# PROJECT DESIGN DOCUMENT (PDD) FORM FOR ARTICLE 6.4 PROJECTS

**(Version 01.0)**

| BASIC INFORMATION | | | |
|---|---|---|---|
| **Project title:** | Reduction of N2O emissions from a nitric acid plant in Attaka | | |
| **UNFCCC project reference number:** | N/A | | |
| **Host Party:** | Egypt | | |
| **Other participating Parties:** | N/A | | |
| **Activity participant(s): (add rows if needed)** | **Type of Party** | **Name of activity participant(s)** | **Party that is to provide authorization** |
| | Host Party | *CONFIDENTIAL INFORMATION* | Egypt |
| | Other participating Party | Carbon Climate Protection GmbH | Egypt |
| **PDD version number:** | 01.0 | | |
| **PDD completion date:** | 12/05/2025 | | |
| **Applied methodologies and standardised baselines, and their versions:** | $N_2O$ abatement from nitric acid production under Article 6.4 mechanism, version 01.0<br><br>No standardized baseline applicable. | | |
| **Sectoral scope(s):** | 5. Chemical Industries | | |
| **Type of the project:** | ☒ Emission reductions activity<br>☐ Removals activity<br>☐ Combined emission reductions and removals activity | | |
| **Estimated annual emission reductions or net removals over the crediting period ($tCO_2e$/year):** | 140,899 $tCO_2e$ / year | | |

# SECTION A. Project description

## A.1. Project purpose and general description

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The purpose of the proposed project activity is to significantly reduce levels of $N_2O$ emissions from the production of nitric acid at *CONFIDENTIAL INFORMATION* (hereinafter called "*CONFIDENTIAL INFORMATION*") in Attaka, Arab Republic of Egypt.

The nitric acid plant was designed for a capacity of 450 metric tons of $HNO_3$ per day (100% of weight) and to operate with a dual pressure process, where the ammonia oxidation reactor (AOR) is operated at a medium pressure (medium pressure combustion plant). The proposed project activity – a secondary $N_2O$ destruction facility – will be implemented within the nitric acid plant.

**Technologies/measures to be deployed and/or implemented by the project:**

*CONFIDENTIAL INFORMATION* will be equipped with a secondary $N_2O$ abatement by installing baskets inside the AOR and equipping them with the $N_2O$ decomposition catalyst right below the platinum gauze in the high temperature zone of the reactor. The measurement devices for the monitoring of $N_2O$ concentration and tail gas flow will be located directly in the stack.

**Project location:**

*CONFIDENTIAL INFORMATION* operates its nitric acid plant in the Attaka industrial area of Suez, Egypt. Specifically, the facility is located in the El Adabeya District, adjacent to the Ministry of Electricity Station. For further details please refer to section A.4. below.

**Project boundary:**

The spatial extent of the project boundary encompasses the facility and equipment for the nitric acid production process from the inlet of the ammonia burner to the outlet of the tail gas section. As the project activity introduces a secondary abatement facility, the only gas to be included as project emissions is the $N_2O$ that is not destroyed and is still present in the tail gas stream of the plant.

Under the project activity, an $N_2O$ catalyst will be inserted below the primary catalyst ($NH_3$ catalyst) in the ammonia oxidation reactor. The $N_2O$ catalyst will largely result in decomposition of $N_2O$ to nitrogen ($N_2$) and oxygen ($O_2$) without any further energy, nor material inputs. Catalytic decomposition of $N_2O$ occurs when the $N_2O$ is split into its constituent elements by contact with a catalyst. A catalyst is a material, which accelerates the speed of the reaction without itself being transformed or consumed by the reaction.

**Baseline scenario:**

In the absence of regulations requiring the $N_2O$ abatement from the nitric acid production, *CONFIDENTIAL INFORMATION* has no economic incentive to take any $N_2O$ abatement measures because this entails significant capital and operating costs but no financial benefits. Therefore, the project activity is considered additional, and the baseline scenario is that the $N_2O$ is emitted to the atmosphere with no $N_2O$ abatement measure being implemented. Hence, the baseline scenario is the continuation of scenario existing prior to the start of the project activity.

**Estimated annual average and total GHG emission reduction:**

Annual average of GHG emission reductions during 1$^{st}$ crediting period: 140,899 $tCO_2e$

Total GHG emission reductions over 1$^{st}$ crediting period: 704,494 $tCO_2e$

## A.2. Confirmation that the project aligns with the A6.4 activity types indicated by the host Party

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The proposed project activity involves the installation of an $N_2O$ secondary destruction facility in the nitric acid plant of *CONFIDENTIAL INFORMATION*, aimed at significantly reducing process-related $N_2O$ emissions, a potent greenhouse gas.

The confirmation by the host country (Egypt) that the project aligns with the A6.4 activity types will be available when requesting registration. However, Egypt updated Nationally Determined Contribution (NDC)[1], submitted in June 2023, outlines sector specific emission reduction targets, particularly in the electricity, transport, and oil & gas sectors which prioritizes emission reductions in the industrial sector and supports implementation of advanced abatement technologies. Consequently, the proposed activity shall be consistent with the country's being prepared approved activity types. Therefore, the project will be in full compliance with paragraph 26(e) of the Rules, Modalities and Procedures (RMPs)."

## A.3. Demonstration that the project, does not constrain, but aligns with the policies, options and implementation plans of the host Party

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Egypt's LT-LEDS 2050 is a forward-looking strategy that seeks to integrate climate considerations into all aspects of national development, ensuring a sustainable and resilient future for the country.

It's officially known as the National Climate Change Strategy (NCCS) 2050, is a comprehensive framework aimed at aligning the country's development with climate resilience and sustainable growth. The strategy integrates climate considerations into national planning and budgeting, supporting Egypt Vision 2030.

Therefore, Egypt's implementation of nitrous oxide ($N_2O$) destruction technologies in its nitric acid industry significantly contributes to the country's LT-LEDS 2050. The planned technology – to be installed at *CONFIDENTIAL INFORMATION* ´s nitric acid plant in Attaka – reduces GHG ($N_2O$) emissions and hence aligns with Egypt's climate goals.

These initiatives demonstrate Egypt's commitment to international climate agreements and enhance its credibility in global climate negotiations, showcasing proactive measures in emission reductions.

## A.4. Project location

[1] https://unfccc.int/sites/default/files/NDC/2023-06/Egypts%20Updated%20First%20Nationally%20Determined%20Contribution%202030%20%28Second%20Update%29.pdf

| | |
|---|---|
| **Host Party** | Egypt |
| **Region(s)/State(s)/Province(s)** | Suez |
| **Cities/towns/communities** | Attaka |
| **Geographic coordinates** | *CONFIDENTIAL INFORMATION* |

**Map of project location**


Figure 1: Project location

## A.5. Technology/measures

### A.5.1. Existing technologies/measures prior to project implementation

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**(a) Existing technology**

The nitric acid plant is designed without any $N_2O$ abatement measure. The scenario existing prior to the project implementation is that the $N_2O$ is emitted to the atmosphere.

$N_2O$ 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 (which includes the main facilities in the nitric acid plant):

1. <u>Ammonia ($NH_3$) combustion to form nitric oxide (NO):</u>

   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 following equation:

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

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

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

$4\,NH_3 + 4O_2 \rightarrow 2\,N_2O + 6\,H_2O$ (side reaction 2)

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

2. NO is oxidized 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 oxidized to $NO_2$ according to main reaction 2.)

When leaving the ammonia oxidation reactor, there is no relevant loss of $N_2O$ in the tail gas section unless a $N_2O$ destruction facility is installed. $N_2O$ that leaves the AOR is thus discharged to atmosphere in the tail gas, and has no economic value.

### (b) NA plant production / Installed capacities

*CONFIDENTIAL INFORMATION* plant plays a pivotal role in Egypt's fertilizer and chemical industry. It produces a range of nitrogenous fertilizers and intermediate chemicals. These products are essential for the agricultural sector, supporting both domestic needs and export markets. The plant's strategic location, advanced production capabilities, and alignment with national industrial objectives underscore its importance in Egypt's economic and industrial development. The nitric acid plant in *CONFIDENTIAL INFORMATION*, designed for a capacity of 450 metric tons of $HNO_3$ per day (100% of weight).

