Natural Gas Input)**,** **CO_N2O,i** (Outlet Analyser which measures CH_4 at the outlet also) as well as **F_TG,i**.
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Every 10 seconds Recording: Daily
Calculation method (if applicable)	-
QA/QC procedures	The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	**P_HNO3,y**
Unit	**tHNO_3**
Description	Plant output of HNO_3
Measured/Calculated /Default	Measured
Source of data	Production reports The actual nitric acid production is measured according to the installed instruments. The instrument signals are recorded in the control room and used to determine whether the nitric acid production is within the historical designed capacity. The HNO_3 production data are derived from AFC recordings which are prepared in accordance with AFC´s quality management system ISO 9001:2008. The cumulative volume of HNO_3 in m^3 and the dedicated temperature in the HNO_3 line is recorded in each shift on an hourly basis by the operator in Abu Qir's EnviNO_X®-System unit log sheet no. 409/1/2/3 F5. The concentration of the nitric acid is analysed two times per shift (six times a day) and logged in reporting sheet 410/3/3/F1. This data is transferred by Carbon Egypt to an excel book according to the *"Procedures for Carbon Egypt CDM Project"* in order to calculate the HNO_3 production on a 0-24h basis. The daily HNO_3 production and the daily average concentration are recorded in sheet no. 409/1/2/3 F1 by AFC on a shift basis. This data is

	used for cross-check purpose. The excel book for presentation of data as required by AM0028 v1 including the total daily HNO_3 production and automatic checks is attached as *Annex 2* to this Monitoring Report.
Value(s) of monitored parameter	**33,819 tHNO_3** The accumulated nitric acid production since the last production year (26/11/2011 – 25/11/2012) is 613,691 tHNO_3. It is clearly shown that the value is lower than the limit established in the PDD: 700,800 tHNO_3.
Monitoring equipment	**Meter location:** Located in the nitric acid line, downstream of the absorption tower. Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **FT 21411** Type: Magnetic flow meter Accuracy class: ± 0.25% Serial number: 0870188456 Calibration frequency: Instrument applied requires no regular calibration after factory calibration General maintenance frequency: 2 years from commissioning or latest general maintenance (meter verification) Date of last general maintenance: 23/04/2012 (meter verification) Validity: 22/04/2014 **TE 21042** Type: Temperature Transmitter Accuracy class : ± 0.15°C digital accuracy in accordance with IEC 751 Serial number: 2304657 Calibration frequency: 2 years Date of last calibration: 22/04/2012 Validity: 21/04/2014
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Hourly Recording: Daily
Calculation method (if applicable)	-
QA/QC procedures	In order to prove plausibility of HNO_3 production a check over the whole Monitoring Period was performed and showed plausible data for all days covered by this Monitoring Period (nitrogen mass balance). The excel book containing this plausibility check is attached as *Annex 2* to this Monitoring Report. A double check by the responsible project manager from Carbon Austria is performed according to the *"Procedures for Carbon Egypt CDM Project"*. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures*

	for monitoring system of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data/Parameter	**BE_N2O,y**
Unit	**tN_2O**
Description	Baseline emissions of N_2O
Measured/Calculated /Default	Calculated
Source of data	Monitoring System Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**157 tN_2O** An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Daily
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report. If the daily ammonia input to the oxidation reactor exceeds the limit on permissible ammonia input, baseline N_2O emissions are capped at the conservative IPCC default value.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**QI_N2O,y**
Unit	**tN_2O**
Description	Quantity of N_2O at inlet of destruction facility
Measured/Calculated /Default	Calculated
Source of data	Monitoring System Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**157 tN_2O** An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.

Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Daily
Calculation method (if applicable)	Calculated according to formulae in AM0028v1. An excel book containing the calculation and a description of the applied formulae is attached as *Annex 2* to this Monitoring Report. Furthermore, please refer to the *special clarification regarding parameters QI_N2O,y and PE_N2O,y* under *Section C – 1 (Information Flow / Data collection procedures)* of this monitoring report.
QA/QC procedures	The quality of excel books working as calculation tool following AM0028v1 has been assured in recent verification periods both by the DOE and by proven conformity with CDM Issuance Team requirements. Furthermore consistency checks and comparison tests are conducted by Carbon Austria and Carbon Egypt team members.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**CI_N2O,i**
Unit	**tN_2O/ Nm^3**
Description	N_2O concentration at destruction facility inlet
Measured/Calculated /Default	Measured
Source of data	Non-dispersive infrared (NDIR) photometry analyser Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**$1.48*10^{-6}$ tN_2O/Nm^3** (Standard temperature: 273.15K, standard pressure: 1,013.25 hPa) An excel book containing recorded daily values (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report.
Monitoring equipment	**Meter location:** Sample take-off is located in the tail gas line, upstream of the EnviNO_X® reactor (21R004) and leads (via sample gas line) to the locked analyser house (located closely to the EnviNOx® reactor), where analysers and standard gases for calibrations are installed. Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **AT 218001** Type: NDIR Analyser Accuracy class: ± 1% (zero/span) Serial number: 370561462894 Calibration frequency: Zero calibration daily (automatically) Span calibration every other day (automatically) Date of last calibration: Done on daily basis Validity: Confirmed by complying with accuracy safeguarding instructions from Emerson Process Management
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Every 10 seconds Recording: Daily

Calculation method (if applicable)	-
QA/QC procedures	The plausibility of measured values was checked with the values of the periodic measurements by means of Gas Chromatography. Accuracy-safeguarding instructions from Emerson Process Management, the manufacturer of the equipment, related to regular self-calibration and quality of used standard gases, are followed. The analysers need a calibration on a regular basis. This adjustment procedure is done automatically and can be triggered manually from the operating console or automatically on a time basis (Zero calibration: daily, span calibration: every two days). Certified (Certificates confirming stability of standard gas during monitoring period and 1% uncertainty) standard gases are used for self calibration. Sample line testing is done annually by applying certified standard gas at the beginning of the sample line. Latest test have been successfully conducted on 16/05/2011 and 26/04/2012. Entrag has been mandated to conduct monthly analyser and DeltaV-system health checks. Furthermore Emerson Germany has been mandated to conduct quarterly inspection checks to ensure good instrument condition. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**QR_N2O,y**
Unit	**tN_2O**
Description	Regulation on N_2O emissions (Regulation I: annual quantity N_2O limited)
Measured/Calculated /Default	Calculated
Source of data	National legislation
Value(s) of monitored parameter	**Not applicable** Actual no regulations on N_2O emissions are in place, confirmed by the Arab Republic of Egypt, Ministry of State for Environmental Affairs.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Date of regulation
Calculation method (if applicable)	-

QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**RSE_N2O,y**
Unit	**$tN_2O/tHNO_3$**
Description	Regulation on N_2O emissions (Regulation II: N_2O emissions per unit of nitric acid)
Measured/Calculated /Default	Calculated
Source of data	National legislation
Value(s) of monitored parameter	**Not applicable** Actual no regulations on N_2O emissions are in place, confirmed by the Arab Republic of Egypt, Ministry of State for Environmental Affairs.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Date of regulation
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**CR_N2O**
Unit	**tN_2O/m^3**
Description	Regulation on N_2O emissions (Regulation III: N_2O concentration in tail gas limited)
Measured/Calculated /Default	Calculated
Source of data	National legislation
Value(s) of monitored parameter	**Not applicable** Actual no regulations on N_2O emissions are in place, confirmed by the Arab Republic of Egypt, Ministry of State for Environmental Affairs.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Date of regulation
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**T_g**
Unit	**°C**
Description	Actual operating temperature ammonia oxidation reactor
Measured/Calculated /Default	Measured
Source of data	Measuring device (please refer to monitoring equipment below)

	Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	Burner I: **882°C** Burner II: **890 °C** The temperature in both ammonia oxidation reactors (AOR) are monitored by two thermocouples. The average operating temperature in the AOR is collected, subsequently the Delta-V system automatically calculates and reports the daily average temperature. An excel book containing daily values and automatic checks, if daily average values are within the permitted range (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report. The actual average daily operating temperature in both AORs is within the permitted range for all operating days covered by this monitoring report.
Monitoring equipment	**Meter location:** Located in the two ammonia oxidation reactors. Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **Burner I:** **TE 21014** and **TE 21015** Type: Temperature transmitter Accuracy class: ± 0.7°C digital accuracy in accordance with IEC 584 Serial number: 2304376 / 2304377 Calibration frequency: 2 years Date of last calibration: 22/04/2012 Validity: 21/04/2014 **Burner II:** **TE 21020** and **TE 21021** Type: Temperature transmitter Accuracy class: ± 0.7°C digital accuracy in accordance with IEC 584 Serial number: 2304378 / 2304379 Calibration frequency: 2 years Date of last calibration: 22/04/2012 Validity: 21/04/2014
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Every 10 seconds Recording: Continuously (DCS), Daily (Excel books)
Calculation method (if applicable)	-
QA/QC procedures	The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for*

	monitoring data during analyser down times.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**P_g**
Unit	**Pa**
Description	Actual operating pressure ammonia oxidation reactor
Measured/Calculated /Default	Measured
Source of data	Measuring device (please refer to monitoring equipment below) Please refer also to *Section C – 1 (Information Flow / Data collection procedures)*of this Monitoring Report.
Value(s) of monitored parameter	**$3.50*10^5$ Pa (equivalent to 3.50 barg)** The operating pressure representing the pressure in the ammonia oxidation reactors (AOR) is measured by a pressure transmitter in the air compressor discharge line. The pressure in the AOR is collected and subsequently the Delta-V system automatically reports the daily average pressure. An excel book containing daily values and automatic checks, if daily values are within the permitted range (for all days covered by this monitoring period), is attached as *Annex 2* to this Monitoring Report. The actual average daily operating pressure in the AORs is within the permitted ranges for all days covered by this monitoring report.
Monitoring equipment	**Meter location:** Located in the air compressor discharge line, upstream of the two ammonia oxidation reactors. Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **PT 21353** Type: Pressure transmitter Accuracy class : $\pm$ 0.15% Serial number: 8641338 Calibration frequency: 2 years Date of last calibration: 22/04/2012 Validity: 21/04/2014
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Every 10 seconds Recording: Continuously (DCS), Daily (Excel books)
Calculation method (if applicable)	-
QA/QC procedures	The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.
Purpose of data	Calculation of baseline emissions

Additional comment	-

Data/Parameter	**Reg_NOx**
Unit	**tNOx/m³**
Description	National regulation on NO_x emissions
Measured/Calculated /Default	Calculated
Source of data	National regulations, Ministry of Environment
Value(s) of monitored parameter	**$4.0*10^{-7}$ tNO_X/m^3** **(400 $mgNO_X/m^3$)** According to the national Environment Law number 4 of Egypt (year 1994) and its latest revision by the prime minister resolution number 710 for 2012, the NO_X emissions at nitric acid plants are limited to 400 mg/m³ for the AFC nitric acid plant. Continuous measurement of the NO_X concentration at the outlet of the EnviNO_X® system reports a concentration of **$1.90*10^{-9}$ tNO_X/Nm^3.** This shows that the CDM Project operation is in compliance with the national environmental standards.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Date of regulation
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**G_sup**
Unit	**-**
Description	Supplier of the ammonia oxidation catalyst
Measured/Calculated /Default	-
Source of data	Supplier information (i.e. commercial invoice)
Value(s) of monitored parameter	**Umicore**
Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Every gauze change
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**G_com**
Unit	**%**
Description	Composition of the ammonia oxidation catalyst
Measured/Calculated	-

/Default	
Source of data	Composition according to catalyst supplier certificate
Value(s) of monitored parameter	**90% Pt** **10% Rh** The composition of the ammonia oxidation catalyst is the same kind of catalyst composition already in operation prior to the start of the project activity. The following table summarizes the campaign information:

