GEF-8 PROJECT IDENTIFICATION FORM (PIF)

TABLE OF CONTENTS

General Project Information

Project Title	
Control and reduction of mercury emissions from the cement industry in Brazil	
Region	GEF Project ID
Brazil	11574
Country(ies)	Type of Project
Brazil	FSP
GEF Agency(ies):	GEF Agency ID
UNIDO	240088
Executing Partner	Executing Partner Type
National executing entity to be determined	Others
GEF Focal Area (s)	Submission Date
Chemicals and Waste	3/20/2024
Project Sector (CCM Only)	
Taxonomy	
Chemicals and Waste, Focal Areas, Mercury, Cement, Influencing models, Convene multi-stakeholder alliances, Strengthen institutional capacity and decision-making, Transform policy and regulatory environments, Demonstrate innovative approache, Stakeholders, Beneficiaries, Private Sector, Large corporations, Communications, Awareness Raising, Behavior change, Strategic Communications, Indigenous Peoples, Type of Engagement, Partnership, Information Dissemination, Consultation, Civil Society, Academia, Trade Unions and Workers Unions, Community Based Organization, Non-Governmental Organization, Gender Equality, Gender Mainstreaming, Sex-disaggregated indicators, Gender-sensitive indicators, Women groups, Gender results areas, Capacity Development, Knowledge Generation and Exchange, Capacity, Knowledge and Research, Knowledge Generation, Training, Workshop, Learning, Adaptive management, Theory of change, Indicators to measure change, Knowledge Exchange, South-South	
Type of Trust Fund	Project Duration (Months)
GET	60
GEF Project Grant: (a)	GEF Project Non-Grant: (b)
12,000,000.00	0.00
Agency Fee(s) Grant: (c)	Agency Fee(s) Non-Grant (d)
1,080,000.00	0.00
Total GEF Financing: (a+b+c+d)	Total Co-financing
13,080,000.00	72,000,000.00
PPG Amount: (e)	PPG Agency Fee(s): (f)
300,000.00	27,000.00

PPG total amount: (e+f)	Total GEF Resources: (a+b+c+d+e+f)
327,000.00	13,407,000.00

Project Tags

CBIT: No NGI: No SGP: No Innovation: No

Project Summary

Provide a brief summary description of the project, including: (i) what is the problem and issues to be addressed? (ii) what are the project objectives, and if the project is intended to be transformative, how will this be achieved? iii), how will this be achieved (approach to deliver on objectives), and (iv) what are the GEBs and/or adaptation benefits, and other key expected results. The purpose of the summary is to provide a short, coherent summary for readers. The explanation and justification of the project should be in section B "project description".(max. 250 words, approximately 1/2 page)

In August 2017, Brazil ratified the Minamata Convention on Mercury. The national inventory of mercury emissions and releases was conducted in 2019, with cement industry as the fourth largest emitter. Brazil counts 91 cement manufacturing plants with annual capacity of 94 million tons and consumption 62.0 million tons. The inventory updated on the basis of 2022 cement production, shows yearly emissions of mercury by the sector would now amount to 3,101 Kg/year (Minimum) and 57,191 (Maximum) Kg/year.

However, there is lack of information and insufficient capacities related to monitoring and reporting of mercury emissions in cement production, sidelining the issue for both the industry and the national regulators in Brazil.

The project will focus on strengthening the capacity of the relevant stakeholders for monitoring and management of the mercury emissions from the cement industry, through review of the national regulations, establishment of guidelines, demonstration of suitable technologies for tracking emissions, but also through comprehensive study monetizing the emission reduction benefits.

Technologies and practices for control and reduction of emissions will be piloted in cement manufacturing plants, enhancing the industry's capacity to achieve significant reductions in mercury emissions. Apart from active filtration, measures such as input material screening for mercury content will be promoted.

Application of energy efficient and circular economy approaches will seek to identify alternative materials to clinker for cement production, increased use of supplementary cementitious materials and recovery of concrete from demolition sites. Dedicated knowledge platform will ensure faster uptake and scaling up of suitable BAT/BEPs.

Using this approach, the project plans to achieve a reduction of 1.9 tonnes of mercury/year or a total of 7.8 tonnes of mercury after 4 years of execution. In addition, the project will reduce at least 3,000,000 tonnes of CO_2 from the cement industry in Brazil. Through targeted capacity-building activities, awareness raising and knowledge generation activities, the project will benefit at least 3000 people with a target of 40% women engaged in the project

Indicative Project Overview

Project Objective

To support national commitment towards the Minamata Convention through monitoring, control and reduction of mercury emissions from the cement industry in Brazil and synergies with innovative approaches planned under the Cement Technology Roadmap

Project Components

1. Capacity building for control, minimization and management of mercury emissions from cement industry

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	**Co-financing ($)**
500,000.00	1,400,000.00

Outcome:

Outcome 1: Strengthened institutional, regulatory, enforcement, and monitoring capacities for control, minimization and management of mercury emission from cement industry.

Output:

Output 1.1.1 Technical study on the monetization of emission reduction benefits, focusing on the social cost of carbon and mercury emissions.

Output 1.1.2 National regulatory policies and frameworks developed to monitor and control mercury emissions.

Output: 1.1.3 National guidelines and standards established for mercury monitoring in the industrial sector and specifically in the cement industry.

1. Capacity building for control, minimization and management of mercury emissions from cement industry

Component Type	Trust Fund
Investment	GET
GEF Project Financing ($)	**Co-financing ($)**
1,000,000.00	7,000,000.00

Outcome:

Outcome 1: Strengthened institutional, regulatory, enforcement, and monitoring capacities for control, minimization and management of mercury emission from cement industry.