### (c) Arrangement of existing facilities

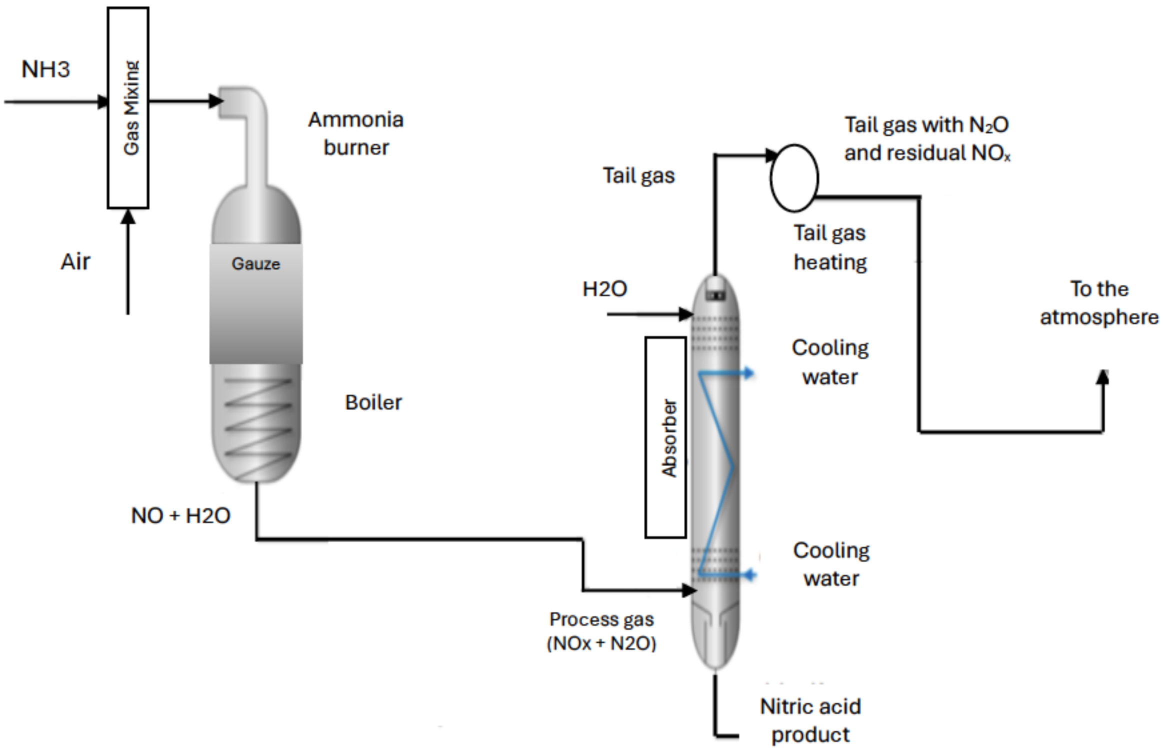


Figure 2: Arrangement of existing facilities

**(d) Age and lifetime of existing equipment**

*CONFIDENTIAL INFORMATION* nitric acid plant was modernized in 1983 and has undergone significant modernization efforts in recent years. There are several factors have been followed to achieve the best performance of nitric acid plant to operate far beyond lifetime of plant such as (not limited to):

- Regular maintenance,
- Regular preventive maintenance activities.
- Equipment overhaul, and modernization which increase significantly the lifetime of the plant,
- Regular replacement of AOR catalyst in accordance with supplier recommendations,

Therefore, NA plant operates normally without any lifetime constrains as long as above-mentioned regular maintenance, modernization and equipment overhaul activities are being taking place.

**(e) Monitoring equipment**

Currently, no relevant monitoring equipment is installed within the project boundary except the nitric acid production measurements and AOR temperature transmitter. The nitric acid production measurement is located directly after the absorber tower of *CONFIDENTIAL INFORMATION* ´s nitric acid plant. The AOR temperature transmitter is located directly at the AOR burner.

### A.5.2. Technologies/measures implemented/deployed by the project

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*CONFIDENTIAL INFORMATION* nitric acid plant will be equipped with a secondary $N_2O$ abatement by installing baskets inside the AOR and equipping them with the $N_2O$ decomposition catalyst right below the platinum gauze in the high temperature zone of the reactor. The measurement devices for the monitoring of $N_2O$ concentration and tail gas flow will be located directly in the stack.

Secondary catalysts have been implemented in a number of nitric acid plants in Europe. The $N_2O$ destruction for the project activity (secondary technology) is taking place as per following reaction:

$$2\,N_2O \rightarrow 2\,N_2 + O_2$$

Operating a secondary catalyst system does not require additional heat or other energy input, because the temperature levels present inside the AOR suffice to ensure its optimum abatement efficiency. There are no additional GHG or other emissions generated by the reactions on at the $N_2O$ abatement catalyst. The following figure describes the arrangement of the secondary abatement facility in general:

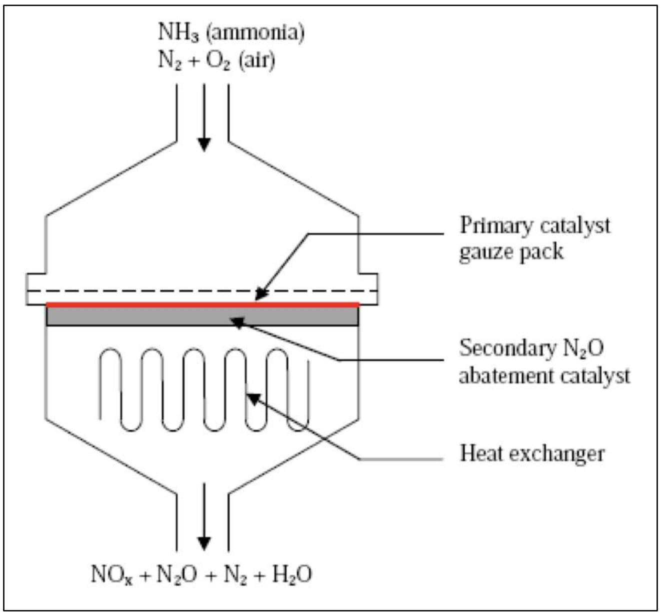


Figure 3: Nitric acid ammonia burner with $N_2O$ secondary abatement

$N_2O$ secondary abatement systems in nitric acid plants mainly consists of a catalyst installed downstream of the AOR which shall be replaced regularly based on its performance. Besides that, any other components of the $N_2O$ facility (e.g. steel housing, equipment, … etc.) shall undergo regular inspection and modernization which makes the lifetime of the respective facility last more than 25 years.

The project will employ the latest state of the art monitoring and control equipment that measures, records and reports all key parameters to determine the GHG emission reductions. The unit will be equipped with an Automated Monitoring System (AMS) in order to allow continuous real-time measurements of the $N_2O$ concentration and the total gas volume flow, which is required by the applied methodology. The measurement devices for the monitoring of $N_2O$ concentration and tail gas flow will be located directly in the stack.

### A.5.3. Declaration related to the existence of a former project in the same geographical location

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The project activity hasn't been registered under any other international, regional, national or subnational GHG mitigation crediting scheme whose crediting period has or has not expired in the same geographical location as the proposed project.

## A.6. Parties and activity participants

| Type of Party | Name of the Party | Activity participant(s) |
|---|---|---|
| Host Party | Egypt | *CONFIDENTIAL INFORMATION*<br>Carbon Climate Protection GmbH |

# SECTION B. Application of methodologies and standardized baselines

## B.1. References to methodologies and standardized baselines

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Applied methodology: $N_2O$ abatement from nitric acid production under Article 6.4 mechanism, version 01.0

## B.2. Applicability of methodologies and standardized baselines

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Applicability conditions of the proposed mechanism methodology:

Title: $N_2O$ abatement from nitric acid production under Article 6.4 mechanism, version 01.0

UNFCCC Ref. No.: not available as this PDD is submitted along with a new proposed Article 6.4 methodology

Methodological tools:

- CDM methodological tool: Tool to determine the mass flow of a greenhouse gas in a gaseous stream, version 03.0
- CDM methodological tool: Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, version 03.0
- Article 6.4 Sustainable development tool, version 01.1

| Applicability condition in the methodological regulatory document or the methodological requirement specified by the host Party | Compliance of the project with the applicability condition in the methodological regulatory document or the methodological requirement specified by the host Party |
|---|---|
| >> In case that the nitric acid plant started commercial operation before the implementation of the project activity, the activity participants shall demonstrate that there was no secondary or tertiary $N_2O$ abatement technology installed in the respective nitric acid plant. In case of a new nitric acid plant, the activity participants shall demonstrate that no $N_2O$ abatement technology was implemented in the design of the respective nitric acid plant. | Presently, no $N_2O$ abatement technology is installed in the plant. |
| >> Continuous real-time measurements of the $N_2O$ concentration and the total gas volume flow can be carried out in the tail gas stream after the abatement of $N_2O$ emissions throughout the crediting period of the project activity. | The plant will be equipped with a complete Automated Monitoring System (AMS). It is used to continuously measure $N_2O$ concentration and total gas volume flow in the stack during the plant's operation throughout the crediting period. |
| >> No law or regulation which mandates the complete or partial destruction of $N_2O$ from nitric acid plants exists in the host country where the project activity is implemented. | The host country does not apply any legal requirements to reduce $N_2O$ emissions from nitric acid plants. |
| >> Sustainable development: The project should align with the host country's sustainable development goals (SDGs) and contribute to the achievement of the NDC of the host country, ensuring that activities are both environmentally and socially responsible. | The catalytic $N_2O$ destruction project at *CONFIDENTIAL INFORMATION* ´s Nitric Acid Plant is a sustainable project that contributes to the environmental, economic and social benefits in Egypt. |
| >> Monitoring, Reporting and Verification (MRV) systems: Projects must have robust MRV systems in place to track emissions reductions, monitor project performance, and ensure that the environmental benefits are accurately accounted for. | The project will employ the latest state of the art monitoring and control equipment that measures, records and reports all key parameters to determine the GHG emission reductions. The plant will be equipped with an Automated Monitoring System (AMS) in order to allow continuous real-time measurements of the $N_2O$ concentration and the total gas volume flow. |

