



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

(Version 01.0)

BASIC INFORMATION

Project title:	Reduction of N ₂ O 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	El Nasr Company for Fertilizers & Chemical Industries	Egypt
	Other participating Party	Carbon Climate Protection GmbH	Egypt
PDD version number:	02.0		
PDD completion date:	13/08/2025		
Applied methodologies and standardised baselines, and their versions:	N ₂ O abatement from nitric acid production, version 02.0 No standardized baseline applicable.		
Sectoral scope(s):	5. Chemical Industries		
Type of the project:	<input checked="" type="checkbox"/> Emission reductions activity <input type="checkbox"/> Removals activity <input type="checkbox"/> Combined emission reductions and removals activity		
Estimated annual emission reductions or net removals over the crediting period (tCO₂e/year):	165,101 tCO ₂ e / 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 N₂O emissions from the production of nitric acid at El Nasr Company for Fertilizers & Chemical Industries (hereinafter called "SEMADCO") in Attaka, Arab Republic of Egypt.

Pre-Activity Scenario:

Prior to the implementation of the Article 6.4 project activity, SEMADCO's nitric acid plant has been operated under the following conditions:

- The nitric acid plant has a design capacity of 450 tons per day of 100 % HNO₃ (equivalent to 100% nitric acid basis) and utilizes a dual-pressure (medium/high) production process, in which ammonia oxidation is carried out at medium pressure in the Ammonia Oxidation Reactor (AOR), followed by absorption at high pressure in the absorption tower.
- At the start date of the Article 6.4 project activity, no secondary or tertiary N₂O abatement technology or their combination was installed or operational at the nitric acid plant. Hence, the tail gas from the AOR was released without any catalytic or non-catalytic N₂O destruction stage; consequently, the N₂O was emitted to the atmosphere.
- A prior consideration was submitted on 12/05/2025, informing the UNFCCC secretariat of seeking registration of the proposed project activity under the Article 6.4 mechanism.

Baseline scenario:

In the absence of regulations requiring the N₂O abatement from the nitric acid production, SEMADCO has no economic incentive to take any N₂O 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 N₂O is emitted to the atmosphere with no N₂O abatement measure being implemented. Hence, the baseline scenario is the continuation of scenario existing prior to the start of the project activity.

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

SEMADCO will be equipped with a secondary N₂O abatement by installing baskets inside the AOR and equipping them with the N₂O decomposition catalyst right below the platinum gauze in the high temperature zone of the reactor. The measurement devices for the monitoring of N₂O concentration and tail gas flow will be located directly in the stack.

Project location:

SEMADCO 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 N₂O that is not destroyed and is still present in the tail gas stream of the plant.

Under the project activity, an N₂O catalyst will be inserted below the primary catalyst (NH₃ catalyst) in the ammonia oxidation reactor. The N₂O catalyst will largely result in decomposition of N₂O to nitrogen (N₂) and oxygen (O₂) without any further energy, nor material inputs. Catalytic decomposition of N₂O occurs when the N₂O 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.

Avoidance of Double Counting:

The Host Party (Arab Republic of Egypt) will provide formal confirmation that the mitigation outcomes generated by the proposed Article 6.4 project activity are not claimed under any domestic mitigation schemes, or other frameworks. Furthermore, as the SEMADCO nitric acid plant is not subject to any mandatory N₂O abatement or N₂O emission reduction scheme at the national or international level, the N₂O emission reductions achieved under this project are additional and are not covered by any mandatory framework. This ensures that all reported mitigation outcomes are unique, verifiable, and free from double counting.

Estimated annual average and total GHG emission reduction:

Annual average of GHG emission reductions during 1st crediting period: 165,101 tCO₂e

Total GHG emission reductions over 1st crediting period: 825,505 tCO₂e

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 N₂O secondary destruction facility in the nitric acid plant of SEMADCO, aimed at significantly reducing process-related N₂O 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 (N₂O) destruction technologies in its nitric acid industry significantly contributes to the country's LT-LEDS 2050. The planned technology – to be installed at SEMADCO's nitric acid plant in Attaka – reduces GHG (N₂O) 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.

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

A.4. Project location

Host Party	Egypt
Region(s)/State(s)/Province(s)	Suez
Cities/towns/communities	Attaka
Geographic coordinates	Latitude: N 29.943512°, Longitude: E 32.463758°

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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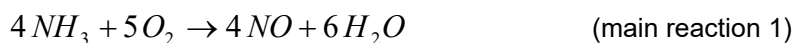
(a) Existing technology

The nitric acid plant is designed without any N₂O abatement measure. The scenario existing prior to the project implementation is that the N₂O is emitted to the atmosphere.

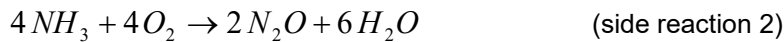
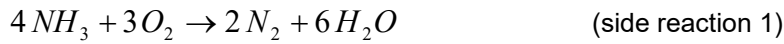
N₂O is an unwanted, invisible and previously neglected by-product of the manufacture of nitric acid. It is formed alongside the main, desired product nitric oxide (NO) during the catalytic oxidation of ammonia in air over noble metal gauzes. The production of nitric acid takes place in three main process steps as indicated by the following reactions (which includes the main facilities in the nitric acid plant):

1. Ammonia (NH₃) combustion to form nitric oxide (NO):

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:



Simultaneously nitrous oxide (N₂O), nitrogen (N) and water (H₂O) are formed as well, in accordance with the following equations:



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 (NO₂):



3. (According to the technical process) Absorption of NO₂ in water to form nitric acid (HNO₃):



(NO is oxidized to NO₂ according to main reaction 2.)

When leaving the ammonia oxidation reactor, there is no relevant loss of N₂O in the tail gas section unless a N₂O destruction facility is installed. N₂O that leaves the AOR is thus discharged to atmosphere in the tail gas, and has no economic value.

(b) NA plant production / Installed capacities

SEMADCO's 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 SEMADCO, is designed for a capacity of 450 metric tons of HNO₃ per day (100% of weight) and to operate with a dual pressure process.