Output:

Output: 1.1.4 National enforcement capacity for mercury monitoring and reporting, including the implementation of continuous mercury monitoring systems to track emissions and ensure compliance with regulatory limits.

2. Implementation of best available technologies and best environmental practices for the control and reduction of mercury emissions from the cement industry

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
128,571.00	800,000.00

Outcome:

Outcome 1: Control and reduce Hazardous emissions from the cement industry controlled and reduced

Output:

Output: 2.1.1 : Gender-responsive sectoral guidelines on process optimization and emission control measures for the cement industry

2. Implementation of best available technologies and best environmental practices for the control and reduction of mercury emissions from the cement industry

Component Type	Trust Fund
Investment	GET
GEF Project Financing ($)	Co-financing ($)
4,800,000.00	27,450,000.00

Outcome:

Output:

Output: 2.1.2 Implementation of best available technologies and best environmental practices to control mercury emissions in cement kilns (emission control technologies and measures for mercury-free raw materials).

Output: 2.1.3 -Advancing the use of alternative fuels for the cement industry with a particular focus on bio-mass.

3. Advancing the Cement Technological Roadmap with energy-efficient processes and circular approaches

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
300,000.00	2,100,000.00

Outcome:

Outcome 1 Circular economy practices promoted in the cement industry supply chain

Output:

Output 3.1.1 -Feasibility studies on alternative low-carbon materials to meet national targets for reducing clinker in cement.

3. Advancing the Cement Technological Roadmap with energy-efficient processes and circular approaches

Component Type	Trust Fund
Investment	GET
GEF Project Financing ($)	Co-financing ($)
3,700,000.00	23,900,000.00

Outcome:

Output:

Output: 3.1.2 Supporting the implementation of energy-efficient processes in kiln operations

Output: 3.1.3 -Technology transfer to support the increase of supplementary cementitious materials in primary production

Output: 3.1.4 -Advancing circular approaches for recycled concrete and clinker

4. Knowledge management and partnerships

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
430,000.00	3,000,000.00

Outcome:

Outcome 1 Promotion of knowledge, experience and lesson sharing and environmental awareness raising among stakeholder groups

Output:

Output 4.1.1 Targeted outreach for the general public, decision-makers and industry experts with gender-specific communication

Output 4.1.2 Knowledge platform to disseminate solutions and information

Output 4.1.3 Business to business events to exchange best practices and establish linkages in the area of technology transfer and cooperation

Output 4.1.4 Connection with development banks to support financing of investment in the sector including gender-responsive finance

M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	**Co-financing ($)**
570,000.00	2,850,000.00

Outcome:

Outcome 1. M&E

Output:

Output: 5.1.1 Periodic monitoring and evaluation supporting gender mainstreaming

Output: 5.1.2 Midterm and terminal evaluation report.

Component Balances

Project Components	GEF Project Financing ($)	Co-financing ($)
1. Capacity building for control, minimization and management of mercury emissions from cement industry	500,000.00	1,400,000.00
1. Capacity building for control, minimization and management of mercury emissions from cement industry	1,000,000.00	7,000,000.00
2. Implementation of best available technologies and best environmental practices for the control and reduction of mercury emissions from the cement industry	128,571.00	800,000.00
2. Implementation of best available technologies and best environmental practices for the control and reduction of mercury emissions from the cement industry	4,800,000.00	27,450,000.00
3. Advancing the Cement Technological Roadmap with energy-efficient processes and circular approaches	300,000.00	2,100,000.00
3. Advancing the Cement Technological Roadmap with energy-efficient processes and circular approaches	3,700,000.00	23,900,000.00
4. Knowledge management and partnerships	430,000.00	3,000,000.00
M&E	570,000.00	2,850,000.00

Subtotal	**11,428,571.00**	**68,500,000.00**
Project Management Cost	571,429.00	3,500,000.00
Total Project Cost ($)	**12,000,000.00**	**72,000,000.00**

Please provide justification

PROJECT OUTLINE

A. PROJECT RATIONALE

Briefly describe the current situation: the global environmental problems and/or climate vulnerabilities that the project will address, the key elements of the system, and underlying drivers of environmental change in the project context, such as population growth, economic development, climate change, sociocultural and political factors, including conflicts, or technological changes. Describe the objective of the project, and the justification for it. (Approximately 3-5 pages) see guidance here

Due to limited upload capacity in this section, for complementary information, please refer to:

- Annex 1 on technical information related to mercury emissions in cement production

- Annex 2 on regulatory and technical aspects related to monitoring of mercury emissions

- Annex 3 which contains all figures.

Global environmental challenges

Mercury emissions and cement production globally

According to the UNEP Global Mercury Assessment 2018, the global anthropogenic mercury emissions reached in 2015 a total of 2,220 metric tons per year. The cement production (11%) is the fourth source of anthropogenic mercury emission after small-scale gold mining (38%), stationary combustion of coal (21%), and non-ferrous metal production (15%). The major pathway for mercury releases from the cement industry comes from the release in the atmosphere of mercury present in raw materials (e.g., limestone), fuel (e.g., coal) or supplementary cementitious materials.

Sources of mercury emissions

Mercury can be present in all types of input mass streams, in the natural and alternative raw materials as well as in the conventional and alternative fuels (including hazardous waste fuels). This means that mercury is introduced into the clinker production systems by all three principal feeding points, i.e., via the raw materials, the main burner and the secondary firing system.