Installation Date	Closure Date	Gauze Supplier	Gauze Specification
25/04/2012	-	Umicore	90% Platinum 10% Rhodium

Monitoring equipment	-
Measuring/Reading/ Recording frequency	Measuring: Not applicable Reading: Not applicable Recording: Every gauze change (this comprises the date of changing gauze composition, if applicable)
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**$A_{OR,d}$**
Unit	**tNH_3/d**
Description	Actual ammonia flow rate to the ammonia oxidation reactor
Measured/Calculated /Default	Measured
Source of data	Measuring device (please refer to monitoring equipment below) The actual ammonia flow to the ammonia oxidation reactor is measured with the already installed measuring devices. The cumulated ammonia flow rate to both ammonia oxidation reactors is derived from AFC recordings which are prepared in accordance with AFC´s quality management system ISO 9001:2008. The cumulative volume in Nm^3 is recorded each hour by the operator in Abu Qir's EnviNO_X®-System unit log sheet no. 409/1/2/3 F3. This data is transferred by Carbon Egypt to an excel book according to the *"Procedures for Carbon Egypt CDM Project"* in order to calculate the NH_3 consumption on a 0-24h basis. The daily consumption is also recorded in sheet no. 409/1/2/3 F1 by AFC on a shift basis. This data is used for cross-check purpose. The excel book for presentation of data as required by AM0028 v1 including the total daily NH_3 consumption and automatic checks is attached as *Annex 2* to this Monitoring Report.
Value(s) of monitored	**469 tNH_3/d**

parameter	The daily ammonia input to the AORs is within the permitted ranges for all days covered by this monitoring report.
Monitoring equipment	**Meter location:** Located in the ammonia supply line, upstream of the two ammonia oxidation reactors. Please refer also to *Section C – 1 (Line diagram)* of this Monitoring Report. **FT 21401** Type: Differential pressure transmitter Accuracy class: ± 0.10% Calibration frequency: 2 years Serial number: 61/011836 Date of last calibration: 22/04/2012 Validity: 21/04/2014 **TE 21001** Type: Temperature transmitter Accuracy class: ±0.15°C digital accuracy in accordance with IEC 751 Serial number: 2304372 Calibration frequency: 2 years Date of last calibration: 22/04/2012 Validity: 21/04/2014 **PT 21201** Type: Pressure transmitter Accuracy class: ± 0.15% Serial number: 8861618 Calibration frequency: 2 years Date of last calibration: 22/04/2012 Validity: 21/04/2014
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Hourly Recording: Continuously, Daily (Excel books)
Calculation method (if applicable)	-
QA/QC procedures	In order to prove plausibility of ammonia flow a check over the whole Monitoring Period was performed and showed plausible data for all days covered by this Monitoring Period (nitrogen mass balance). The excel sheet containing this plausibility check will be attached as *Annex 2* to this Monitoring Report. A double check by the responsible project manager from Carbon Austria is performed according to the *"Procedures for Carbon Egypt CDM Project"*. The quality assurance and quality control procedures, in terms of equipment operations and maintenance, have been incorporated in the ISO 9001:2008 and ISO 14001:2009 procedures of AFC. Please refer also to *Section C – 4. Back Up plans / Emergency procedures for monitoring system* of this Monitoring Report and respective subitems *Back Up Plans for measuring systems / Periodically observation of the automated monitoring system* and *Systematic measures for QA for monitoring data during analyser down times*.

Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**LE_y**
Unit	tCO_2e
Description	Leakage emissions
Measured/Calculated /Default	-
Source of data	-
Value(s) of monitored parameter	According to AM0028 v1, leakage emissions have been excluded in the PDD, as a tail gas turbine is installed in the plant, hence **value is zero**.
Monitoring equipment	-
Measuring/Reading/ Recording frequency	-
Calculation method (if applicable)	-
QA/QC procedures	
Purpose of data	Calculation of leakage emissions
Additional comment	-

D.3. Implementation of sampling plan

>>

Not applicable for the project activity.