(c) Arrangement of existing facilities

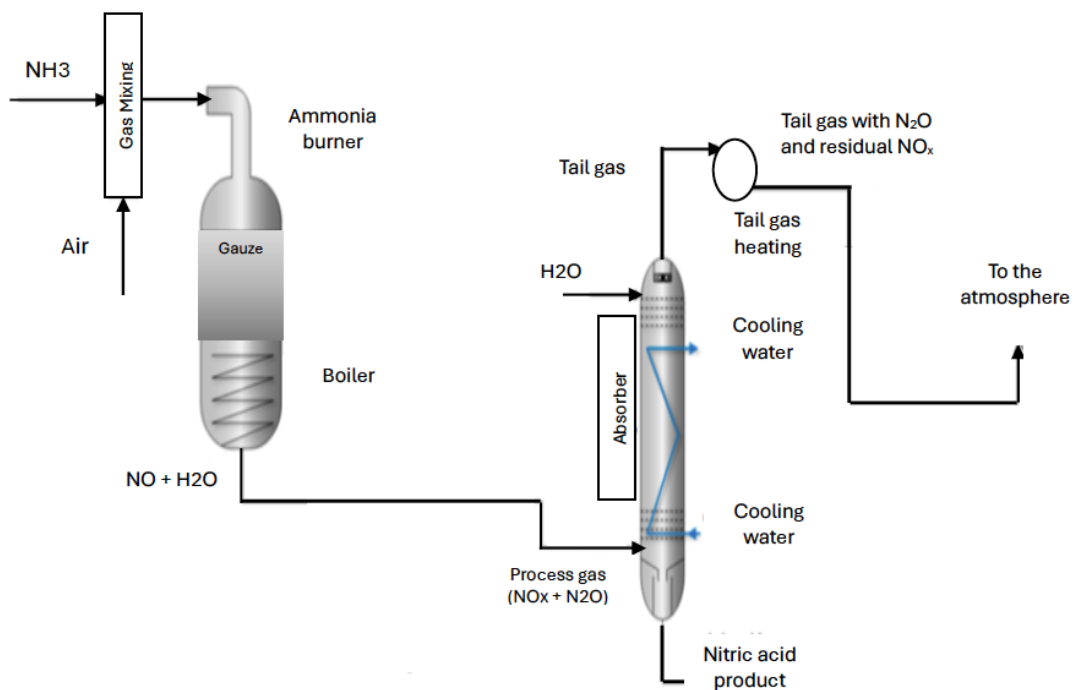


Figure 2: Arrangement of existing facilities

(d) Age and lifetime of existing equipment

SEMADCO 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

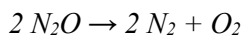
Currently, no relevant monitoring equipment is installed within the project boundary except the nitric acid production measurements and AOR temperature transmitter. The nitric acid production measurement is located directly after the absorber tower of SEMADCO's nitric acid plant. The AOR temperature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

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

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SEMADCO nitric acid plant will be equipped with a secondary N₂O abatement by installing baskets inside the AOR and equipping them with the N₂O decomposition catalyst right below the platinum gauze in the high temperature zone of the reactor. The measurement devices for the monitoring of N₂O 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 N₂O destruction for the project activity (secondary technology) is taking place as per following reaction:



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 N₂O abatement catalyst. The following figure describes the arrangement of the secondary abatement facility in general:

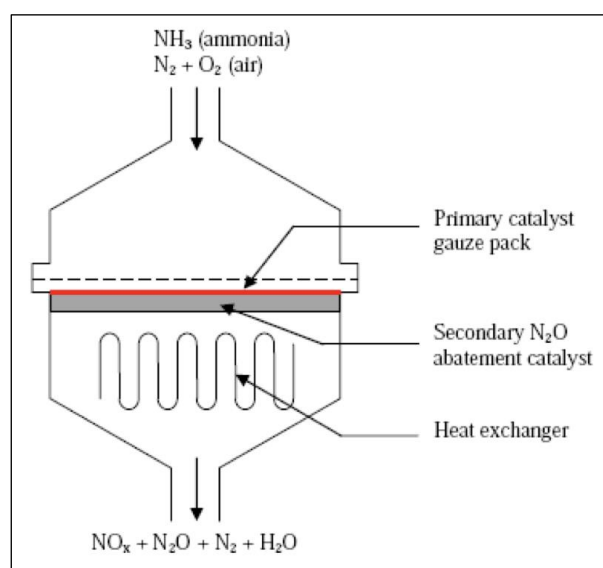


Figure 3: Nitric acid ammonia burner with N₂O secondary abatement

N₂O 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 N₂O 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 N₂O concentration and the total gas volume flow, which is required by the applied methodology. The measurement devices for the monitoring of N₂O concentration and tail gas flow will be located directly in the stack.

The N₂O abatement facility promotes environmental protection, offers technological innovation, and influences social welfare by creating jobs, improving air quality. Social, economic, environmental, and technological impacts of N₂O abatement facilities are interconnected, creating a holistic effect that benefits both the plant and the broader community.

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	El Nasr Company for Fertilizers & Chemical Industries 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: N₂O abatement from nitric acid production, version 02.0

B.2. Applicability of methodologies and standardized baselines

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Applicability conditions of the proposed mechanism methodology:

Title: N₂O abatement from nitric acid production, version 02.0

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

Methodological tools:

- Tool to determine the mass flow of a greenhouse gas in a gaseous stream, (currently under development by the MEP)
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (currently under development by the MEP)
- 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
<p>>> The activity participants shall demonstrate that the nitric acid plant started commercial operation before the implementation of the Article 6.4 project activity, and that there was no secondary, tertiary N₂O abatement technology or a combination of them installed in the respective nitric acid plant at the project start date of the Article 6.4 project activity.</p>	<p>Presently, no N₂O abatement technology is installed in the plant.</p>
<p>>> Further, activity participants shall clearly demonstrate the incentive provided by the participation under the Article 6.4 mechanism by confirming that the N₂O abatement system was never installed in any nitric acid plant, and that no emission reductions were previously claimed for the same period or same equipment.</p>	<p>The whole equipment that is planned to be installed under the Article 6.4 project activity is new and has never been installed in a nitric acid plant before and no emission reductions were previously claimed for the same equipment.</p>
<p>>> The methodology applies to existing nitric acid plants only² and to following technologies:</p> <ul style="list-style-type: none"> • Secondary N₂O abatement technology (e.g., catalysts in the ammonia burner); • Tertiary N₂O abatement technology (e.g., selective catalytic reduction units); or • A combination of a secondary and tertiary N₂O abatement system, installed simultaneously at the Article 6.4 project activity start date. 	<p>The nitric acid plant has been in commercial operation before the relevant date of 12/05/2025.</p> <p>It is planned that a secondary N₂O abatement will be implemented at the nitric acid plant.</p>
<p>>> Continuous real-time measurements of the N₂O concentration and the total gas volume flow can be carried out in the tail gas stream after the abatement of N₂O emissions throughout the crediting period of the Article 6.4 project activity.</p>	<p>The plant will be equipped with a complete Automated Monitoring System (AMS). It is used to continuously measure N₂O concentration and total gas volume flow in the stack during the plant's operation throughout the crediting period.</p>
<p>>> No law or regulation which mandates the destruction of N₂O from nitric acid plants exists in the host country where the Article 6.4 project activity is implemented.</p>	<p>The host country does not apply any legal requirements to reduce N₂O emissions from nitric acid plants.</p>

² “Existing” in this context means that the plant’s commercial operation took place on or before the date of initial submission of the proposed methodology A6.4-PNM002, i.e. 12/05/2025; any newer plant shall not be applicable under this methodology.

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

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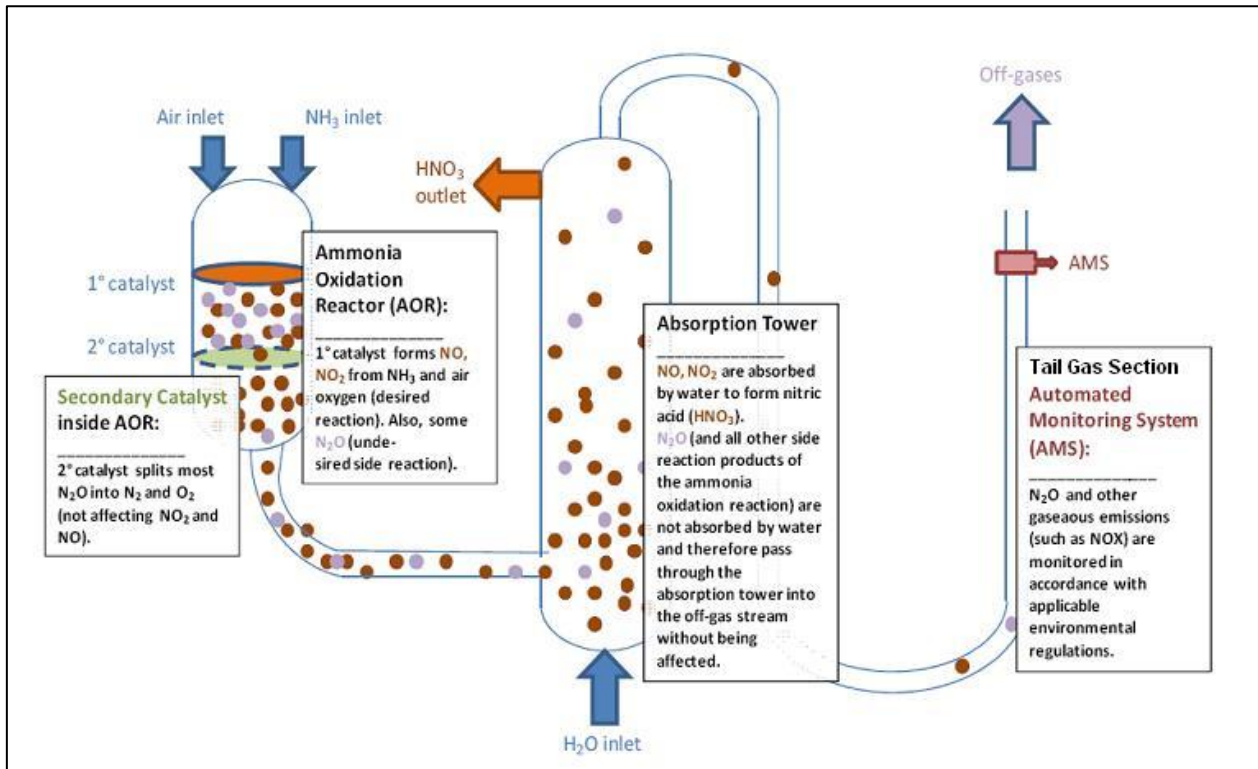


Figure 4: Project boundary if the project activity includes the introduction of a secondary N₂O abatement measure (simplified standard nitric plant layout displaying the location of the N₂O abatement catalyst, process sources of N₂O and the sampling point location for the Automated Monitoring System (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 N₂O that is not destroyed and is still present in the tail gas stream of the plant. The secondary N₂O abatement takes place in the ammonia oxidation reactor (AOR).

The location of the Article 6.4 project activity has been provided as KMZ-file.

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	<input type="checkbox"/> Included	>> The Article 6.4 project activity has no influence on these types of emissions, if present
		<input checked="" type="checkbox"/> Not included	
	CH ₄	<input type="checkbox"/> Included	>> The Article 6.4 project activity has no influence on these types of emissions, if present
		<input checked="" type="checkbox"/> Not included	
	N ₂ O	<input checked="" type="checkbox"/> Included	>> Included, main emission source
		<input type="checkbox"/> Not included	

Data quality, conservativeness and uncertainty: All instruments involved in the quantification of baseline emissions will undergo regular calibration, verification, and maintenance in accordance with the manufacturer's or supplier's specifications. These procedures shall be documented in the QA/QC plan and maintained

throughout the crediting period to ensure methodological consistency and compliance. To conservatively address the issue of uncertainty:

- An uncertainty factor will be applied in the baseline emissions calculations. This factor will be derived based on the type and specifications of measurement instruments.
- The applied uncertainty factor will be verified during the issuance stage.