One of the most effective way of eliminating mercury emissions is to limit the input of mercury into the cement manufacturing process by carefully monitoring raw materials and fuels. This method requires some knowledge of the typical mercury content of raw materials and fuels as well as a careful monitoring program for determining input values of mercury. On the other hand, this is most frequently very difficult as far as natural raw materials and regular fuels are used.

Baseline Scenario

Cement production in Brazil

Brazil counts 91 cement manufacturing plants (Figure 1) controlled by 23 industrial groups with a capacity of 94 million tons of cement per year (2022). In 2021, the cement production amounted to 65.8 million tons. Infrastructure building, housing construction work, and property development contributed to a 6.6% annual increase of cement consumption between 2020 and 2022. The sales of cement in 2023 were about 62.0 million tons, 2,2% below the result of 2022.

Figure 1. Apparent consumption in Brazil from 1965 to 2022 (million tons per annum)

Figure 2. Brazilian integrated and grinding cement plants (2022).

In Brazil, fuels combustion represents 36% of the global carbon dioxide emissions, whereas calcination contributes 63% (Figure 2). In addition, electrical energy contributes approximately one per cent to the global emissions, since renewable sources currently have the largest share in electric power capacity in Brazil (74%).

Figure 3. Carbon dioxide emissions broken down by area by the cement production in Brazil (2022)

The Brazilian Cement Sector Roadmap

As a large emerging economy, Brazil is currently implementing a significant infrastructure program in response to increased population and urbanization rates. Therefore, the demand for cement in the coming decades will rise, leading to significant GHG and mercury emissions resulting from the increase in cement production.

The Brazilian cement sector has formulated a Cement Technology Roadmap outlining strategies to mitigate carbon dioxide emissions from the national industry. One of the primary mitigation measures involves increasing cement constituents, such as limestone and calcined clay, to partially replace clinker in the final blended cement. These measures are estimated to result in a substantial reduction of the clinker/cement ratio from 67% (2014) to 52% in 2050, leading to a reduction of 290 million tons of CO_2 over the same period. These measures will lead to a cumulative carbon dioxide depletion of 38 million tons by 2050 (9% of the Brazilian industry mitigation).

Table 1. Key indicators for the Brazilian cement industry by 2030 and 2050 within the 2 ◦C scenario.

With regard to the substitution rate with alternative fuels (% of thermal substitution), the range of substitution could be 30–40% and 50–60% for 2030 and 2050, respectively. Consequently, the carbon dioxide mitigation due to the increase in alternative fuel’s usage is about 13%.

Implementation of Minamata Convention on Mercury in Brazil

In 2013, the Brazilian government signed the Minamata Convention, marking a significant commitment to environmental protection. Since then, the milestones of the protocol's implementation have been documented and are depicted in Figure 4 below. Following the ratification, a national inventory of mercury emissions and releases was conducted in 2019.

Fig. 4: Timeline of the Minamata Convention in Brazil

Furthermore, the primary outcomes of this process are illustrated in Figure 5. It is apparent that Output 4, which entails the action loggings aimed at addressing the identified issues, is still under construction by the Brazilian government.

Fig. 5: Main Outcomes from the Minamata Initial Assessment (MIA) of the Hg Inventory in Brazil

Overview of the Brazilian Initial Inventory Results

Efforts were undertaken to gather national data and information. In instances where national data were unavailable, default values outlined in Toolkit 2015 were utilized, representing minimum and maximum values. The inventory presents several uncertainties and certain estimates require confirmation through a monitoring programme. The severity of these gaps underscores the need for enhanced capacities for the collection and management of information. The lack of information from the cement industry and insufficient capacities related to monitoring and reporting of emissions are significant barriers impacting the sustainable development of the cement industry in Brazil.

Fig. 6: MIA - Minamata Initial Assessment of the Hg Inventory in Brazil (2016) | Minimum Scenario

Fig. 7: Minamata initial assessment on the Hg inventory in Brazil (2016) l Maximum Scenario

Based on Output 3, the Emissions and Releases Minimum and Maximum Scenarios depicted in Figures 8 and 9 respectively, the estimated emissions and releases of the cement sector were determined to be 2.809 (Min) and 51.801 (Max) Kg Hg per year. However, given that the study was conducted based on cement production data from 2016, it was necessary to update the analysis to reflect the cement production activity of 2022. The results of this updated study are presented in Figure 10 below.

Fig. 8: MIA - Minamata Initial Assessment of the Hg Inventory in Brazil | Min and Max Scenarios updated to 2022.

In 2016, emissions of mercury from the cement sector were estimated to range between 2,809 Kg/year (Min) and 51,801 kg/year (Max) (see figures 1 and 2 in Annex). Based on the cement production activity from 2022, yearly emissions and releases by the sector amount to 3,101 Kg/year (Min) and 57,191 (Max) Kg/year.

On the other hand, UNEP highlights thar the emission factor of Hg is 15 times more (Minimum) and 2 times more (Maximum) with higher thermal substitution rate. This is based on the assumption that Hg is introduced through waste relevant for the cement industry.

Regulations on mercury monitoring in Brazil The regulations in Brazil for atmospheric emissions from industrial activities are governed by **Resolutions CONAMA 382/2006 and 436/2011**, issued by the National Council for the Environment. Both resolutions establish maximum emission limits for air pollutants from stationary sources. The first resolution addresses new sources, while the second applies to old sources, with reference to installation license applications submitted after and before January 2, 2007. The cement production activity falls under the stationary sources of pollutant emissions regulated by these CONAMA Resolutions. In both resolutions, the emission limits are defined in Annex XI - Limits of atmospheric pollutant emissions from the Portland cement industry. On October 6, 2020, the National Environmental Council (CONAMA) released a new resolution, CONAMA/MMA Nº 499, revoking the old Resolution Nº 264. CONAMA 499. More information can be found in Annex 2, including on measurement techniques applicable for the Brazil context.