SECTION E. Calculation of emission reductions or GHG removals by sinks
E.1. Calculation of baseline emissions or baseline net GHG removals by sinks
>>
Baseline emissions of the project activity are determined based on the quantity of N_2O emitted in the baseline scenario (i.e. the quantity at inlet of the destruction facility), taking national regulations, production levels, the operating conditions of the ammonia oxidation reactor (temperature and pressure), the composition of ammonia oxidation catalyst and the ammonia flow rate to the ammonia oxidation reactor into consideration. Following monitoring activities have been done for the nitric acid plant:

- The quantity of N_2O at inlet of destruction facility (QI_N2O,y) is directly calculated by multiplying the measured tail gas volume flow rate and the measured N_2O concentrations;
- It has been monitored, if there are Egyptian regulation in place that would limit the quantity of N_2O that can be taken into account for the calculation of baseline emissions;
- It has been monitored, if the production level of HNO_3 for the monitoring period was below the design capacity of the plant;
- It has been monitored, if the operating conditions (temperature and pressure) in the ammonia oxidation reactor were within the permitted ranges for the days covered by the monitoring period;
- It has been monitored, if the composition of the ammonia oxidation catalyst gauzes in the ammonia oxidation reactor has been the same as the historical catalyst composition;
- It has been monitored, if the ammonia flow rate to the ammonia oxidation reactor has been below the historical maximum.

Excel books containing recorded monitored data, a comprehensive calculation of baseline emissions with actual values (including implementation of the formulae described below), automatic checks of nitric acid production levels against design capacity, automatic checks of operating conditions (temperature, pressure) against permitted operating ranges and automatic checks of ammonia flow rates to the ammonia oxidation reactor against the historical maximum are attached as *Annex 2* to this Monitoring Report.

Baseline emissions are given by the following equation:

$$BE\_y = BE\_N2O,y \times GWP\_N2O$$

where:
BE_y Baseline emissions in year y (tCO_2e)
BE_N2O,y Baseline emissions of N_2O in year y (tN_2O)
GWP_N2O Global warming potential of N_2O = 310

$$BE\_y = BE\_N2O,y \times GWP\_N2O = 156.737 \times 310 =$$

$$= \mathbf{48{,}588\ tCO_2e}$$

As no regulations on N_2O emissions are in place, the baseline emissions of N_2O (BE_N2O,y) are equal to the quantity of N_2O at inlet of destruction facility (QI_N2O,y).

$$BE\_N2O,y = QI\_N2O,y$$

where:
BE_N2O,y Baseline emissions of N_2O in year y (tN_2O)
QI_N2O,y Quantity of N_2O at inlet of the destruction facility in year y (tN_2O)

The quantity of N_2O at the inlet of the destruction facility (QI_N2O,y) is calculated based on continuous measurement of the tail gas volume flow rate (F_TG,i) and the N_2O concentration at the inlet of the N_2O destruction facility (CI_N2O,i). Furthermore, please refer to the *special clarification regarding parameters*

QI_N2O,y and PE_N2O,y under *Section C – 1 (Information Flow / Data collection procedures)* of this monitoring report.

$$QI\_N2O,y = \sum_i^n F\_TG,i \times CI\_N2O,i \times M\_i$$

$$= \mathbf{157\ tN_2O}$$

For calculation on a daily basis please refer to excel book in Annex 2 of this monitoring report.

where:

QI_N2O,y	Quantity of N_2O at inlet of the destruction facility in year y (tN_2O)
F_TG,i	Volume flow rate at the destruction facility inlet during interval i (Nm^3 / h)
CI_N2O,i	N_2O concentration at destruction facility inlet during interval i (tN_2O / Nm^3)
M_i	Length of measuring interval i (h)
i	Interval
n	Number of intervals during the year

The specific N_2O emissions per unit of output nitric acid is defined as:

$$SE\_N2O,y = QI\_N2O,y / P\_HNO3,y = 157 / 33,819=$$

$$= \mathbf{4.63*10^{-3}\ tN_2O/tHNO_3}$$

where:

SE_N2O,y	Specific N2O emissions per output nitric acid in year y ($tN_2O/tHNO_3$)
QI_N2O,y	Quantity of N_2O emissions at inlet of the destruction facility in year y (tN_2O)
P_HNO3,y	Production of nitric acid in year (t HNO_3)

Other monitoring activities with effect on baseline emissions

The production of nitric acid for the monitoring period is below the design capacity, hence no limitation of the baseline emissions is to be applied.