## B.3. Project boundary, sources, sinks and greenhouse gases

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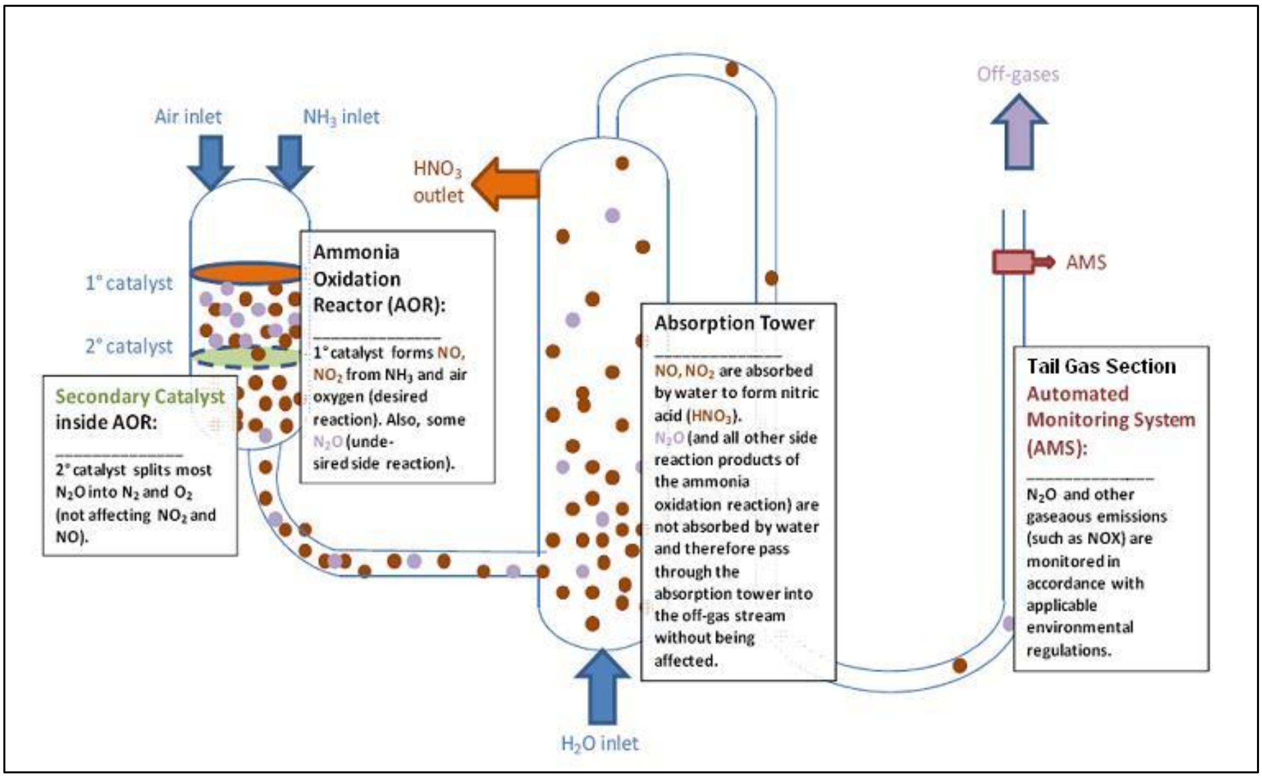


Figure 4: Project boundary if the project activity includes the introduction of a secondary $N_2O$ abatement measure (simplified standard nitric plant layout displaying the location of the $N_2O$ abatement catalyst, process sources of $N_2O$ and the sampling point location for the Automated Monitoring System (AMS))

The spatial extent of the project boundary encompasses the facility and equipment for the nitric acid production process from the inlet of the ammonia burner to the outlet of the tail gas section. As the project activity introduces secondary abatement, the only gas to be included as project emissions is the $N_2O$ that is not destroyed and is still present in the tail gas stream of the plant. The secondary $N_2O$ abatement takes place in the ammonia oxidation reactor (AOR).

For greenhouse gases included in or excluded from the project boundary please refer to the tables in section B.3.1 and B.3.2.

### B.3.1. Baseline emissions/removals

| Source/reservoir/pool | GHG | | Justification/Explanation |
|---|---|---|---|
| $NH_3$ oxidation at the primary catalyst gauze | $CO_2$ | ☐ Included<br>☒ Not included | >> The project activity has no influence on these types of emissions, if present |
| | $CH_4$ | ☐ Included<br>☒ Not included | >> The project activity has no influence on these types of emissions, if present |
| | $N_2O$ | ☒ Included<br>☐ Not included | >> Included, main emission source |

### B.3.2. Project emissions/removals

| Source/reservoir/pool | GHG | | Justification/Explanation |
|---|---|---|---|
| $NH_3$ oxidation at the primary catalyst gauze | $CO_2$ | ☐ Included<br>☒ Not included | >> The project activity has no influence on these types of emissions, if present |
| | $CH_4$ | ☐ Included<br>☒ Not included | |

| | | | |
|---|---|---|---|
| | $N_2O$ | ☒ Included<br>☐ Not included | >> Included, main emission source |
| Operation of a secondary $N_2O$ abatement facility | $CO_2$ | ☐ Included<br>☒ Not included | >> The project activity has no influence on these types of emissions, if present |
| | $CH_4$ | ☐ Included<br>☒ Not included | |
| | $N_2O$ | ☒ Included<br>☐ Not included | >> Included |

## B.4. Establishment and description of baseline scenario

### B.4.1. Identification of the baseline scenario

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At present, no laws or regulations exist, which mandate the complete or partial destruction of $N_2O$ from NA plants in the host country, the Arab Republic of Egypt. In accordance with the proposed methodology, *CONFIDENTIAL INFORMATION* has no economic incentives to take any $N_2O$ abatement measures in its NA plant in the absence of regulations requiring such measures, as this would entail significant capital and operating costs, but no financial benefits. Therefore, as per scenario 1 “Continued $N_2O$ emissions without any abatement” of the applied proposed mechanism methodology, the project activity is considered additional and it is identified as the baseline scenario ($N_2O$ is emitted to the atmosphere with no $N_2O$ abatement measure implemented).

### B.4.2. Identification of the BAU scenario or reference benchmark

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$N_2O$ is an unwanted by-product of the manufacture process of nitric acid ($HNO_3$), where it is formed alongside the main product nitric oxide (NO) during the catalytic oxidation of ammonia ($NH_3$). Without any incentives plant operators won´t take any $N_2O$ abatement measures, which is identified to be the business-as-usual (BAU) scenario.

As per the applied proposed methodology, the emissions under the BAU scenario are based on *IPCC 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* (hereinafter called “IPCC 2019”).

## B.5. Demonstration of additionality

### B.5.1. Regulatory analysis

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The host country does not apply any legal requirements to reduce $N_2O$ emissions from nitric acid plants.

In the absence of regulations requiring the abatement of $N_2O$ emissions, *CONFIDENTIAL INFORMATION* has no economic incentives to take any $N_2O$ abatement measures because this entails significant capital and operating costs but no financial benefits.

### B.5.2. Avoidance of lock-in

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The lifetime of an $N_2O$ abatement is longer than the crediting period of an Article 6.4 mitigation activity. Therefore:

- Egypt will benefit from the installed $N_2O$ abatement technology even beyond the end of the Article 6.4 activity´s crediting period.

- Does not lead to the adoption or the prolongation of the lifetime of technologies or practices that are incompatible with long term goals of the Paris Agreement, considering different national circumstances, approaches and pathways.
- This mechanism methodology has been developed based on actual and reliable data of nitric acid plants taking into consideration the technologies, which achieve lower $N_2O$ emission levels. This leads to lower emissions nationally and globally and contributes to achieve the long-term goals of the Paris Agreement. Hence, it can be ensured that crediting levels won´t undermine the host country's achievement of NDCs and Long-term Low-Emission Development Strategy (LT-LEDS).

### B.5.3. Financial additionality or performance-based approach

☒ Financial additionality ☐ Performance-based approach

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In the absence of regulations requiring the abatement of $N_2O$ emissions, the operator of the nitric acid plant has no economic incentives to take any $N_2O$ abatement measures because this would entail significant capital and operating costs but no financial benefits. Hence, the income from selling certified and approved emission reductions generated by an Article 6.4 activity is the only income stream and motivation for an operator of a nitric acid plant to invest in an $N_2O$ abatement measure.

Therefore, the project activity is considered additional, and the baseline scenario is that the $N_2O$ is emitted to the atmosphere with no $N_2O$ abatement measure being implemented.

### B.5.4. Common practice analysis

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The proposed project activity is not common practice in Egypt. All nitric acid plants release the $N_2O$ emissions to the atmosphere in Egypt with no $N_2O$ abatement facility installed, except one registered and implemented project under the CDM. Accordingly, as per the geographic boundary (Egypt), the proposed project activity (equip *CONFIDENTIAL INFORMATION* ´s nitric acid plant with an $N_2O$ abatement facility) is considered not a common practice.

## B.6. Addressing non-permanence and risks of reversals

### B.6.1. Identification of risk of reversal

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This project activity doesn't involve removals and emission reduction with reversal risks.