B.3.2. Project emissions/removals

Source/reservoir/pool	GHG		Justification/Explanation
NH ₃ oxidation at the primary catalyst gauze	CO ₂	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not included	>> The Article 6.4 project activity has no influence on these types of emissions, if present
	CH ₄	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not included	
	N ₂ O	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included	>> Included, main emission source
Operation of a tertiary N ₂ O abatement facility	CO ₂	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included	>> In some cases, fossil fuels are used as reducing agent and/or for decomposing the tail gas as part of a tertiary N ₂ O abatement facility. In this case the fossil fuels are mainly converted to CO ₂ . CO ₂ emissions arising from the production of ammonia are assumed to be negligible and not taken into account.
	CH ₄	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not included	
	N ₂ O	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included	>> Included
Transport of equipment and catalysts	CO ₂	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not included	>> CO ₂ emissions arising from the transport of equipment and catalysts are assumed to be negligible and not taken into account.
	CH ₄	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not included	
	N ₂ O	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not included	

Data quality, conservativeness and uncertainty: Activity emissions are mainly based on the N₂O concentration and volume or mass flow of the tail gas. These parameters shall be measured and monitored in accordance with EN 14181, which ensures robust, standardized quality assurance of AMS. This standard guarantees data accuracy, reliability, and transparency for emission monitoring. All instruments involved in the quantification of activity emission must undergo regular calibration, verification, and maintenance as per the manufacturer’s or supplier’s recommendations. These procedures shall be documented as part of the QA/QC plan and shall be implemented throughout the crediting period to ensure compliance, and consistency with the methodological requirements.

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 destruction of N₂O from NA plants in the host country, the Arab Republic of Egypt. In accordance with the proposed methodology, SEMADCO has no economic incentives to take any N₂O 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 of the applied methodology “Continued N₂O emissions without any abatement”

of the applied proposed mechanism methodology, the project activity is considered additional and it is identified as the baseline scenario (N₂O is emitted to the atmosphere with no N₂O abatement measure implemented).

Baseline approach from paragraph 36 of the RMPs

As per the applied methodology, the ambitious benchmark approach has been selected. The nitric acid plant of SEMADCO uses a dual pressure process with a medium pressure AOR (3.5 bar) and a high-pressure absorption (9.0 bar). Therefore, it can be categorized as dual pressure M/H plant as per the applied methodology and the applicable baseline N₂O emission factor is 6.30 kg N₂O/t HNO₃ (before downward adjustment).

Since Egypt as host country has not established a baseline emission factor for nitric acid plants, the IPCC 2019 emission factors are applicable.

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

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N₂O is an unwanted by-product of the manufacture process of nitric acid (HNO₃), where it is formed alongside the main product nitric oxide (NO) during the catalytic oxidation of ammonia (NH₃). Without any incentives plant operators won't take any N₂O abatement measures, which is identified to be the business-as-usual (BAU) scenario.

Since no credible and verifiable historical data is available for SEMADCO's nitric acid plant, and as no economically viable N₂O abatement is observed as common practice in Egypt's nitric acid sector (and a combination of these two options is unrealistic), the BAU scenario is determined using a standardized, conservative approach. As per the applied 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").

For SEMADCO's nitric acid plant applies:

- There are no active or scheduled national or sub-national policies in place at the time of validation that mandate N₂O abatement or set specific N₂O emission limits for nitric acid production. Therefore, no such policies are incorporated in the baseline determination.
- There are no sector-specific national or sub-national targets applicable to nitric acid production supported by policy frameworks; hence, only the conservative IPCC-based factors are applied.

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 N₂O emissions from nitric acid plants. In the absence of regulations requiring the abatement of N₂O emissions, SEMADCO has no economic incentives to take any N₂O abatement measures because this entails significant capital and operating costs but no financial benefits.

An analysis of all relevant legal requirements in Egypt was conducted based on credible and current evidence at the time of preparing this document. The review included national laws, ministerial decrees, environmental regulations, licensing and permitting conditions, as well as any binding local, regional, or national obligations related to nitric acid production.

The analysis confirms that there are no legal requirements, binding decisions, or enforceable obligations mandating the abatement of N₂O emissions from nitric acid production at SEMADCO's nitric acid plant. Furthermore, there are no explicit legal provisions integrating the Article 6.4 mechanism as a compliance or implementation tool. This further confirms that the emission reductions resulting from the Article 6.4 project activity would not occur in the absence of the Article 6.4 project activity.

The regulatory analysis will be updated at each renewal of the crediting period in accordance with the methodological requirements.

B.5.2. Avoidance of lock-in

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The lifetime of the installed N₂O abatement technology is longer than the crediting period of the Article 6.4 activity³. Therefore:

- Egypt will benefit from the installed N₂O abatement technology even beyond the end of the Article 6.4 activity's crediting period.
- The Article 6.4 project activity 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; instead, it supports a transition toward low-emission development, aligns with the Host Party's NDC.
- The applied methodology has been developed based on actual and reliable data of nitric acid plants taking into consideration the technologies, which achieve lower N₂O 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 Egypt'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 N₂O emissions, the operator of the nitric acid plant has no economic incentives to take any N₂O 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 N₂O abatement measure.

Therefore, the project activity is considered additional, and the baseline scenario is that the N₂O is emitted to the atmosphere with no N₂O 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 N₂O emissions to the atmosphere in Egypt with no N₂O abatement facility installed, except one registered and implemented project under the CDM. Accordingly, as per the geographic boundary (Egypt), the proposed Article 6.4 project activity (equip SEMADCO's nitric acid plant with an N₂O abatement facility) is considered not a common practice.

³ An analysis of the lock-in risk shall be conducted acc. to the tool once it has been approved.

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

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N/A

B.6.4. Remediation of reversals

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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

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As per the applied methodology the conservative BAU baseline emissions are determined by following stepwise approach:

Step 1: Identify plant operating parameters

- Operating parameters: Dual pressure process with a medium pressure AOR (3.5 bar) and a high-pressure absorption (9.0 bar).
- It can be confirmed that no N₂O abatement technology has ever been installed in the nitric acid plant.