Current barriers preventing an alternative scenario

Regulatory	No regulation on direct limits in the mercury content of input in the cement kiln or output. Current cement standards that limit the use of dust in the cement which can be a barrier to the project.
Institutional	The monitoring capacity is insufficient. At present, air pollutants included in the routine monitoring procedure generally include sulphur dioxide (SO2), nitrogen oxide (NOx) and dust. There is an obvious gap between the current monitoring capacity and convention implementation capacity.

Technical	Insufficient capacities to review and assess mercury control and reduction technologies for cement industry Limited technical capacity from national stakeholders and local environmental management departments to monitor the atmospheric mercury emissions from cement kilns, nor bring mercury into routine inspection and monitoring of enterprises. Limited expertise to select and operate technologies proposed to control and reduce mercury emission from cement industry, lack of equipment to identify and control the whole process mass flow of mercury in cement production lines. There are no commercial technologies available for the environmentally safe and cost-effective reduction of mercury in cement industry, especially for the integrated technologies to control mercury and other heavy metals and pollutants such as Cl, dust, SO2 and NOx. Lack of technical expertise of service companies that offer monitoring campaigns.
Awareness	Cement plants have low knowledge about mercury emissions in cement plants according to various input materials, lack understanding for the behavior of mercury transfer and transform along the production processes. The general public has limited knowledge of the health impact of mercury emission from cement production, and consequently do not participate in the supervision of mercury pollution control of enterprises. In terms of pollutant release and transfer registration, there is no relevant information available at present. The public lacks access to relevant environmental pollution information and the channels provided by government and enterprises are insufficient. Awareness raising among governments, cement industry, civil societies, and the public on the necessity to control and reducing mercury emission from cement production is highly required
Financing opportunities	Very few funds are supported for controlling and reducing mercury emissions from cement production. Considering the relatively high price and high cost for control and reduction of mercury emission in cement industry together with lack of trained technical workers for application of Best available Techniques and Best Environmental Practices (BAT/BEPs), cement plants are reluctant to apply the BAT/BEPs to control and reducing mercury emissions. Financial support for cement plants will facilitate adoption of BAT/BEPs to control and reduce mercury emission.

B. PROJECT DESCRIPTION

Project description

This section asks for a theory of change as part of a joined-up description of the project as a whole. The project description is expected to cover the key elements of good project design in an integrated way. It is also expected to meet the GEF's policy requirements on gender, stakeholders, private sector, and knowledge management and learning (see section D). This section should be a narrative that reads like a joined-up story and not independent elements that answer the guiding questions contained in the PIF guidance document. (Approximately 3-5 pages) see guidance here

Project logic

The project aims to offer a comprehensive approach to monitor and control mercury emissions from the cement industry in Brazil and achieve significant and lasting impact, in the context of forecasted cement production increase due to housing and infrastructure needs. In the same time, the project intervention would be alligned with the national response to the environmental obligations under the Minamata Conventionand and in synergy with the decarbonization roadmap of the industry. It will therefore support regulatory measures, sustainable funding mechanisms, multi-stakeholder collaboration with global platforms and innovation to transform the supply chain through new products and processes. The project will focus on the following actions across the supply chain in the construction sector:

The project aims to offer a comprehensive approach to monitor and control mercury emissions from the cement industry in Brazil and achieve significant and lasting impact, in the context of forecasted cement production increase due to housing and infrastructure needs. In the same time, the project intervention would be alligned with the national response to the environmental obligations under the Minamata Conventionand and in synergy with the decarbonization roadmap of the industry. It will therefore support regulatory measures, sustainable funding mechanisms, multi-stakeholder collaboration with global platforms and innovation to transform the supply chain through new products and processes. The project will focus on the following actions across the supply chain in the construction sector:

Building the necessary institutional and regulatory capacity to effectively manage mercury emissions. Support to understanding the economic implications of reducing mercury emissions and shedding light on the socio-economic costs associated with these pollutants is a key fundamental step. This understanding will inform our approach to policy development towards robust policies and frameworks tailored to address the mercury emissions reduction in the cement industry. Additionally, the project will work towards establishing national guidelines specifically for mercury monitoring in the cement sector, ensuring standardized protocols and reporting mechanisms. The effective enforcement of these regulations is hinged on the strengthened enforcement capacity, so the project aims to ensure compliance with regulatory limits and uphold environmental standards.

Implementing the best available technologies and environmental practices in the cement industry. Emphasis on developing sectoral guidelines for emission control measures, tailored to the unique needs of cement manufacturing processes in Brazil is key to reducing mercury emissions, and the project would further help these with pilots that deploy cutting-edge technologies to achieve this goal.

Moreover, the importance of alternative fuels, particularly biomass, in reducing the industry's environmental footprint is well accepted by the industry in Brazil. The project will leverage that to remove some of the technical demonstration barriers.

The stakeholders commitment to innovation and sustainability drives also the exploration of alternative approaches to cement production. Therefore, conducting feasibility studies on low-carbon materials to reduce clinker content, is a pivotal step in promoting circular economy practices foreseen by the project. Additionally, attention will be given on implementing energy-efficient processes in kiln operations, further reducing the industry's carbon footprint, in line with the national cement industry roadmap.