During the monitoring period, the daily average operating temperature of the ammonia oxidation reactor did not exceed the permitted range for all days covered by the monitoring period, hence no limitation of the baseline emissions is to be applied.

During the monitoring period, the daily average operating pressure of the ammonia oxidation reactor did not exceed the permitted range for all days covered by the monitoring period, hence no limitation of the baseline emissions is to be applied.

During the monitoring period, the composition of ammonia oxidation catalysts was the same as the historic composition of ammonia oxidation catalyst, hence no limitation of the baseline emissions is to be applied.

During the monitoring period, the daily ammonia flow rate to the ammonia oxidation reactor did not exceed the historical maximum for all days covered by the monitoring period.

E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

Project emissions of the project activity are determined based on the quantity of N_2O not destroyed by the destruction facility and emissions related to the operation of the destruction facility (i.e. emissions from ammonia and hydrocarbon input), taking production levels under consideration. Following monitoring activities have been done:

- The quantity of N_2O not destroyed (PE_N2O,y) is directly calculated by multiplying the measured tail gas volume flow rate and the measured N_2O concentrations;
- The quantity of hydrocarbon (natural gas) to the EnviNOx® reactor has been monitored;
- The oxidation factor of hydrocarbon (OXID_HC) has been monitored;
- It has been monitored, if the production level of HNO_3 for the monitoring period was below the design capacity of the plant.

Excel books containing recorded monitored data, a comprehensive calculation of project emissions with actual values (including implementation of the formulae described below) and automatic checks of nitric acid production levels against design capacity are attached as *Annex 2* to this Monitoring Report.

$$PE\_y = PE\_ND,y + PE\_DF,y = 599 + 81 =$$

$$= \mathbf{680\ tCO_2e}$$

where:

PE_y	Project emissions in year y (tCO_2e)
PE_ND,y	Project emissions from N_2O not destroyed in year y (tCO_2e)
PE_DF,y	Project emissions related to the operation of the destruction facility in year y (tCO_2e)

$$PE\_ND,y = PE\_N2O,y \times GWP\_N2O = 1.9339 \times 310 =$$

$$= \mathbf{599\ tCO_2e}$$

where:

PE_ND,y	Project emissions from N_2O not destroyed in year y (tCO_2e)
PE_N2O,y	Project emissions of N_2O in year y (tN_2O)
GWP_N2O	Global warming potential of N_2O = 310

The quantity of N_2O not destroyed by the project activity (PE_N2O,y) is calculated based on continuous measurement of the tail gas volume flow rate (F_TG,i) and the N_2O concentration at the outlet of the N_2O destruction facility (CO_N2O,i). Furthermore, please refer to the *special clarification regarding parameters QI_N2O,y and PE_N2O,y* under *Section C – 1 (Information Flow / Data collection procedures)* of this monitoring report.

$$PE\_N2O,y = \sum_i^n F\_TG,i \times CO\_N2O,i \times M\_i$$

$$= \mathbf{1.9\ tN_2O}$$

For calculation on a daily basis please refer to excel book in Annex 2 of this monitoring report.

where:

PE_N2O,y	Project emissions of N_2O in year y (tN_2O)

F_TG,i	Volume flow rate tail gas at destruction facility during interval i (Nm^3 / h)
CO_N2O,i	N_2O concentration in the tail gas of the N_2O destruction facility during interval i (tN_2O / Nm^3)
M_i	Length of measuring interval i (h)
i	Interval
n	Number of intervals during the year

Project emissions related to the operation of the destruction facility are calculated based on ammonia input to the destruction facility and hydrocarbon input to the destruction facility.

$$PE\_DF,y = PE\_NH3,y + PE\_HC,y = 0 + 81 =$$

$$= \mathbf{81\ tCO_2e}$$

where:

PE_DF,y	Project emissions related to the operation of the destruction facility in year y (tCO_2e)
PE_NH3,y	Project emissions related to ammonia input to destruction facility in year y (tCO_2e)
PE_HC,y	Project emissions related to hydrocarbon input to destruction facility in year y (tCO_2e)

A SCR DeNOx unit has been installed prior to the project activity, therefore project emissions related to ammonia input to destruction to the facilities (PE_NH3,y) are zero.

$$PE\_HC,y = HCE\_C,y + HCE\_NC,y = 50 + 31 =$$

$$= \mathbf{81\ tCO_2e}$$

where:

PE_HC,y	Project emissions related to hydrocarbon input to destruction facility in year y (tCO_2e)
HCE_C,y	Converted hydrocarbon emissions in year y (tCO_2e)
HCE_NC,y	Methane emissions in year y (tCO_2e)

$$HCE\_C,y = \rho\_HC \times Q\_HC,y \times EF\_HC \times OXID\_HC/100$$

$$= \mathbf{50\ tCO_2e}$$

For calculation please refer to excel book in Annex 2 of this monitoring report.

$$HCE\_NC,y = \rho\_HNC \times Q\_HNC,y \times GWP\_CH4 \times (1-OXID\_CH4/100)$$

$$= \mathbf{31\ tCO_2e}$$

For calculation please refer to excel book in Annex 2 of this monitoring report.

where

HCE_C,y	Converted hydrocarbon emissions in year y (tCO_2e)
HCE_NC,y	Methane emissions in year y (tCO_2e)
ρ_HC = ρ_HNC	Hydrocarbon (methane) density (t / Nm^3)
Q_HC,y = Q_HNC,y	Hydrocarbon (methane) input in year (Nm^3)
GWP_CH4	Global warming potential of methane
EF_HC	Carbon emission factor of hydrocarbon (tCO_2 / t HC)

OXID_HC = OXID_CH4 Oxidation factor of hydrocarbon (methane) (%)

Other monitoring activities with effect on project emissions
The production of nitric acid for the monitoring period is below the design capacity, hence no limitation of the project emissions is to be applied.

E.3. Calculation of leakage
>>
According to AM0028v1, leakage emissions need only to be analyzed if the project activity does not involve any energy recovery from the tail gas. A tail gas turbine is installed end of pipe, hence LE_y is zero for all plants.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	48,588	680	0	47,907 *)

**) Note that actual calculation of emissions reductions as presented in chapters E1 to E4 has been done in the excel book. Rounding in chapters E1 to E4 has just been done for ease of presentation. Please note that conservative rounding has been made for final ER_y calculation only. This can be traced in the excel book attached to this monitoring report as Annex 2.*

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	140,171 (48 days)	47,907 (48 days)

E.6. Remarks on difference from estimated value in registered PDD
>>
The emissions reductions in this Monitoring Period are 47,907 tonnes of CO_2 equivalents. The yearly expected emissions reductions according to the registered PDD is 1,065,881 tonnes of CO_2 equivalents. This corresponds to emissions reductions of 140,171 tonnes of CO_2 equivalents in 48 days, hence the observed emissions reduction is lower than expected.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		

ANNEX 1

As described in the PDD a Social Fund was established by the project developer and the project operator. This fund contributes to the social and environmental benefit of the people living in the area of the project activity by financing projects. The contribution to the Social Fund and the activities are monitored and reported on an annual basis.
The contribution to the Social Fund since start of operation of the CDM project activity was:

- 2006: no issuance of emission reduction certificates
- 2007: 263,230 Euro
- 2008: 292,690 Euro
- 2009: 467,115 Euro
- 2010: 192,851 Euro
- 2011: 517,411 Euro

The total amount was transferred to the AFC Social Fund bank account expeditiously.