Step 2: Determine the BAU N₂O emission factor

- Acc. to IPCC 2019 Guidelines and based on the process type (dual pressure M/H as identified above) the applicable BAU N₂O emission factor is 9.00 kg N₂O/t HNO₃.

Step 3: Determine the BAU baseline emissions

$$BE_{BAU,y} = P_{production,y} * EF_{BAU} * GWP_{N2O} * 10^{-3}$$

Equation (1)

Where:

$$BE_{BAU,y} = \text{BAU baseline emissions in year } y \text{ (t CO}_2\text{e)}$$

$$P_{production,y} = \text{Production of nitric acid in year } y \text{ (t HNO}_3\text{)}$$

EF_{BAU}	=	Default BAU baseline N ₂ O emission factor acc. to the operating pressure of ammonia burner (related to 100 % pure acid) (kg N ₂ O/t HNO ₃)
GWP_{N2O}	=	Global warming potential N ₂ O

Step 4: Determine the conservative BAU baseline emissions

$$BE_{BAU,cons,UNC,y} = BE_{BAU,y} * (1 - UNC_{BAU}) \quad \text{Equation (2)}$$

Where:

$BE_{BAU,cons,UNC,y}$	=	Conservative BAU baseline emissions considering uncertainty in year y (t CO ₂ e)
$BE_{BAU,y}$	=	BAU baseline emissions in year y (t CO ₂ e)
UNC_{BAU}	=	Uncertainty at the lower bound of the uncertainty interval relative to the central estimate of the ex-ante quantified most likely net BAU baseline emissions (fraction) ⁴

Step 5: Determine the minimum conservative BAU baseline emissions

$$BE_{BAU min,y} = BE_{BAU,y} - (BE_{BAU,y} - AE_y) * 0.1 \quad \text{Equation (3)}$$

Where:

$BE_{BAU min,y}$	=	Minimum conservative BAU baseline emissions in year y (t CO ₂ e)
AE_y	=	Activity emissions in year y (t CO ₂ e)

Step 6: Determine the lowest BAU baseline emissions

Compare step 5 ($BE_{BAU,cons,UNC,y}$) and step 6 ($BE_{BAU min,y}$), and the lower value shall be considered as the lowest most conservative BAU baseline emissions:

$$BE_{BAU cons,y} = \min (BE_{BAU min,y} : BE_{BAU,cons,UNC,y}) \quad \text{Equation (4)}$$

Where:

$BE_{BAU cons,y}$	=	Conservative BAU baseline emissions in year y (t CO ₂ e)
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For the sources of the different parameters please refer to sections B.7.5. and B.8.1.

B.7.1.2. Calculation of baseline emissions/removals

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Adjusted baseline emissions are calculated as follows as per the applied methodology:

$$BE_{adj,y} = \min(P_{production,y} : P_{product,max}) * (1 - UNC_P) * EF_y * \frac{(h_y - h_{r,y})}{h_y} * GWP_{N2O} * 10^{-3} \quad \text{Equation (5)}$$

Where:

$BE_{adj,y}$	=	Downward adjusted baseline emissions in year y (t CO ₂ e)
$P_{production,y}$	=	Production of nitric acid in year y (t HNO ₃)

⁴ When requesting the renewal of crediting period, the uncertainty during the first crediting period shall be used.

$P_{product,max}$	Design capacity of nitric acid production (t HNO ₃)
UNC_p	Uncertainty of nitric acid production (fraction)
EF_y	= Conservative baseline N ₂ O emission factor acc. to the operating pressure of the ammonia burner in year y (kg N ₂ O/t HNO ₃)
GWP_{N2O}	= Global Warming Potential of N ₂ O 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: <ul style="list-style-type: none"> a) Secondary N₂O abatement system was not installed, underperforming or failed; b) Tertiary N₂O abatement system is by-passed, underperforming or failed

Determination of the conservative baseline N₂O emission factor (EF_y):

- The emission factor of the first crediting year shall not be adjusted.
- In the following year a downward adjustment (DA) of 1% shall be applied to the baseline emission factor.
- In any subsequent year the downward adjustment (DA) of the previous year shall be increased by 1% (DA_i).

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:

$$F_{N2O,tail\ gas,h} > EF_y \times P_{NA,h} \tag{Equation (6)}$$

Where:

$P_{NA,h}$	= Nitric acid produced in the hour h (t HNO ₃)
EF_y	= Conservative baseline N ₂ O emission factor acc. to the operating pressure of the ammonia burner in year y (kg N ₂ O/t HNO ₃)
$F_{N2O,tailgas,h}$	= Mass flow of N ₂ O in the gaseous stream of the tail gas in the hour h (kg N ₂ O/h)

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

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The annual difference between baseline and BAU emissions is determined as follows:

$$BE_y = \min (BE_{adj,y}; BE_{BAU\ cons,y}) \tag{Equation (7)}$$

Where:

BE_y	= Baseline emissions in year y (t CO ₂ e)
$BE_{adj,y}$	= Downward adjusted baseline emissions in year y (t CO ₂ e)
$BE_{BAU\ cons,y}$	= Conservative BAU baseline emissions in year y (t CO ₂ e)

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

- Crediting baseline emissions (BE_y) are lower than the conservative BAU baseline emissions ($BE_{BAU\ cons,y}$) for all individual years.

- Crediting baseline emissions (BE_y) are lower than the BAU baseline emissions ($BE_{BAU\ cons,y}$) for the whole crediting period.

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

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For N₂O abatement projects, adjustment factors take into account the economic viability of such technologies, which remain capital-intensive and not yet widely adopted. These systems typically achieve high performance, but require significant capital and operational expenditure to maintain efficiency. For existing nitric acid plants, no inherent significant technological development or improvement exists.

Therefore, 1% annual downward adjustment shall be applied to baseline emissions for each year after the first crediting year. The annual increase in the downward adjustment shall correspond to at least 1% of the baseline emissions in the calendar year of the start date of the first crediting period.

Each calendar year y shall last from 1.1. – 31.12. and the downward adjustment will be applied accordingly.