### B.6.2. Reversals risk assessment

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N/A

### B.6.3. Reversals risk mitigation plan

>>

N/A

### B.6.4. Remediation of reversals

>>

N/A

## B.7. Calculation of emission reductions or net removals

### B.7.1. Calculation of BAU emissions/removals and baseline emissions/removals

#### B.7.1.1. Calculation of BAU emissions/removals

>>

BAU baseline emissions are calculated as follows:

$$BE_{BAU,y} = P_{production,y} \times EF_{BAU} \times h_y \times GWP_{N2O} \times 10^{-3}$$ Equation (1)

Where:

| Parameter | | Description | Source of data |
|---|---|---|---|
| $BE_{BAU,y}$ | = | BAU baseline emissions in year *y* (t $CO_2$e) | Calculated |
| $P_{production,y}$ | = | Production of nitric acid in year *y* (t $HNO_3$) | Measured |
| $EF_{BAU}$ | = | Default BAU baseline $N_2O$ emission factor acc. to the operating pressure of ammonia burner (related to 100 % pure acid) (kg $N_2O$/t $HNO_3$) | IPCC 2019 |
| $GWP_{N2O}$ | = | Global Warming Potential of $N_2O$ | Relevant decisions by the CMA |
| $h_y$ | = | Number of hours in year *y* during which the plant was in operation (h) | Measured |

To calculate the BAU emissions as per the equation above, neither assumptions nor sampling were made.

#### B.7.1.2. Calculation of baseline emissions/removals

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Baseline emissions are calculated as follows as per the applied methodology:

$$BE_y = P_{production,y} \times EF_y \times \frac{(h_y - h_{r,y})}{h_y} \times GWP_{N2O} \times 10^{-3}$$ Equation (2)

Where:

| | | |
|---|---|---|
| $BE_y$ | = | Baseline emissions in year *y* (t $CO_2$e) |
| $P_{production,y}$ | = | Production of nitric acid in year *y* (t $HNO_3$) |
| $EF_y$ | = | Baseline $N_2O$ emission factor for nitric acid production in year *y* (kg $N_2O$/t $HNO_3$) |
| $GWP_{N2O}$ | = | Global Warming Potential of $N_2O$ valid for the commitment period |
| $h_y$ | = | Number of hours in year *y* during which the plant was in operation (h) |
| $h_{r,y}$ | = | Number of hours (h) in year *y* where:<br>a) Secondary $N_2O$ abatement system was not installed, underperforming or failed;<br>b) Tertiary $N_2O$ abatement system is by-passed, underperforming or failed |

**Determination of baseline emission factor ($EF_y$)**

$$EF_y = Min(EF_{default\ adjusted,y}; EF_{BAU,y})$$ Equation (3)

Where:

| | | |
|---|---|---|
| $EF_y$ | = | Baseline $N_2O$ emission factor for nitric acid production in year *y* (kg $N_2O$/t $HNO_3$) |
| $EF_{default\ adjusted,y}$ | = | Adjusted default baseline $N_2O$ emission factor for nitric acid production in year *y (*kg $N_2O$/t $HNO_3$) |
| $EF_{BAU,y}$ | = | Default BAU baseline $N_2O$ emission factor acc. to the operating pressure of ammonia burner (related to 100 % pure acid) (kg $N_2O$/t $HNO_3$) |

Parameter $EF_{default\ adjusted,y}$ shall be determined as per applied proposed methodology.

**Calculation of $h_{r,y}$**

An abatement system is deemed to be by-passed, not working, underperforming or failed in the hour *h* in year *y* if:

$$F_{N2O,tail\ gas,h} > EF_y \times P_{NA,h} \quad \text{Equation (4)}$$

Where:

| | | |
|---|---|---|
| $P_{NA,h}$ | = | Nitric acid produced in the hour *h* (t $HNO_3$) |
| $EF_y$ | = | Baseline $N_2O$ emission factor for nitric acid production in year *y* (kg $N_2O$/t $HNO_3$) |
| $F_{N2O,tailgas,h}$ | = | Mass flow of $N_2O$ in the gaseous stream of the tail gas in the hour *h* (kg $N_2O$/h) |

### B.7.1.3. Calculation of the annual difference between baseline and BAU emissions/removals

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According to the calculations in section 7.4 below the following can be confirmed:

- Crediting baseline ($BE_y$) is lower than the conservative BAU baseline ($BE_{BAU,y}$) for all individual years.
- Crediting baseline ($BE_y$) is lower than the BAU baseline ($BE_{BAU,y}$) for the whole crediting period.

### B.7.1.4. Factors or quantitative methods for downward adjustment of baseline

>>

Default baseline emission factor according to the ambitious benchmark approach is calculated as per the applied proposed mechanism methodology, considering IPCC guidelines as a reference to the default emission factor ($EF_{default,y}$) and annual downward adjustment increase.

The annual increase in the downward adjustment corresponds to 1% of the baseline emissions in the calendar year of the start date of the first crediting period besides the annual downward adjustment by 0.2 kg $N_2O$ / t $HNO_3$ (which is reflected in the baseline calculations).

### B.7.2. Calculation of project emissions/removals

>>

Project emissions include emissions of $N_2O$, which have not been destroyed by the project activity, and in case of the installation of a tertiary $N_2O$ abatement facility, $CO_2$ emissions resulting from the operation of the $N_2O$ abatement facility. They are calculated as follows:

$$PE_y = PE_{N2O,y} + PE_{CO2,tertiary,y} \quad \text{Equation (5)}$$

Where:

| | | |
|---|---|---|
| $PE_y$ | = | Project emissions in year *y* (t $CO_2$e) |
| $PE_{N2O,y}$ | = | Project emissions of $N_2O$ from the project plant in year *y* (t $CO_2$e) |
| $PE_{CO2,tertiary,y}$ | = | Project emissions of $CO_2$ from the operation of the tertiary $N_2O$ abatement facility in year *y* (t $CO_2$) |

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

The amount of $N_2O$ emissions from the project activity are the emissions from the $N_2O$ contained in the tail gas stream of the plant which is released to the atmosphere. Accordingly, $PE_{N2O,y}$ is determined as follows:

$$PE_{N2O,y} = \sum_{1}^{h_y - h_{r,y}} F_{N2O,tail\ gas,h} \times GWP_{N2O} \times 10^{-3} \quad \text{Equation (6)}$$

Where:

| | | |
|---|---|---|
| $PE_{N2O,y}$ | = | Project emissions of $N_2O$ from the project plant in year *y* (t $CO_2$e) |
| $GWP_{N2O}$ | = | Global warming potential of $N_2O$ valid for the commitment period |
| $F_{N2O,tailgas,h}$ | = | Mass flow of $N_2O$ in the gaseous stream of the tail gas in the hour *h* (kg $N_2O$/h) |
| $h_y$ | = | Number of hours in year *y* during which the plant was in operation (h) |
| $h_{r,y}$ | | Number of hours (h) in year *y* where:<br>(a) Secondary $N_2O$ abatement system was not installed, underperforming or failed;<br>(b) Tertiary $N_2O$ abatement system is by-passed, underperforming or failed |

Determination of $F_{N2O,tailgas,h}$

The amount of $N_2O$ emissions from the tail gas stream of the project plant shall be determined using the latest approved and/or under Article 6.4 updated version of “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”. In applying the tool, the following provisions apply:

(a) Throughout the crediting periods of the project activity, the $N_2O$ concentration and volume or mass flow of the tail gas are to be monitored continuously. The monitoring system is to be installed and maintained throughout the crediting period based on the European Norm 14181 (2015) or any recent update of that standard, or any equivalent national standard;

(b) The monitoring system should provide separate hourly average values for the $N_2O$ concentration and the volume or mass flow of the tail gas based on two seconds (or shorter) interval readings that are recorded and stored electronically. These $N_2O$ data sets shall be identified by means of a unique time/date key indicating when exactly the values were observed;

(c) The correction factors derived from the calibration curve of the QAL2 audit for the monitoring components as determined during the QAL2-test in accordance with EN14181 must be applied to both the $N_2O$ concentration and the volume or mass flow of the tail gas. This can either be applied automatically to the raw data recorded by the data storage system at the plant or it can be applied to the calculated hourly averages as part of the calculation of project emissions;

(d) If data for either the $N_2O$ concentration or the volume or mass flow of the tail gas are not available for more than 1/3 of any hour while the plant was in operation, the value for that hour shall be replaced with the maximum value of $N_2O$ concentration or volume or mass flow of the tail gas observed during the monitoring period. If data for neither the $N_2O$ concentration nor the volume or mass flow of the tail gas are available for more than 1/3 of any hour while the plant was in operation, the maximum value of mass flow of $N_2O$ calculated during the monitoring period shall be applied to any such hour. Values observed during five operating hours before and after a plant start-up and shut-down shall not be used for the determination of the maximum values;

(e) In the case that the $N_2O$ concentration and the volume or mass flow of the tail gas and by-pass are automatically converted to normal conditions by the AMS during the monitoring process, the parameters $P_t$ and $T_t$ do not need to be monitored except, if applicable, for the purpose of determining the moisture content in the gaseous stream.

Based on the currently available information Option A of the tool will be applied (measurement options for option A: volume flow of gaseous stream on dry basis, volumetric fraction on dry or wet basis), which states two ways how to demonstrate that the gaseous stream is dry. These are:

(a) Measure the moisture content of the gaseous stream ($C_{H2O,t,db,n}$) and demonstrate that this is less or equal to 0.05 kg $H_2O/m^3$ dry gas; or

(b) Demonstrate that the temperature of the gaseous stream ($T_t$) is less than 60°C (333.15 K) at the flow measurement point.