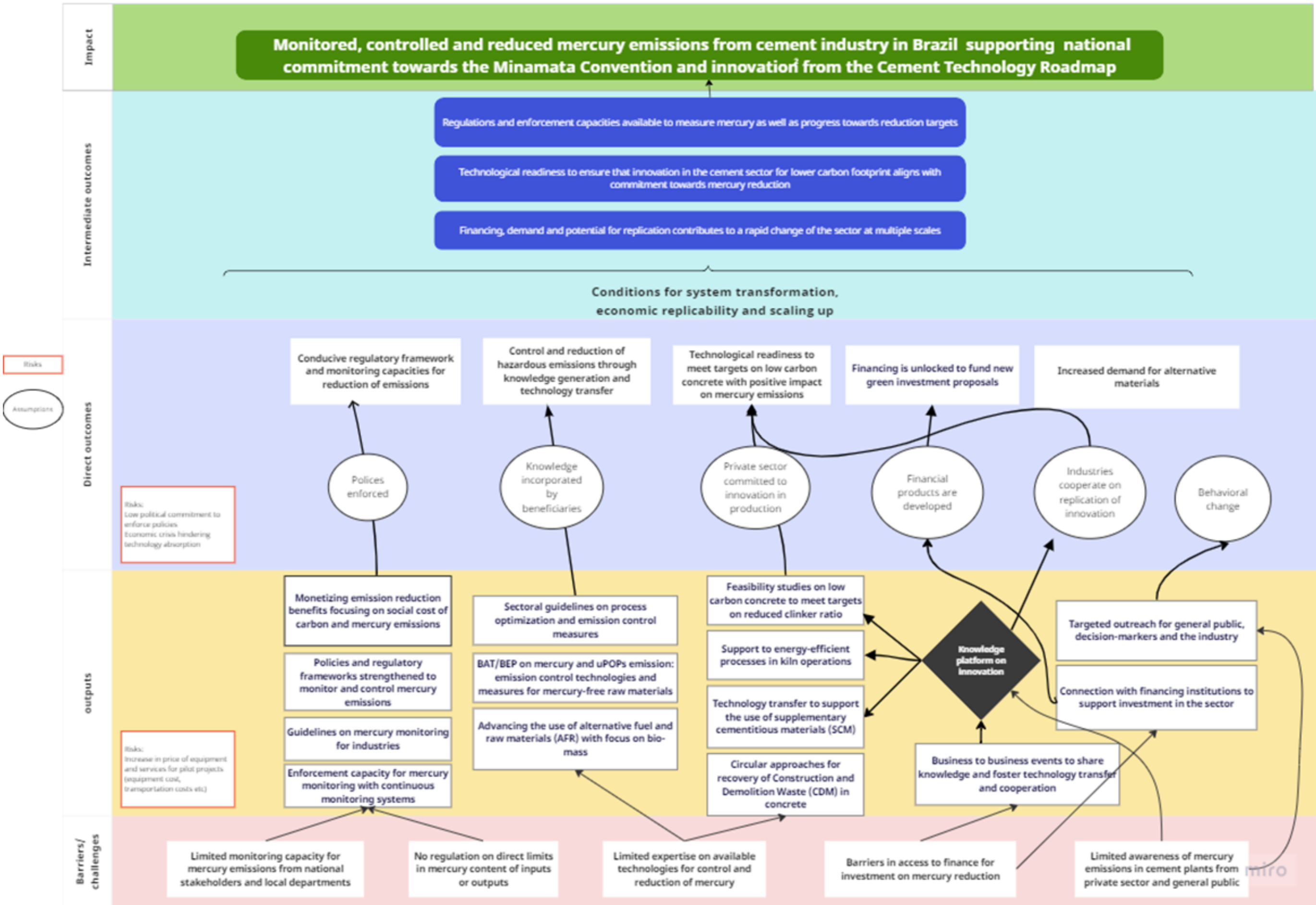
Recognizing the potential of supplementary cementitious materials in reducing mercury and GHG emissions, the project will also facilitate their integration into primary production processes. By leveraging these materials, the aim is to conserve resources and minimize environmental impact.

The promotion of knowledge sharing and collaboration is central to the project strategy. Targeted outreach and training sessions to raise awareness and build capacity among stakeholders will be set up through the national cement association as well as the Ministry of Environment. Concurently, the project will establish a knowledge platform to disseminate information and solutions, fostering a culture of learning and innovation.

Moreover, dedicated project activities will be focused on facilitating business-to-business events, creating opportunities for industry stakeholders to exchange best practices and forge partnerships that can advance the mercury emission reduction in the industry. Avenues for financing investments in the sector will be explored therefore, with the aim to ensuring sustainability beyond the project's duration.

To ensure the management for optimal results, the project will deploy a robust monitoring and evaluation framework, tracking progress and assessing its impact. Midterm and terminal evaluation reports will provide valuable insights into the effectiveness of the project‘s interventions, guiding future efforts.

Theory of change



People: Given the current limited expertise on available technologies for controlling and reducing mercury emissions from the cement industry, and the limited awareness about mercury emissions in cement plants among both the private sector and the general public, the project aims to equip stakeholders, industry representatives, and policymakers with the necessary knowledge and skills to effectively manage mercury emissions in the cement industry. This objective is met through a comprehensive approach, including awareness-raising, targeted training sessions, and robust stakeholder engagement for decision-makers, industry experts, and the general public. Additionally, the project focuses on establishing a knowledge platform for disseminating solutions and information, as well as facilitating business-to-business events to exchange best practices and foster technology transfer and cooperation. Through these efforts, the project not only seeks to generate behavioral change within the cement industry but also aims to benefit local communities, marginalized groups, women, and youth, ensuring that their perspectives are included in all industrial programs and promoting equitable environmental governance.