B.7.2. Calculation of project emissions/removals

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Activity emissions include emissions of N₂O, which have not been destroyed by the project activity. As no tertiary N₂O abatement facility will be installed, CO₂ emissions resulting from the operation of the N₂O abatement facility are considered to be zero. Activity emissions are calculated as follows:

$$AE_y = AE_{N2O,y} + AE_{CO2,tertiary,y} \tag{Equation (8)}$$

Where:

- AE_y = Activity emissions in year y (t CO₂e)
- $AE_{N2O,y}$ = Activity emissions of N₂O from the project plant in year y (t CO₂e)
- $AE_{CO2,tertiary,y}$ = Activity emissions of CO₂ from the operation of the tertiary N₂O abatement facility in year y (t CO₂)

Activity emissions of N₂O from the project plant

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

$$AE_{N2O,y} = \sum_1^{h_y-h_{r,y}} F_{N2O,tail\ gas,h} \times GWP_{N2O} \times 10^{-3} \tag{Equation (9)}$$

Where:

- $AE_{N2O,y}$ = Activity emissions of N₂O from the project plant in year y (t CO₂e)
- GWP_{N2O} = Global warming potential of N₂O valid for the commitment period
- $F_{N2O,tailgas,h}$ = Mass flow of N₂O in the gaseous stream of the tail gas in the hour h (kg N₂O/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:
 - (a) Secondary N₂O abatement system was not installed, underperforming or failed;
 - (b) Tertiary N₂O abatement system is by-passed, underperforming or failed

Determination of $F_{N_2O,tailgas,h}$

The amount of N₂O emissions from the tail gas stream of the project plant shall be determined using the latest approved 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 N₂O 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 N₂O concentration and the volume or mass flow of the tail gas based on two seconds (or shorter) interval readings that are recorded and stored electronically. These N₂O 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 N₂O 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 activity emissions;
- (d) If data for either the N₂O concentration or the volume or mass flow of the tail gas are not available for more than 1/3 of any hour while the plant was in operation, the value for that hour shall be replaced with the maximum value of N₂O concentration or volume or mass flow of the tail gas observed during the monitoring period. If data for neither the N₂O concentration nor the volume or mass flow of the tail gas are available for more than 1/3 of any hour while the plant was in operation, the maximum value of mass flow of N₂O calculated during the monitoring period 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 N₂O concentration and the volume or mass flow of the tail gas and by-pass are automatically converted to normal conditions by the AMS during the monitoring process, the parameters P_t and T_t do not need to be monitored 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 ($C_{H_2O,t,db,n}$) and demonstrate that this is less or equal to 0.05 kg H₂O/m³ 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 ($F_{i,t}$)⁵ is determined as follows:

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

With

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

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 (m³ 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 (m³ gas i/m³ dry gas)

⁵ $F_{i,t}$ corresponds to the parameter $F_{N_2O,tail gas,h}$ of the applied methodology.

- $\rho_{i,t}$ = Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/m³ 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.m³/kmol.K)
- T_t = Temperature of the gaseous stream in time interval t (K)

Assumptions and source of data

- All relevant parameters are included and fully described, and for unavailable data a conservative reassessment/replacement shall be applied.
- 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.).
- N₂O emission factors (e.g. EF_y) are based on IPCC 2019 guidelines.

B.7.3. Addressing of leakage

B.7.3.1. Sources of leakage

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Any leakage emissions sources are deemed to be negligible.

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

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Any leakage emissions sources are deemed to be negligible.

B.7.3.3. Calculation of leakage emissions

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Any leakage emissions sources are deemed to be negligible.

B.7.4. Calculation of emission reductions or net removals

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Lowest most conservative BAU baseline emissions

BAU baseline emissions:

Parameter		BE _{BAU,y}	P _{production,y}	EF _{BAU}	GWP _{N2O}
Unit		t CO ₂ e	t HNO ₃	kg N ₂ O / t HNO ₃	-
Year 1	01/07 – 31/12/2026	139,046	58,300	9.00	265
Year 2	2027	275,825	115,650	9.00	265
Year 3	2028	275,825	115,650	9.00	265
Year 4	2029	275,825	115,650	9.00	265
Year 5	2030	275,825	115,650	9.00	265
Year 6	01/01 – 30/06/2031	136,779	57,350	9.00	265

Conservative BAU baseline emissions:

Parameter		BE _{BAU,cons,unc,y}	UNC _{BAU}
Unit		t CO ₂ e	%
Year 1	01/07 – 31/12/2026	97,332	-30%
Year 2	2027	193,078	-30%
Year 3	2028	193,078	-30%
Year 4	2029	193,078	-30%
Year 5	2030	193,078	-30%
Year 6	01/01 – 30/06/2031	95,745	-30%

Minimum conservative value of BAU baseline emissions:

Parameter		BE _{BAU,min,y}	AE _y
Unit		t CO ₂ e	t CO ₂ e
Year 1	01/07 – 31/12/2026	126,211	10,696
Year 2	2027	250,364	21,217
Year 3	2028	250,364	21,217
Year 4	2029	250,364	21,217
Year 5	2030	250,364	21,217
Year 6	01/01 – 30/06/2031	124,153	10,522

Lowest most conservative BAU baseline emissions:

Parameter		BE _{BAU,cons,y}
Unit		t CO ₂ e
Year 1	01/07 – 31/12/2026	97,332
Year 2	2027	193,078
Year 3	2028	193,078
Year 4	2029	193,078
Year 5	2030	193,078
Year 6	01/01 – 30/06/2031	95,745

Crediting baseline emissionsAdjusted baseline emissions:

Parameter		BE _{adj,y}	P _{production,y}	EF _y	GWP _{N2O}	h _y	h _{r,y}	UNC _p
Unit		t CO ₂ e	t HNO ₃	kg N ₂ O / t HNO ₃	-	h	h	%
Year 1	01/07 – 31/12/2026	96,359	58,300	6.30	265	3,109	0	1%
Year 2	2027	189,235	115,650	6.24	265	6,168	0	1%
Year 3	2028	187,305	115,650	6.17	265	6,168	0	1%
Year 4	2029	185,355	115,650	6.11	265	6,168	0	1%
Year 5	2030	183,386	115,650	6.04	265	6,168	0	1%
Year 6	01/01 – 30/06/2031	89,953	57,350	5.98	265	3,059	0	1%