The mass flow of greenhouse gas i ($F_{i,t}$)[2] is determined as follows:

$$F_{i,t} = V_{t,db} \times v_{i,t,db} \times \rho_{i,t}$$ Equation (5) of tool

With

$$\rho_{i,t} = \frac{P_t \times MM_i}{R_u \times T_t}$$ Equation (6) of tool

Where:

| | | |
|---|---|---|
| $F_{i,t}$ | = | Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h) |
| $V_{t,db}$ | = | Volumetric flow of the gaseous stream in time interval t on a dry basis ($m^3$ dry gas/h) |
| $v_{i,t,db}$ | = | Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis ($m^3$ gas i/$m^3$ dry gas) |
| $\rho_{i,t}$ | = | Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/$m^3$ gas i) |
| $P_t$ | = | Absolute pressure of the gaseous stream in time interval t (Pa) |
| $MM_i$ | = | Molecular mass of greenhouse gas i (kg/kmol) |
| $R_u$ | = | Universal ideal gases constant (Pa.$m^3$/kmol.K) |
| $T_t$ | = | Temperature of the gaseous stream in time interval t (K) |

**Assumptions and source of data**

- This methodology doesn't include assumptions, all relevant parameters are included and fully described, and for unavailable data a conservative recalculation approach is given.
- Parameters are measured by calibrated instruments, which undergo maintenance and calibration routines based on the manufacturer specifications and in accordance with relevant approved standards (Article 6.4 validation and verification standards for projects, etc.).
- $N_2O$ emission factors (e.g. $EF_{default,y}$) are based on IPCC guidelines.

[2] $F_{i,t}$ corresponds to the parameter $F_{N2O,tail\ gas,h}$ of the methodology ACM0019.

### B.7.3. Addressing of leakage

#### B.7.3.1. Sources of leakage

>>

Any leakage emissions sources are deemed to be negligible.

#### B.7.3.2. Description of how leakage is avoided, minimized or addressed

>>

Any leakage emissions sources are deemed to be negligible.

#### B.7.3.3. Calculation of leakage emissions

>>

Any leakage emissions sources are deemed to be negligible.

### B.7.4. Calculation of emission reductions or net removals

>>

**BAU baseline emissions:**

| Parameter | | $BE_{BAU,y}$ | $P_{production,y}$ | $EF_{BAU}$ | $GWP_{N2O}$ | $h_y$ | $h_{r,y}$ |
|---|---|---|---|---|---|---|---|
| Unit | | t $CO_2$e | t $HNO_3$ | kg $N_2O$ / t $HNO_3$ | - | h | h |
| Year 1 | 01/07 – 31/12/2026 | **108,147** | 58,300 | 7.00 | 265 | 3,109 | 0 |
| Year 2 | 2027 | **214,531** | 115,650 | 7.00 | 265 | 6,168 | 0 |
| Year 3 | 2028 | **214,531** | 115,650 | 7.00 | 265 | 6,168 | 0 |
| Year 4 | 2029 | **214,531** | 115,650 | 7.00 | 265 | 6,168 | 0 |
| Year 5 | 2030 | **214,531** | 115,650 | 7.00 | 265 | 6,168 | 0 |
| Year 6 | 01/01 – 30/06/2031 | **106,384** | 57,350 | 7.00 | 265 | 3,059 | 0 |

**Baseline emissions:**

| Parameter | | $BE_y$ | $P_{production,y}$ | $EF_y$ | $GWP_{N2O}$ | $h_y$ | $h_{r,y}$ |
|---|---|---|---|---|---|---|---|
| Unit | | t $CO_2$e | t $HNO_3$ | kg $N_2O$ / t $HNO_3$ | - | h | h |
| Year 1 | 01/07 – 31/12/2026 | **89,608** | 58,300 | 5.80 | 265 | 3,109 | 0 |
| Year 2 | 2027 | **171,563** | 115,650 | 5.60 | 265 | 6,168 | 0 |
| Year 3 | 2028 | **165,311** | 115,650 | 5.39 | 265 | 6,168 | 0 |
| Year 4 | 2029 | **158,995** | 115,650 | 5.19 | 265 | 6,168 | 0 |
| Year 5 | 2030 | **152,617** | 115,650 | 4.98 | 265 | 6,168 | 0 |
| Year 6 | 01/01 – 30/06/2031 | **72,487** | 57,350 | 4.77 | 265 | 3,059 | 0 |

Baseline $N_2O$ emission factor:

| Parameter | | $EF_y$ | $EF_{Default\ adjusted,y}$ | $EF_{BAU,y}$ |
|---|---|---|---|---|
| Unit | | kg $N_2O$ / t $HNO_3$ | kg $N_2O$ / t $HNO_3$ | kg $N_2O$ / t $HNO_3$ |
| Year 1 | 01/07 – 31/12/2026 | **5.80** | 5.80 | 7.00 |
| Year 2 | 2027 | **5.60** | 5.60 | 7.00 |
| Year 3 | 2028 | **5.39** | 5.39 | 7.00 |
| Year 4 | 2029 | **5.19** | 5.19 | 7.00 |
| Year 5 | 2030 | **4.98** | 4.98 | 7.00 |
| Year 6 | 01/01 – 30/06/2031 | **4.77** | 4.77 | 7.00 |

Increase of downward adjustment of baseline emissions:

| Parameter | | $EF_{default,y}$ | $EF_{default\ adjusted,y}$ | Annual increase of adjustment |
|---|---|---|---|---|
| Unit | | kg $N_2O$ / t $HNO_3$ | kg $N_2O$ / t $HNO_3$ | 1.00% |
| Year 1 | 01/07 – 31/12/2026 | 5.80 | 5.80 | |
| Year 2 | 2027 | 5.60 | 5.60 | |
| Year 3 | 2028 | 5.40 | 5.39 | |
| Year 4 | 2029 | 5.20 | 5.19 | |
| Year 5 | 2030 | 5.00 | 4.98 | |
| Year 6 | 01/01 – 30/06/2031 | 4.80 | 4.77 | |

**Crediting baseline emissions:**

| Parameter | | Crediting baseline | Downward adjusted baseline | | Conservative BAU baseline | |
|---|---|---|---|---|---|---|
| | | $BE_y$ | $BE_{y,adjusted}$ | $EF_{default\ adjusted,y}$ | $BE_{BAU,y}$ | $EF_{BAU}$ |
| Unit | | $tCO_2e$ | $tCO_2e$ | $kgN_2O/tHNO_3$ | $tCO_2e$ | $kgN_2O/tHNO_3$ |
| year 1 | 01/07 – 31/12/2026 | **89,608** | 89,608 | 5.80 | 108,147 | 7.00 |
| year 2 | 2027 | **171,563** | 171,563 | 5.60 | 214,531 | 7.00 |
| year 3 | 2028 | **165,311** | 165,311 | 5.39 | 214,531 | 7.00 |
| year 4 | 2029 | **158,995** | 158,995 | 5.19 | 214,531 | 7.00 |
| year 5 | 2030 | **152,617** | 152,617 | 4.98 | 214,531 | 7.00 |
| Year 6 | 01/01 – 30/06/2031 | **72,487** | 72,487 | 4.77 | 106,384 | 7.00 |
| Total | | **810,581** | 810,581 | | 1,072,654 | |

**Project emissions:**

| Parameter | | $PE_y$ | $PE_{N2O,y}$ | $PE_{CO2,tertiary,y}$ |
|---|---|---|---|---|
| Unit | | t $CO_2e$ | t $CO_2e$ | t $CO_2e$ |
| Year 1 | 01/07 – 31/12/2026 | **10,696** | 10,696 | 0 |
| Year 2 | 2027 | **21,217** | 21,217 | 0 |

| | | | | |
|---|---|---|---|---|
| Year 3 | 2028 | **21,217** | 21,217 | 0 |
| Year 4 | 2029 | **21,217** | 21,217 | 0 |
| Year 5 | 2030 | **21,217** | 21,217 | 0 |
| Year 6 | 01/01 – 30/06/2031 | **10,522** | 10,522 | 0 |

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

| **Parameter** | | **$PE_{N2O,y}$** | **$F_{N2O,tailgas,h}$** | **$GWP_{N2O}$** | **$h_y$** | **$h_{r,y}$** |
|---|---|---|---|---|---|---|
| Unit | | t $CO_2$e | kg$N_2$O/h | - | h | h |
| Year 1 | 01/07 – 31/12/2026 | **10,696** | 12.98 | 265 | 3,109 | 0 |
| Year 2 | 2027 | **21,217** | 12.98 | 265 | 6,168 | 0 |
| Year 3 | 2028 | **21,217** | 12.98 | 265 | 6,168 | 0 |
| Year 4 | 2029 | **21,217** | 12.98 | 265 | 6,168 | 0 |
| Year 5 | 2030 | **21,217** | 12.98 | 265 | 6,168 | 0 |
| Year 6 | 01/01 – 30/06/2031 | **10,522** | 12.98 | 265 | 3,059 | 0 |