Process: The project strategically enhances the efficiency and effectiveness of mercury emission control measures within the cement

industry by improving expertise on available technologies for controlling and reducing mercury. Extensive research and collaboration with relevant stakeholders will identify key parameters for mercury monitoring, establish standardized monitoring protocols, and define reporting requirements, thus addressing the current lack of regulation on the direct limits in the mercury content of inputs and outputs. Moreover, the project supports the ongoing innovation from the cement sector on the use of alternative fuel and raw materials (AFR), with a focus on biomass, while ensuring that additives do not lead to mercury emissions. The Project will also support the recovery of Construction and Demolition Waste (CDM) in concrete, with thorough assessment of any impact on mercury to ensure mercury-free processes in circular approaches. These actions directly address the limited expertise on available technologies for control and reduction of mercury. By implementing best practices and strengthening institutional and regulatory capacities, the project optimizes operational efficiency and avoids environmental impact throughout the cement supply chain. Additionally, considering the current barriers in access to finance for investment on mercury reduction in Brazil, the project will connect industry representatives with financing institutions to fund new green investment proposals.

Systems: Anchoring long-term impact, the project will ensure that a conducive environment enforced mercury monitoring and control in Brazil. To address the current limited monitoring capacity for mercury emissions from national stakeholders and local departments and to establish a conducive regulatory framework and monitoring capacities, the project targets the enforcement capacity for mercury monitoring with continuous monitoring systems and aims to establish guidelines on mercury monitoring for industries, strengthen policies and regulatory frameworks to monitor and control mercury emissions. The Project will promote adaptive management principles and continuous learning through the integration of knowledge in decision-making processes, development of additional tools for knowledge generation, and dissemination mechanisms for successful outcome and innovation. Thus, the project will maximize the accessibility and utility of lessons learned, supporting future interventions and policy refinement. Furthermore, feasibility studies on alternative low-carbon materials represent a proactive step towards meeting national targets for reducing clinker in cement production, reinforcing the project's commitment to sustainable practices and environmental stewardship.

Detailed description of project components

The objective of this proposal is to to monitor and control mercury emissions in the air and further reduce GHG and mercury emissions from the cement industry

Component 1: Capacity building for control, minimization and management of mercury emissions from cement industry

This component will demonstrate the integrated policy, regulatory, standard and associated capacities to meet the requirement of the Convention.

Outcome 1: Strengthened institutional, regulatory, enforcement, and monitoring capacities for control, minimization and management of mercury emission from cement industry.

Output 1.1.1: Technical study on the monetization of emission reduction benefits, focusing on the social cost of carbon and mercury emissions

The output entails conducting a comprehensive technical study on the monetization of emission reduction benefits, with a specific focus on assessing the social cost associated with carbon and mercury emissions. This study aims to delve into the economic implications of reducing these emissions, considering their environmental impact and societal consequences including potential greater social effects on women. By analyzing the social cost of carbon and mercury emissions and its health impact on both men and women, the project seeks to quantify the monetary value of mitigating these pollutants beyond prescribed limits, thereby providing crucial insights into the economic incentives for further emission reduction measures. Through rigorous research and analysis, this output aims to inform policymakers and stakeholders about the financial implications of reducing carbon and mercury emissions, facilitating informed decision-making towards more sustainable and environmentally responsible practices.

Output 1.1.2 National regulatory policies and frameworks developed to monitor and control mercury emissions.

The project aims to assess Brazil's current laws, policies, regulations, standards, systems, and mechanisms pertaining to the cement industry. Its objective is to enhance and supplement the relevant laws and regulations concerning the control and reduction of mercury emissions in the cement sector. As part of the detailed analysis of the current regulatory framework, the project will review the Brazil's National Air Quality Standards for strengthened requirement on mercury emissions. Additionally, the project will propose technical policies and specifications aimed at preventing and controlling mercury pollution within the cement industry. In line with the Minamata Convention, which prioritizes gender mainstreaming to safeguard human health and the environment from mercury's harmful effect the project will advocate for integrating gender mainstreaming into technical policies where applicable. It will also suggest revisions or updates to existing policies, regulations, and standards to address emerging challenges in Brazil. Moreover, the project will provide recommendations for evaluating and revising current mercury emission limits in flue gas, as well as revising monitoring methods for flue gas mercury emissions from industrial boilers

Output 1.1.3: National guidelines and standards established for mercury monitoring in the industrial sector and specifically in the cement industry.

The project will focus on developing national guidelines and standards for monitoring mercury emissions within the industrial sector, with a specific emphasis on the cement industry. These guidelines will be designed to provide comprehensive frameworks for effective monitoring and regulation of mercury emissions, tailored to the unique characteristics of cement manufacturing processes. The project will involve extensive research and collaboration with relevant stakeholders to identify key parameters for mercury monitoring, establish standardized monitoring protocols, and define reporting requirements. By developing these guidelines, the project aims to enhance the capacity of regulatory authorities and industry stakeholders to monitor and manage mercury emissions effectively, thereby mitigating environmental and health risks associated with mercury contamination in the cement industry. Additionally, the project will contribute to strengthening regulatory frameworks and promoting sustainable industrial practices nationwide. Guidelines will include key information on the health impact of mercury on health and the environment, with specific elements on gender-specific impact.

Such guidelines will be in line with the one developed by the Global Cement and Concrete Association under their Sustainability Charter aimed at enhancing the monitoring and reporting of emissions from cement manufacturing. This initiative addresses the inconsistent use of analytical standards worldwide, which leads to inadequate monitoring and enforcement of environmental regulations in some regions. The guideline is designed with three primary goals: to standardize the monitoring and reporting of cement emissions data, to deliver credible and practical information on emissions, and to encourage the effective internal management of emissions within the cement industry.