Crediting baseline emissions:

Parameter		BE _y	BE _{adj,y}	BE _{BAU,cons,y}
Unit		t CO ₂ e	t CO ₂ e	t CO ₂ e
Year 1	01/07 – 31/12/2026	96,359	96,359	97,332
Year 2	2027	189,235	189,235	193,078
Year 3	2028	187,305	187,305	193,078
Year 4	2029	185,355	185,355	193,078
Year 5	2030	183,386	183,386	193,078
Year 6	01/01 – 30/06/2031	89,953	89,953	95,745

Activity emissions

Parameter		AE _y	AE _{N2O,y}	AE _{CO2,tertiary,y}
Unit		t CO ₂ e	t CO ₂ e	t CO ₂ e
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

Activity emissions of N₂O from the project plant:

Parameter		PE _{N2O,y}	F _{N2O,tailgas,h}	GWP _{N2O}	h _y	h _{r,y}
Unit		t CO ₂ e	kgN 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}	ρ _{i,t}
Unit		kgN ₂ O/h	m ³ dry gas/h	m ³ gas i/m ³ dry gas	kg gas i/m ³ 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

With:

Parameter		$\rho_{i,t}$	P_t	MM_i	R_u	T_t
Unit		kg gas i/m ³ gas i	Pa	kg/kmol	Pa.m ³ /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

As no tertiary N₂O abatement facility will be installed, CO₂ emissions resulting from the operation of the N₂O abatement facility are considered to be zero.

Emission reductions

$$ER_y = BE_y - AE_y \quad \text{Equation (10)}$$

Where:

- ER_y = Emission reductions in year y (t CO₂e)
- BE_y = Baseline emissions in year y (t CO₂e)
- AE_y = Activity emissions in year y (t CO₂e)

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	85,663	96,359	10,696
Year 2	2027	168,018	189,235	21,217
Year 3	2028	166,087	187,305	21,217
Year 4	2029	164,138	185,355	21,217
Year 5	2030	162,168	183,386	21,217
Year 6	01/01 – 30/06/2031	79,431	89,953	10,522

B.7.5. Data and parameters fixed ex ante

Data / Parameter table 1.

Data/parameter	Operating pressure
Description	Operating pressure of nitric acid plant (AOR and Absorber)
Data unit	bar
Equations referred	Equation (1), Equation (5), Equation (6)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	AOR pressure: 3.5, Absorber pressure: 9.0

Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	Manufacturer specifications
Additional comments	The parameter is used to determine the nitric acid plant's operating pressure.

Data / Parameter table 2.

Data/parameter	P_{product,max}
Description	Design capacity of nitric acid production
Data unit	t HNO ₃
Equations referred	Equation (5)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	164,250
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	Manufacturer information

Data / Parameter table 3.

Data/parameter	EF_y
Description	Conservative baseline N ₂ O emission factor acc. to the operating pressure of the ammonia burner in year y (related to 100 % pure acid)
Data unit	kg N ₂ O/t HNO ₃
Equations referred	Equation (1), Equation (5), Equation (6)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	6.30
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	IPCC 2019; Uncertainty is applied conservative of IPCC N ₂ O emission factors.
Additional comments	<ul style="list-style-type: none"> - The emission factor of the first crediting year shall not be adjusted. - In the following year a downward adjustment (<i>DA</i>) of 1% shall be applied to the baseline emission factor. - In any subsequent year the downward adjustment (<i>DA</i>) of the previous year shall be increased by 1% (<i>DA_i</i>). <p>Since Egypt has not established emission factors for nitric acid plants, IPCC values are applicable.</p>

Data / Parameter table 4.

Data/parameter	EF_{BAU}
Description	Default BAU baseline N ₂ O emission factor acc. to the operating pressure of ammonia burner (related to 100 % pure acid)
Data unit	kg N ₂ O/t HNO ₃
Equations referred	Equation (1)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	9.00
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	IPCC 2019
Additional comments	N/A

Data / Parameter table 5.

Data/parameter	GWP_{N2O}
Description	Global warming potential of N ₂ O valid for the commitment period
Data unit	t CO ₂ e/t N ₂ O
Equations referred	Equation (1), Equation (5), Equation (9)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input checked="" type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	265
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	Relevant decisions by the CMA
Additional comments	N/A

Data / Parameter table 6.

Data/parameter	DA
Description	Baseline downward adjustment
Data unit	%
Equations referred	Equation (5)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions

Value(s) applied	1
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	Refer to section B.7.1.4.
Additional comments	-

Data / Parameter table 7.

Data/parameter	DAi
Description	Downward adjustment increase
Data unit	%
Equations referred	Equation (5)
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions/removals <input type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	1
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources
Choice of data or measurement methods and procedures	Refer to section B.7.1.4.
Additional comments	-

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

Data / Parameter table 8.

Data/parameter	R_n
Description	Universal ideal gases constant
Data unit	Pa.m ³ /kmol.K
Equations referred	Equation (5), Equation (6) of the tool
Purpose of data	<input type="checkbox"/> Baseline emissions/removals <input checked="" type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions
Value(s) applied	8,314
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> 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 9.

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	<input type="checkbox"/> Baseline emissions/removals <input checked="" type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions			
Value(s) applied	Compound	Structure	Molecular mass (kg/kmol)	
	Nitrous oxide	N ₂ O	44.02	
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources			
Choice of data or measurement methods and procedures	Specified in the tool			
Additional comments	N/A			

Data / Parameter table 10.

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	<input type="checkbox"/> Baseline emissions/removals <input checked="" type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions			
Value(s) applied	101,325			
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> Other sources			
Choice of data or measurement methods and procedures	Specified in the tool			
Additional comments	N/A			

Data / Parameter table 11.