The mass flow of GHG is calculated as follows:

| **Parameter** | | **$F_{N2O,tailgas,h}$** | **$V_{t,db,n}$** | **$v_{i,t,db}$** | **$\rho_{i,t}$** |
|---|---|---|---|---|---|
| Unit | | kg$N_2$O/h | m³ dry gas/h | m³ gas i/m³ dry gas | kg gas i/m³ gas i |
| Year 1 | 01/07 – 31/12/2026 | **12.98** | 83,612 | 1.10E-04 | 1.41 |
| Year 2 | 2027 | **12.98** | 83,612 | 1.10E-04 | 1.41 |
| Year 3 | 2028 | **12.98** | 83,612 | 1.10E-04 | 1.41 |
| Year 4 | 2029 | **12.98** | 83,612 | 1.10E-04 | 1.41 |
| Year 5 | 2030 | **12.98** | 83,612 | 1.10E-04 | 1.41 |
| Year 6 | 01/01 – 30/06/2031 | **12.98** | 83,612 | 1.10E-04 | 1.41 |

| **Parameter** | | **$\rho_{i,t}$** | **$P_t$** | $MM_i$ | **$R_u$** | **$T_t$** |
|---|---|---|---|---|---|---|
| Unit | | kg gas i/m³ gas i | Pa | kg/kmol | Pa.m³/kmol.K | K |
| Year 1 | 01/07 – 31/12/2026 | **1.41** | 104,000 | 44.02 | 8,314 | 390.15 |
| Year 2 | 2027 | **1.41** | 104,000 | 44.02 | 8,314 | 390.15 |
| Year 3 | 2028 | **1.41** | 104,000 | 44.02 | 8,314 | 390.15 |
| Year 4 | 2029 | **1.41** | 104,000 | 44.02 | 8,314 | 390.15 |
| Year 5 | 2030 | **1.41** | 104,000 | 44.02 | 8,314 | 390.15 |
| Year 6 | 01/01 – 30/06/2031 | **1.41** | 104,000 | 44.02 | 8,314 | 390.15 |

**Emission reductions:**

| **Parameter** | | **$ER_y$** | **$BE_y$** | **$PE_y$** |
|---|---|---|---|---|
| Unit | | t $CO_2$e | t $CO_2$e | t $CO_2$e |
| Year 1 | 01/07 – 31/12/2026 | **78,912** | 89,608 | 10,696 |
| Year 2 | 2027 | **150,346** | 171,563 | 21,217 |

| | | | | |
|---|---|---|---|---|
| Year 3 | 2028 | **144,093** | 165,311 | 21,217 |
| Year 4 | 2029 | **137,778** | 158,995 | 21,217 |
| Year 5 | 2030 | **131,400** | 152,617 | 21,217 |
| Year 6 | 01/01 – 30/06/2031 | **61,965** | 72,487 | 10,522 |

### B.7.5. Data and parameters fixed ex ante

**Data / Parameter table 1.**

| **Data/parameter** | **Operating pressure** |
|---|---|
| Description | Operating pressure of the ammonia burner |
| Data unit | kPa |
| Equations referred | Equation (1), Equation (2); Determination of ammonia burner pressure |
| Purpose of data | ☒ Baseline emissions/removals ☐ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | 350 |
| Source of data | ☐ Measured ☒ Other sources |
| Choice of data or measurement methods and procedures | Manufacturer specifications |
| Additional comments | The parameter is used to determine whether the nitric acid plant operates at a low, medium or high pressure. |

**Data / Parameter table 2.**

| **Data/parameter** | **$EF_{default,y}$** |
|---|---|
| Description | Default baseline $N_2O$ emission factor according to the operating pressure of the ammonia burner in year y (related to 100 % pure acid) |
| Data unit | kg $N_2O$/t $HNO_3$ |
| Equations referred | Equation (2), Equation (3), Equation (4) |
| Purpose of data | ☒ Baseline emissions/removals ☐ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | The emission factors for all plant types will decrease until they reach a value of 2.5 kg $N_2O$/t $HNO_3$. Afterwards emission factors will remain constant over time:<br>Year / Medium pressure (200 – 600kPa):<br>2026: 5.80<br>2027: 5.60<br>2028: 5.40<br>2029: 5.20<br>2030: 5.00<br>2031: 4.80 |
| Source of data | ☐ Measured ☒ Other sources |

| | |
|---|---|
| | |
| Choice of data or measurement methods and procedures | IPCC 2019 |
| Additional comments | The decrease in the value for the baseline emission factor over time is to reflect the technological development.<br>The parameter $EF_{default, adjusted,y}$ is based on parameter $EF_{default,y}$. |

**Data / Parameter table 3.**

| **Data/parameter** | **$EF_{BAU}$** |
|---|---|
| Description | Default BAU baseline $N_2O$ emission factor acc. to the operating pressure of ammonia burner (related to 100 % pure acid) |
| Data unit | kg $N_2O$/t $HNO_3$ |
| Equations referred | Equation (1), Equation (2), Equation (3) |
| Purpose of data | ☒ Baseline emissions/removals ☐ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | 7.00 |
| Source of data | ☐ Measured ☒Other sources |
| Choice of data or measurement methods and procedures | IPCC 2019 |
| Additional comments | N/A |

**Data / Parameter table 4.**

| **Data/parameter** | **$GWP_{N2O}$** |
|---|---|
| Description | Global warming potential of $N_2O$ valid for the commitment period |
| Data unit | t $CO_2$e/t $N_2O$ |
| Equations referred | Equation (1), Equation (2), Equation (6) |
| Purpose of data | ☒ Baseline emissions/removals ☒ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | 265 |
| Source of data | ☐ Measured ☒Other sources |
| Choice of data or measurement methods and procedures | Relevant decisions by the CMA |
| Additional comments | N/A |

Parameters from the “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”:

**Data / Parameter table 5.**

| **Data/parameter** | **$R_n$** |
|---|---|
| Description | Universal ideal gases constant |
| Data unit | Pa.m³/kmol.K |
| Equations referred | Equation (5), Equation (6) of the tool |
| Purpose of data | ☐ Baseline emissions/removals ☒ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | 8,314 |
| Source of data | ☐ Measured ☒Other sources |
| Choice of data or measurement methods and procedures | Tool to determine the mass flow of a greenhouse gas in a gaseous stream |
| Additional comments | N/A |

**Data / Parameter table 6.**

| **Data/parameter** | **$MM_i$** |
|---|---|
| Description | Molecular mass of greenhouse gas i |
| Data unit | kg/kmol |
| Equations referred | Equation (5), Equation (6) of the tool |
| Purpose of data | ☐ Baseline emissions/removals ☒ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | <table><tr><th>Compound</th><th>Structure</th><th>Molecular mass (kg/kmol)</th></tr><tr><td>Nitrous oxide</td><td>$N_2O$</td><td>44.02</td></tr></table> |
| Source of data | ☐ Measured ☒Other sources |
| Choice of data or measurement methods and procedures | Specified in the tool |
| Additional comments | N/A |

**Data / Parameter table 7.**

| **Data/parameter** | **$P_n$** |
|---|---|
| Description | Total pressure at normal conditions |
| Data unit | Pa |
| Equations referred | Equation (5), Equation (6) of the tool |
| Purpose of data | ☐ Baseline emissions/removals ☒ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | 101,325 |

| | |
|---|---|
| Source of data | ☐Measured ☒Other sources |
| Choice of data or measurement methods and procedures | Specified in the tool |
| Additional comments | N/A |

**Data / Parameter table 8.**

| **Data/parameter** | $T_n$ |
|---|---|
| Description | Temperature at normal conditions |
| Data unit | K |
| Equations referred | Equation (5), Equation (6) of the tool |
| Purpose of data | ☐ Baseline emissions/removals ☒ Project emissions/removals ☐ Leakage emissions |
| Value(s) applied | 273.15 |
| Source of data | ☐Measured ☒Other sources |
| Choice of data or measurement methods and procedures | Specified in the tool |
| Additional comments | N/A |

### B.7.6. Summary of ex ante estimates of emission reductions/net removals

| Year | Baseline emissions ($tCO_2e$) | Project emissions ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Emission reductions ($tCO_2e$) |
|---|---|---|---|---|
| 01/07 – 31/12/2026 | 89,608 | 10,696 | 0 | 78,912 |
| 2027 | 171,563 | 21,217 | 0 | 150,346 |
| 2028 | 165,311 | 21,217 | 0 | 144,093 |
| 2029 | 158,995 | 21,217 | 0 | 137,778 |
| 2030 | 152,617 | 21,217 | 0 | 131,400 |
| 01/01 – 30/06/20231 | 72,487 | 10,522 | 0 | 61,965 |
| **Total** | **826,241** | **106,087** | **0** | **720,153** |
| **Total number of years in the crediting period** | 5 | | | |
| **Annual average over the crediting period** | **162,116** | **21,217** | **0** | **140,899** |

## B.8. Monitoring Plan

### B.8.1. Data and parameters to be monitored

**Data / Parameter table 10.**

| **Data/parameter** | **$P_{production,y}$** | |
|---|---|---|
| Description | Nitric acid produced in year *y* | |
| Data unit | t $HNO_3$ | |
| Equations referred | Equation (1), Equation (2), Equation (4) | |
| Purpose of data | ☒ Baseline emissions / removals ☐ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Measurements by activity participants and production reports | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | Flow meter transmitter |
| | *Accuracy class* | According to the supplier information |
| | *Calibration requirements* | According to the supplier requirements |
| | *Location* | After NA absorber tower |
| Measurement intervals | Measure continuously and record at appropriate intervals | |
| QA/QC procedures | Periodic calibration of relevant transmitter will be performed acc. to supplier's recommendations.<br>QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator´s procedures. | |
| Additional comment | The parameter $P_{NA,h}$ (Nitric acid produced in the hour h) represents the hourly value of $P_{production,y}$ and is used for determining $h_{r,y}$. | |