<u>Output 1.1.4: National enforcement capacity for mercury monitoring and reporting, including the implementation of continuous mercury monitoring systems to track emissions and ensure compliance with regulatory limits.</u>

The project will also focus on strengthening the national enforcement capacity for mercury monitoring and reporting, with a particular emphasis on implementing continuous mercury monitoring systems to track emissions and ensure compliance with regulatory limits. This initiative involves enhancing the technical capabilities of regulatory authorities and industry stakeholders to effectively monitor mercury emissions in real-time. By deploying continuous monitoring systems, the project aims to provide timely and accurate data on mercury emissions, enabling proactive measures to address any deviations from regulatory limits promptly. Furthermore, the project will support the development of robust reporting mechanisms to facilitate transparent communication and accountability in mercury monitoring and compliance efforts. Through these initiatives, the project seeks to enhance national enforcement capacity for mercury monitoring and reporting, contributing to improved environmental protection and public health outcomes.

As per the revisions in the Waste Incineration (WI) BAT Conclusions document updated in December 2019, continuous mercury emissions monitoring is mandated unless the waste incinerated demonstrates a 'proven low and stable mercury content.' Facilities with at least six periodic mercury measurement results, all below 10 $\mu g/Nm^3$, are allowed to conduct periodic monitoring bi-annually or engage in long-term sampling.

The 2019 Waste Incineration (WI) Best Available techniques (BAT) Conclusions document specifies mercury concentration limits ranging from 5-20 $\mu g/Nm^3$ (daily average) to 1-10 $\mu g/Nm^3$ (long-term sampling), with a transition period of four years for facilities to comply. Mercury Continuous Emission Monitoring Systems (CEMS) should be installed promptly, becoming a permanent fixture once in place.

Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities.

Component 2: Implementation of best available technologies and best environmental practices for the control and reduction of mercury emissions from the cement industry

Outcome 2.1: Control and reduce hazardous emissions from the entire value chain of cement industry

Output 2.1.1: Gender-responsive sectoral guidelines on process optimization and emission control measures for the cement industry;

The project will prioritize the implementation of best available technologies (BAT) and best environmental practices (BEP) to effectively control and reduce mercury emissions originating from the cement industry. This strategic approach entails identifying and deploying cutting-edge technologies and practices specifically tailored to mitigate mercury emissions throughout the cement manufacturing process. By leveraging BAT and BEP, the project aims to optimize operational efficiency while minimizing environmental impact, aligning with global standards for emission reduction and environmental stewardship. Additionally, the project will develop sectoral guidelines focusing on process optimization and emission control measures specifically tailored to the cement industry. These guidelines will provide detailed recommendations and protocols for optimizing cement manufacturing processes to reduce mercury emissions effectively. Through the implementation of BAT, BEP, and sectoral guidelines, the project seeks to enhance the cement industry's capacity to achieve significant reductions in mercury emissions, contributing to environmental sustainability and public health protection. Guidelines will include key information on the health impact of mercury on health and the environment, with specific elements on gender-specific impact. Guidelines on effective monitoring of mercury emissions will include gender-sensitive recommendations related to occupational hazards, protection of workers and measures related to mitigation of risks.

Output 2.1.2: Implementation of best available technologies and best environmental practices to control mercury and uPOPs emissions in cement kilns (emission control technologies and measures for mercury-free raw materials).

The project will spearhead the implementation of cutting-edge technologies and best environmental practices aimed at controlling mercury and unintentionally produced persistent organic pollutants (uPOPs) emissions in cement kilns. This initiative underscores a commitment to deploying state-of-the-art solutions tailored specifically to address mercury and uPOPs emissions, leveraging the best available technologies in the industry. By investing in these innovative technologies, the project will facilitate the adoption of efficient emission control measures within cement kilns, ensuring compliance with stringent environmental regulations and standards. Moreover, the project will provide comprehensive technical support and capacity-building initiatives to cement industry stakeholders, enabling them to effectively integrate these advanced technologies into their operations. Through collaborative efforts and targeted investments, the project aims to significantly reduce mercury and uPOPs emissions from cement kilns, thereby contributing to environmental sustainability and public health protection.

Mercury emissions can be reduced by primary measures such as controlling the amount of mercury in the inputs to the kiln and secondary measures such as dust shuttling and sorbent injection. Mercury can also be controlled as a co-benefit of applying multi-pollutant control techniques such as wet scrubbers, selective catalytic reduction and activated carbon filters.

Primary measures include:

Use of limit requirements on mercury content in raw materials and fuels.

Use of a quality assurance system for input materials, especially for alternative raw materials and fuels, for the control of mercury content in input materials.

Use of input materials with low mercury content when possible and avoiding the use of waste with high mercury content.

Selective mining if mercury concentrations vary in the quarry, when possible.

Choice of location for new facilities that takes mercury content in the limestone quarry into account

Secondary measures include:

Injection of activated carbon

- Installation of ACY system tail-end
- Separate thermal treatment of precipitated dust in a separate installation
- Multi pollutant control measures: Air pollution control devised installed for removing sulfur oxides and nitrogen oxides can also achieve mercury capture (e.g. wet scrubber, Selective Catalytic Reduction (SCR) technology etc)

Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities. Gender criteria will be considered when selecting private partners engaged in project activities for technology transfer. These could include the inclusion of gender equality and diversity in corporate governance, fair representation of women at all levels of the company and zero-tolerance policy for workplace gender discrimination.

Output 2.1.3: Advancing the use of alternative fuels for the cement industry with a particular focus on bio-mass.