Data/parameter	T_n			
Description	Temperature at normal conditions			
Data unit	K			
Equations referred	Equation (5), Equation (6) of the tool			
Purpose of data	<input type="checkbox"/> Baseline emissions/removals <input checked="" type="checkbox"/> Project emissions/removals <input type="checkbox"/> Leakage emissions			

Value(s) applied	273.15
Source of data	<input type="checkbox"/> Measured <input checked="" type="checkbox"/> 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 ₂ e)	Activity emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Emission reductions (tCO ₂ e)
01/07 – 31/12/2026	96,359	10,696	0	85,663
2027	189,235	21,217	0	168,018
2028	187,305	21,217	0	166,087
2029	185,355	21,217	0	164,138
2030	183,386	21,217	0	162,168
01/01 – 30/06/20231	89,953	10,522	0	79,431
Total	931,593	106,087	0	825,505
Total number of years in the crediting period	5			
Annual average over the crediting period	186,319	21,217	0	165,101

B.8. Monitoring Plan

B.8.1. Data and parameters to be monitored

Data / Parameter table 12.

Data/parameter	P_{production,y}	
Description	Production of nitric acid in year y	
Data unit	t HNO ₃	
Equations referred	Equation (1), Equation (5), Equation (6)	
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions / removals <input type="checkbox"/> Activity emissions / removals <input type="checkbox"/> 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

	<i>Accuracy class</i>	According to the supplier information
	<i>Calibration requirements</i>	According to the supplier requirements
	<i>Location</i>	After NA absorber tower
Measurement intervals	Measure continuously and record at appropriate intervals	
QA/QC procedures	<p>Periodic calibration of relevant transmitter will be performed acc. to supplier's recommendations.</p> <p>QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator's procedures.</p>	
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 13.

Data/parameter	h_y	
Description	Number of hours of operation in year y	
Data unit	h	
Equations referred	Equation (5), Equation (9)	
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> Leakage emissions	
Measurement methods and procedures	Measurements by activity participants and production reports	
Entity/person responsible for the measurement	Project operator	
Measuring instrument(s)	<i>Type of instrument</i>	Temperature transmitter
	<i>Accuracy class</i>	According to the supplier information
	<i>Calibration requirements</i>	According to the supplier requirements
	<i>Location</i>	AOR burner
Measurement intervals	Measure continuously and record at appropriate intervals	
QA/QC procedures	<p>Periodic calibration of relevant transmitter as above mentioned will be performed according to supplier's recommendations.</p> <p>QA/QC procedures, in terms of equipment operations and maintenance, will be incorporated in the project operator's procedures.</p>	
Additional comment	The information will be stored in electronic records and paper during whole project's lifetime.	

Data / Parameter table 14.

Data/parameter	$h_{r,y}$
Description	Number of hours (h) in year y where: Secondary N ₂ O abatement system was not installed, underperforming or failed
Data unit	h

Equations referred	Equation (5), Equation (9)	
Purpose of data	<input checked="" type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> 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: $F_{N2O,tail\ gas,h} > EF_{default,y} \times P_{NA,h}$	
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. 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 15.

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	<input type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> Leakage emissions	
Measurement methods and procedures	Volumetric flow measurement will refer to normal conditions. 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

	<i>Location</i>	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 16.

Data/parameter	$V_{i,t,db}$	
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	<input type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> 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)	<i>Type of instrument</i>	N ₂ O Analyzer
	<i>Accuracy class</i>	According to the supplier information
	<i>Calibration requirements</i>	According to the supplier requirements
	<i>Location</i>	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 ₂ O 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 17.

Data/parameter	$C_{H_2O,t,db,n}$	
Description	Moisture content of the gaseous stream at normal conditions, in time interval t	
Data unit	m^3 dry gas i / m^3 dry gas	
Equations referred	Equation (5), Equation (6) of the tool	
Purpose of data	<input type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> Leakage emissions	
Measurement methods and procedures	Discrete measurement procedure.	

Entity/person responsible for the measurement	By third party	
Measuring instrument(s)	<i>Type of instrument</i>	N/A
	<i>Accuracy class</i>	N/A
	<i>Calibration requirements</i>	N/A
	<i>Location</i>	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 18.

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	<input type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> Leakage emissions	
Measurement methods and procedures	Measurements by activity participants	
Entity/person responsible for the measurement	Project operator	
Measuring instrument(s)	<i>Type of instrument</i>	Temperature transmitter
	<i>Accuracy class</i>	According to the supplier information
	<i>Calibration requirements</i>	According to the supplier requirements
	<i>Location</i>	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 19.

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	<input type="checkbox"/> Baseline emissions / removals <input checked="" type="checkbox"/> Activity emissions / removals <input type="checkbox"/> Leakage emissions	
Measurement methods and procedures	Measurements by activity participants	
Entity/person responsible for the measurement	Project operator	
Measuring instrument(s)	<i>Type of instrument</i>	Pressure transmitter
	<i>Accuracy class</i>	According to the supplier information
	<i>Calibration requirements</i>	According to the supplier requirements
	<i>Location</i>	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	

The provisions as mentioned in above parameter tables shall be followed to ensure accuracy, transparency, and reliability of data throughout the crediting period. Furthermore, allocation of roles and responsibilities for MRV implementation, including data collection, validation, documentation, and reporting shall be defined prior to the first verification of GHG emission reductions.

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 N₂O 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 (N₂O) 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: <ul style="list-style-type: none"> • Creating new long-term jobs and additional indirect employment opportunities. • Supporting local businesses involved in catalyst transportation, instrument installation, and maintenance work. • 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: <ul style="list-style-type: none"> • Introducing the secondary abatement technology, the first of its kind in Egypt and the Middle East, for abating N2O. • 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	<input checked="" type="checkbox"/> The proposed A6.4 project has not been already registered as an A6.4 project. <input checked="" type="checkbox"/> 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). <input checked="" type="checkbox"/> The proposed A6.4 project has not been previously deregistered from the Article 6.4 mechanism. <input type="checkbox"/> The proposed A6.4 project has not been excluded from a registered A6.4 PoA.
Other	<input checked="" type="checkbox"/> 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. <input checked="" type="checkbox"/> 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. <input checked="" type="checkbox"/> 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 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)

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

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	11 December 2024	Initial publication of form template.
Decision Class: Regulatory Document Type: Form Business Function: A6.4 activity cycle Keywords: A6.4 mechanism, A6.4 projects, project implementation, project design document		