**Data / Parameter table 11.**

| **Data/parameter** | **$h_y$** | |
|---|---|---|
| Description | Number of hours of operation in year y | |
| Data unit | h | |
| Equations referred | Equation (1), Equation (2), Equation (6) | |
| Purpose of data | ☒ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Measurements by activity participants and production reports | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | Temperature transmitter |
| | *Accuracy class* | According to the supplier information |

| | | |
|---|---|---|
| | *Calibration requirements* | According to the supplier requirements |
| | *Location* | AOR burner |
| Measurement intervals | Measure continuously and record at appropriate intervals | |
| QA/QC procedures | Periodic calibration of relevant transmitter as above mentioned will be performed according to supplier's recommendations.<br>QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator´s procedures. | |
| Additional comment | The information will be stored in electronic records and paper during whole project´s lifetime. | |

**Data / Parameter table 12.**

| **Data/parameter** | **$h_{r,y}$** | |
|---|---|---|
| Description | Number of hours (h) in year y where: Secondary $N_2O$ abatement system was not installed, underperforming or failed | |
| Data unit | h | |
| Equations referred | Equation (2), Equation (6) | |
| Purpose of data | ☒ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Calculated; An abatement system is deemed to be by-passed, not working, underperforming or failed in the hour *h* in year *y* if:<br>$F_{N2O,tail\ gas,h} > EF_{default,y} \times P_{NA,h}$ | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | N/A |
| | *Accuracy class* | N/A |
| | *Calibration requirements* | N/A |
| | *Location* | N/A |
| Measurement intervals | Every monitoring period | |
| QA/QC procedures | QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator´s procedures. | |
| Additional comment | Records to be maintained during project's lifetime.<br>The parameter $P_{NA,h}$ (Nitric acid produced in the hour h) represents the hourly value of $P_{production,y}$ and is used for determining $h_{r,y}$. | |

Parameters from the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream":

**Data / Parameter table 13.**

| **Data/parameter** | **$V_{t,db,n}$** |
|---|---|
| Description | Volumetric flow of the gaseous stream in time interval t on a dry basis |

| | | |
|---|---|---|
| Data unit | $m^3$ dry gas/h | |
| Equations referred | Equation (5) of the tool | |
| Purpose of data | ☐ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Volumetric flow measurement will refer to normal conditions.<br>Calculated based on the dry basis flow measurement plus water concentration measurement (according to Option A of the tool). | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | Flow meter |
| | *Accuracy class* | According to the supplier information |
| | *Calibration requirements* | According to the supplier requirements |
| | *Location* | Exact location is not available in this preliminary draft PDD. |
| Measurement intervals | Continuous measurement | |
| QA/QC procedures | According to European Norm 14181. | |
| Additional comment | Option A parameter, according to the applied tool. The volume flow is converted to normal conditions according to the applied methodology. Therefore, the respective parameters were determined at normal conditions ($P_t = P_n$ = 101,325 Pa; $T_t = T_n$ = 273.15 K). | |

**Data / Parameter table 14.**

| **Data/parameter** | $\mathbf{v_{i,t,db}}$ | |
|---|---|---|
| Description | Volumetric flow of the gaseous stream in time interval t on a dry basis | |
| Data unit | $m^3$ dry gas i / $m^3$ dry gas | |
| Equations referred | Equation (5) of the tool | |
| Purpose of data | ☐ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Continuous gas analyzer operating in dry-basis. Volumetric fraction measurement refers to normal conditions. | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | $N_2O$ Analyzer |
| | *Accuracy class* | According to the supplier information |
| | *Calibration requirements* | According to the supplier requirements |
| | *Location* | Exact location is not available in this preliminary draft PDD. |
| Measurement intervals | Continuous measurement | |
| QA/QC procedures | According to European Norm 14181. | |

| | |
|---|---|
| Additional comment | The $N_2O$ concentration is converted to normal conditions according to the applied methodology. Therefore, the respective parameters were determined at normal conditions ($P_t = P_n$ = 101,325 Pa; $T_t = T_n$ = 273.15 K). |

**Data / Parameter table 15.**

| **Data/parameter** | **$C_{H2O,t,db,n}$** | |
|---|---|---|
| Description | Moisture content of the gaseous stream at normal conditions, in time interval t | |
| Data unit | m³ dry gas i / m³ dry gas | |
| Equations referred | Equation (5), Equation (6) of the tool | |
| Purpose of data | ☐ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Discrete measurement procedure. | |
| Entity/person responsible for the measurement | By third party | |
| Measuring instrument(s) | *Type of instrument* | N/A |
| | *Accuracy class* | N/A |
| | *Calibration requirements* | N/A |
| | *Location* | Exact location is not available in this preliminary draft PDD. |
| Measurement intervals | The mean value among three consecutive measurements performed in the same day (at least 2 hours each) shall be considered. Measurements will coincide with the Annual Surveillance Test (associated with requirements of the EN 14181 standard) or the calibration of the flow meter for the gaseous stream. | |
| QA/QC procedures | According to the USEPA CF42 method 4. | |
| Additional comment | Option A parameter for proving that the gaseous stream is dry. | |

**Data / Parameter table 16.**

| **Data/parameter** | **$T_t$** | |
|---|---|---|
| Description | Temperature of the gaseous stream in time interval t | |
| Data unit | K | |
| Equations referred | Equation (6) of the tool | |
| Purpose of data | ☐ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Measurements by activity participants | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | Temperature transmitter |
| | *Accuracy class* | According to the supplier information |

| | | |
|---|---|---|
| | *Calibration requirements* | According to the supplier requirements |
| | *Location* | Exact location is not available in this preliminary draft PDD. |
| Measurement intervals | Continuous measurement | |
| QA/QC procedures | QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator´s procedures. | |
| Additional comment | N/A | |

**Data / Parameter table 17.**

| **Data/parameter** | **$P_t$** | |
|---|---|---|
| Description | Pressure of the gaseous stream in time interval t | |
| Data unit | Pa | |
| Equations referred | Equation (6) of the tool | |
| Purpose of data | ☐ Baseline emissions / removals ☒ Project emissions / removals ☐ Leakage emissions | |
| Measurement methods and procedures | Measurements by activity participants | |
| Entity/person responsible for the measurement | Project operator | |
| Measuring instrument(s) | *Type of instrument* | Pressure transmitter |
| | *Accuracy class* | According to the supplier information |
| | *Calibration requirements* | According to the supplier requirements |
| | *Location* | Exact location is not available in this preliminary draft PDD. |
| Measurement intervals | Continuous measurement | |
| QA/QC procedures | QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator´s procedures. | |
| Additional comment | N/A | |

### B.8.2. Sampling plan

>>

Not applicable for the project activity.

### B.8.3. Monitoring management system

>>

The system is designed for automatic operation so that activities by operation personnel are not required during normal operation. However, it is required to observe the system for possible failures, and to perform required maintenance activities on a regular basis.

It is the project operator´s responsibility to ensure that required and experienced capacity is available and that their operational staffs are able to operate the monitoring system properly. It is also the project operator´s responsibility to organize and implement a quality management system that ensures the integrity of the data.

The monitoring procedures will be integrated in the project operator´s quality management system. All monitoring equipment will be serviced, calibrated and maintained according to the manufacturers' instructions and international standards. Parameters to be monitored are described above.

#### B.8.4. Post-crediting period monitoring plan

>>

Not applicable for the project activity.

## SECTION C. Start date, crediting period type and duration

### C.1. Project start date

>>

Start date of the project activity is: 01/09/2025

### C.2. Expected operational lifetime of the project

>>

25 years, 0 months

### C.3. Project crediting period

#### C.3.1. Type of crediting period approved by the host Party

☒ Renewable ☐ Fixed

#### C.3.2. Start date of the crediting period

>>

Starting date of the first crediting period is: 01/07/2026

#### C.3.3. Duration of the crediting period

>>

5 years, 0 months

## SECTION D. Environmental impacts, social impacts and sustainable development impacts

### D.1. Environmental and social impacts and sustainable development impacts as per the Article 6.4 sustainable development tool

#### D.1.1. Summary of the environmental and social risk assessment and applicable mitigation measures

>>

The reduction of $N_2O$ emissions from the nitric acid plant in Attaka is a sustainable project that contributes to the environmental, economic and social benefits in the Arab Republic of Egypt. According to Article 6.4 sustainable development tool (A6.4 SD tool) v.01.1, the activity participants conduct a risk assessment to identify, evaluate, avoid, minimize, and mitigate potential risks associated with proposed project activity, and the outcome of this assessment is summarized in the table below:

| Overview of the outcomes of the environmental and social safeguards elements risk assessment | | | |
|---|---|---|---|
| **Environmental** | Element 1 | Energy | No |
| | Element 2 | Air, land and water | No |
| | Element 3 | Ecology and natural resources | No |
| **Social** | Element 4 | Human rights | No |
| | Element 5 | Labor | No |
| | Element 6 | Health and safety | No |
| | Element 7 | Gender equality | No |
| | Element 8 | Land acquisition and involuntary resettlement | No |
| | Element 9 | Indigenous People | No |
| | Element 10 | Corruption | No |
| | Element 11 | Cultural heritage | No |

Full details of this assessment for the element level question have to be conducted in accordance with the elements and criteria as defined in sections 6.3 and 6.4: Environmental and social safeguards of the article 6.4 sustainable development tool (A6.4 SD Tool).