By the end of this Monitoring Period the following Social Fund projects have been finished and cleared or are still on-going:

Finished and ongoing projects					
No	**Project**	**Status**	**Status Date**	**Expenses [LE]**	**Estimated [LE]**
1	Environmental surveillance stations	Finished & cleared	6/2012	1,845,168	2,000,000
2	Adding a central unit to the environment surveillance stations in order to connect it with the national netwrok for industrial emissions surveillance	Finished & cleared	12/2010	17,185	
3	Maintenance and fortification project of the roads (Ali Maher) surrounding AFC company	Finished & cleared	12/2010	2,174,622	
4	Medical convoy (Purchasing of necessary cleaning tools, masks and medicine for the adjacent hospital as well as disinfection measurements)	Finished & cleared	12/2010	52,412	
5	Removing Wastes surrounding AFC company	On-going	11/2012	570,000	
6	Water treatment of a drain in district of Adfina city in El-Buharira governate	Finished & cleared	12/2010	45,500	45,500
7	Planting trees on the roads in the surrounding environment	On-going	11/2012	272,303	250,000
8	Renovation and rehabilitation of schools in the surrounding environment	On-going	11/2012	394,268	450,000
9	Agricultural Area: Purchasing equipment for eradicating mosquitoes and flies including pesticides;	On-going	11/2012	299,815	300,000
10	Medical care for students and people around AFC area for medical checkup and endemic diseases (medical convoy 2)	On-going	11/2012	99,392	100,000
11	Making an environmental study of one of the ditches in the area surrounding the company	On-going	11/2012	150,000	300,000
12	Environmental cleaning activities around AFC area	On-going	11/2012	15,100	500,000
13	Establishment of bridges on Rakta canal for serving residents around AFC area	On-going	11/2012	628,975	750,000
14	Donating for an equipped ambulance for Jone medical center for quick help	On-going	11/2012	431,955	475,000
15	Financing the tools and applications under the cooperation protocol between AFC and Faculty of Science for treatment of El-Amya drainage canal	On-going	11/2012	847,270	1,000,000
16	Construction of a reading and celebration hall	On-going	11/2012	244,252	300,000
17	Finalizing the import of charcoal kiln	Finished & cleared	6/2011	115,000	115,000
18	School development project	On-going	11/2012	169,480	300,000
19	Medical clinic project (Houd 9 area)	On-going	11/2012	139,072	200,000
20	Developing & upgrading project of the environmental affairs agency branch in Alexandria	On-going	11/2012	222,501	500,000
21	Maintaning and strengthening the roads surrounding the company	On-going	11/2012	169,599	3,600,000
	Total amount spent	**cleared**	**11/2012**	**8,903,870**	
	(including estimate)				**13,982,534**

AFC and the local DNA (EEAA) commonly agreed on the funding of the above mentioned and approved projects.

Furthermore AFC and EEAA agreed on the funding of several new projects. They are currently in the design phase.

Designed Projects				
No	**Project**	**Status**	**Status Date**	**Estimated [LE]**
1	Project of Rakta lake annual cleaning works	Design	11/2012	To be defined
2	Covering the canal and the drains on both side of Ali Maher 's road	Design	11/2012	2,500,000
3	Project of medium sized fire truck	Design	11/2012	2,820,000
4	Developing environmental projects in Alexandria	Design	11/2012	135,000
5	Completing the furniture work of reading and celebration hall	Design	11/2012	150,000
6	Developing the post office of the company's residental city	Design	11/2012	150,000
7	Comprehensive maintenance works for fertilizer preparatory / secondary schools	Design	11/2012	1,500,000
8	supporting the installation of smokestack monitoring devices	Design	11/2012	1,000,000
	Total amount estimated		**11/2012**	**8,255,000**

The process of decision making between the plant operator AFC and the local DNA (EEAA) ensures the highest possible social and environmental integrity of projects funded by the AFC Social Fund.

All relevant documents, bank statements and correspondence between AFC and EEAA are submitted for verification.

ANNEX 2

An Excel book containing monitored data and calculations of baseline emissions, project emissions and emission reductions and additional checks and information is attached:

MR_25_AFC_UNFCCC_v1_FINAL.xlsx

Please note: This file is used for claiming emission reductions.