#### D.1.2. Summary of the sustainable development impacts assessment

>>

The project involves the development, design, engineering, procurement, financing, construction, operation, and maintenance of a catalytic reduction system for nitrous oxide ($N_2O$) at a nitric acid plant in Suez, Egypt. The activity participants intend to establish a Social Fund. This fund will support sustainable projects that directly benefit the surrounding community.

According to Article 6.4 sustainable development tool (A6.4 SD tool) v.01.1, the activity participants identified and assessed impacts of the project activity on the sustainable development of the host country (Egypt), and the outcome of this assessment is summarized in below table:

| Sustainable Development Goal (SDG) | Does the project activity directly impact this SDG | Egypt sustainable development (SD) | Does the project activity directly impact this SD |
|---|---|---|---|
| (SDG 1) End Poverty | No | (Goal 1) Quality of Life and Living Standards | No |
| (SDG 2) Zero hunger | No | (Goal 2) Social Justice and Equality | No |
| (SDG 3) Health and wellness | No | (Goal 3) Integrated and Sustainable Environmental System | Yes |
| (SDG 4) Quality education | No | (Goal 4) Diversified Knowledge-based, and Competitive Economy | Yes |
| (SDG 5) Gender equality | No | (Goal 5) Well-Developed Infrastructure | No |
| (SDG 6) Clean water and sanitation | No | (Goal 6) Governance and Partnerships | No |
| (SDG 7) Affordable and clean energy | No | | |
| (SDG 8) Decent work and economic growth | Yes | | |
| (SDG 9) Industry innovation and infrastructure | Yes | | |
| (SDG 10) Reduction of inequalities | No | | |
| (SDG 11) Sustainable cities and communities | No | | |
| (SDG 12) Responsible consumption and production | No | | |
| (SDG 13) Climate action | Yes | | |
| (SDG 14) Submarine life | No | | |
| (SDG 15) Life of terrestrial ecosystems | No | | |
| (SDG 16) Peace justice and strong institutions | No | | |
| (SDG 17) Partnerships to achieve the objectives | No | | |

The full details of the assessment of sustainable development impacts have to be conducted in form (A6.4-FORM-AC-017) in accordance the article 6.4 sustainable development tool (A6.4 SD Tool).

### D.1.3. Monitoring plan of activity-level environmental and social indicators and activity-level SD indicators

>>

| A6.4 activity-level SD indicator 1 - SDG related | |
|---|---|
| Monitoring indicator: | creation of Job opportunities |
| SDG | SDG_8_Decent_work_and_economic_growth |

| | |
|---|---|
| SDG target: | 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value |
| SDG indicator | 8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities |
| Description: | The project's social fund supports decent work and economic growth by:<br>• Creating new long-term jobs and additional indirect employment opportunities.<br>• Supporting local businesses involved in catalyst transportation, instrument installation, and maintenance work.<br>• Contributing to the region's economic growth by implementing a new technology and attracting investments. |
| Data Unit: | No. |
| Source of data: | Employments records / training records |
| Measurement procedure: | By surveying the employment records and training records |
| Monitoring frequency: | Periodically |
| Comments: | - |

| **A6.4 activity-level SD indicator 2 - SDG related** | |
|---|---|
| Monitoring indicator: | CO2 emission per unit of value added |
| SDG | SDG_9_Industry_innovation_and_infrastructure |
| SDG target: | 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities |
| SDG indicator | CO2 emission per unit of value added |
| Description: | The project fosters industry, innovation, and infrastructure by:<br>• Introducing the secondary abatement technology, the first of its kind in Egypt and the Middle East, for abating N2O.<br>• Facilitating technology transfer and building local capacity in the operation and maintenance of advanced emission reduction technologies. |
| Data Unit: | tCO2/unit |
| Source of data: | Annual report |
| Measurement procedure: | Measuring instruments are in place to monitor the emissions reduction per nitric acid production |
| Monitoring frequency: | Annually |
| Comments: | - |

| **A6.4 activity-level SD indicator 3 - SDG related** | |
|---|---|
| Monitoring indicator: | Quantification of GHG emission reductions |
| SDG | SDG_13_Climate_action |
| SDG target: | 13.2 Integrate climate change measures into national policies, strategies and planning |

| | |
|---|---|
| SDG indicator | 13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other) |
| Description: | The project addresses Goal 13 by significantly reducing N2O emissions, a potent greenhouse gas, which contributes to mitigating climate change. |
| Data Unit: | tCO2 |
| Source of data: | Annual report |
| Measurement procedure: | Measuring instruments are in place to monitor the emission reductions |
| Monitoring frequency: | Annually |
| Comments: | - |

The activity participants intend to establish a Social Fund. This fund will contribute to achieve extra sustainable development goals (e.g. SDG 3, SDG 4 & SDG 11) which shall increase the environmental and social benefits of the people living in the area of the project activity by financing sustainable development projects.

### D.2. Environmental and social impacts as per the host Party regulations

#### D.2.1. Summary of host Party requirements

>>

Not applicable, as no significant environmental impacts are considered.

#### D.2.2. Summary and conclusion of the assessment

>>

Not applicable, as no significant environmental impacts are considered.

## SECTION E. Local stakeholder consultation

### E.1. Scope of the consultation

>>

Local stakeholder consultation is not available at this stage of this preliminarily draft PDD, which was prepared to be submitted along with the proposed methodology for approval by the Article 6.4 Supervisory Body.

### E.2. Stakeholders invited

>>

Local stakeholder consultation is not available at this stage of this preliminarily draft PDD, which was prepared to be submitted along with the proposed methodology for approval by the Article 6.4 Supervisory Body.

### E.3. Modalities for the consultation

>>

Local stakeholder consultation is not available at this stage of this preliminarily draft PDD, which was prepared to be submitted along with the proposed methodology for approval by the Article 6.4 Supervisory Body.

## E.4. Summary of comments received

>>

Local stakeholder consultation is not available at this stage of this preliminarily draft PDD, which was prepared to be submitted along with the proposed methodology for approval by the Article 6.4 Supervisory Body.

## E.5. Consideration of comments received

>>

Local stakeholder consultation is not available at this stage of this preliminarily draft PDD, which was prepared to be submitted along with the proposed methodology for approval by the Article 6.4 Supervisory Body.

## SECTION F. Confirmation of avoidance of double or revived registration

| | | |
|---|---|---|
| **A 6.4 mechanism** | ☒ | The proposed A6.4 project has not been already registered as an A6.4 project. |
| | ☒ | The proposed A6.4 project has not been already included as a component project (CP) in a registered Article 6.4 mechanism programme of activities (A6.4 PoA). |
| | ☒ | The proposed A6.4 project has not been previously deregistered from the Article 6.4 mechanism. |
| | ☐ | The proposed A6.4 project has not been excluded from a registered A6.4 PoA. |
| **Other** | ☒ | The proposed A6.4 project is not currently registered or being pursued for registration, or covered by a programme, under any other international, regional, national, subnational or sector-wide GHG mitigation crediting scheme. |
| | ☒ | The proposed A6.4 project was previously registered under or covered by a programme under any other international, regional, national, or subnational or sector-wide GHG mitigation crediting scheme but deregistered or excluded from the other crediting scheme before fully consuming the crediting period under the other crediting scheme. |
| | ☒ | The proposed A6.4 project is currently registered or covered by other international, regional, national, subnational or sector-wide GHG mitigation crediting scheme. |

## Appendix 1. Contact information of activity participants

| | |
|---|---|
| **Organization name** | Carbon Climate Protection GmbH |
| **Country** | Austria |
| **Address** | Am Suedblick 7, Top 2<br>3550 Langenlois |
| **Telephone** | +43 2734 32270-30 |
| **Mobile** | - |
| **E-mail** | dunkel@carbon-austria.com |
| **Website** | https://www.carbon-austria.com/ |
| **Contact person** | Mr. Gerald Dunkel-Schwarzenberger |

## Appendix 2. Applicability of methodologies and standardized baselines

>>

No additional information on the applicability of the methodology is to be mentioned.

## Appendix 3. Further background information on ex ante calculation of emission reductions or net removals

>>

No additional information on the ex-ante calculation of emission reductions is to be mentioned.

## Appendix 4. Summary of post-registration changes

>>

No post-registration changes have been taken place.

## Appendix 5. Further background information on monitoring plan

>>

No information available at this stage of the proposed activity,

## Appendix 6. A6.4 Environmental and Social Safeguards Risk Assessment Form (A6.4-FORM-AC-015)

>>

Detailed information will be made available at a later stage of the proposed activity.

## Appendix 7. A6.4 Environmental and Social Management Plan Form (A6.4-FORM-AC-016)

>>

Not applicable, as no significant environmental impacts are considered.

## Appendix 8. A6.4 Sustainable Development Impact Form (A6.4-FORM-AC-017)

>>

Detailed information will be made available at a later stage of the proposed activity.

- - - - -

## Document information

| *Version* | *Date* | *Description* |
| --- | --- | --- |
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