The energy needed for the manufacturing process makes the cement industry one of the five sectors in the world with the largest energy consumption. For this reason, it is constantly diversifying the range of fuels used. Around 85% of fuels used by the sector in Brazil are of fossil origin, almost exclusively petroleum coke, or petcoke. The other 15% are classified as alternative fuels, and are subdivided, essentially, into waste and biomass. The use of alternative fuels in the production process reduces the amount of fossil fuels needed, contributing to the reduction of greenhouse gases by having a lower CO_2 emission factor, i.e. they emit less carbon in generating the same amount of energy.

Cement kilns have characteristics favorable to the burning of waste, such as high temperatures, a long time at temperatures above 1,450^{O}C, oxidizing atmosphere, total destruction of organic components and zero ash, among others. The combined operation of manufacturing cement together with the burning of waste is known as co-processing. Besides re-using the energy value and the mineral fraction of the waste, substituting non-renewable fossil fuels, co-processing diminishes the environmental impact caused by inadequate disposal of waste in nature. Even when technical problems limit the use of certain waste or co-processing, the range of adequate matter is very large[5].

In 2010, Law No. 12.305, which institutes the National Policy for Solid Waste (PNRS), established a hierarchy in waste management and prioritized use for energy rather than disposal in landfills, which strengthened, on a legal level, the option for co-processing of waste. Currently around 60% of integrated plants have kilns licensed by environmental agency to co-process waste. The consumption of alternative fuels by the sector in Brazil has grown considerably. However, when the current level of thermal substitution (15%) is compared to that of other countries, it is clear that there exists major potential for an increase in the use of waste and biomass for energy generation, including municipal solid waste. In 2014, the Brazilian cement industry utilized 1.5 million tons of waste and biomass, representing 15% of the total energy consumed, 8% coming from waste and 7% from biomass.

In relation to biomass, the main source used currently is residue from charcoal, which comes from small pig-iron plants. In light of the contraction of this sector and the forecast of technological changes in the future, total scarcity of this fuel is expected as early as 2030. The sector will have to seek alternative sources of biomass. One potential alternative is agricultural waste. However, as Brazil is a country of continental dimensions, locations of agricultural production, volume, seasonality, costs of collection, transport etc. must be considered by region. Solid Municipal Waste and Sewage sludge, to a lesser degree, could also have potential for co-processing in the near future, but with limited impact on thermal substitution due to the low calorific power and the need to remove the moisture.

With no control measure in place on waste used for co-processing, studies have indicated a substantial risk of increase in mercury emissions from the cement production. The output focuses on advancing the utilization of alternative fuels within the cement industry while preventing any adverse impact on mercury emissions. National authorities and studies have confirmed availability and potential of using biomass as alternative fuel. This initiative aims to promote the adoption of sustainable and environmentally friendly fuel sources to replace traditional fossil fuels in cement manufacturing processes. By emphasizing the use of biomass, such as agricultural residues, wood waste, or energy crops, the project seeks to reduce greenhouse gas as well as mercury emissions and minimize environmental impact associated with cement production. Moreover, this output will involve conducting feasibility studies, developing guidelines, and providing technical assistance to facilitate the integration of biomass fuels into cement kiln operations. Through these efforts, Output 2.1.3 aims to support the cement industry in transitioning towards more sustainable fuel options, contributing to overall environmental sustainability and climate change mitigation as well as compliance with the Minamata Convention.

Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities. Gender criteria will be considered when selecting private partners engaged in project activities for technology transfer. These could include the inclusion of gender equality and diversity in corporate governance, faire representation of women at all level of the company and zero-tolerance policy for workplace gender discrimination. Gender aspects related to the supply chain of inputs. Feasibility studies will also look at social aspects of the fuel supply chain with considerations on gender aspects on inclusion and employment.

Component 3: Advancing the Cement Technological Roadmap with energy-efficient processes and circular approaches

Outcome 1: Circular economy practices promoted in the cement industry supply chain

<u>Output 3.1.1: Feasibility studies on alternative low-carbon materials to meet national targets for reducing clinker in cement</u>

The project will conduct feasibility studies on alternative low-carbon materials with the aim of meeting national targets for reducing clinker content in cement production in view of their impact on the mercury emissions. Reducing clinker ratio in cement production may lead to mercury increase in the output due to additive incorporated in concrete. Studies have shown limited leakage of mercury content. In this context, the Project would confirm with detailed studies the impact of mercury increase in concrete with effects on leakage. These studies will explore the possibilities for innovative materials and techniques that can effectively replace or reduce the use of clinker, a primary component in traditional cement manufacturing known for its high carbon and mercury footprint. By investigating alternative low-carbon materials, such as supplementary cementitious materials (SCMs) or alternative binders, the project seeks to identify viable strategies for reducing clinker content while maintaining or enhancing the quality and performance of cement products. This will reduce primary production of raw clinker from limestone and the associated mercury and GHG emissions. Through Output 3.1.1, the project aims to contribute to the development of more sustainable and environmentally friendly practices within the cement industry, aligning with national goals for carbon and mercury reduction and promoting a circular economy approach to cement production.

<u>Output 3.1.2: Supporting the implementation of energy-efficient processes in kiln operations;</u>

The output will focus on supporting the implementation of energy-efficient processes in kiln operations within the cement industry through tailored audits, feasibility studies, and technology transfer initiatives. This focused approach emphasizes the importance of assessing current operational practices through comprehensive audits to identify areas for improvement. Feasibility studies will then be conducted to evaluate the viability of implementing energy-efficient technologies and processes in kiln operations. These studies will provide valuable insights into the potential benefits and challenges associated with adopting new technologies combined with targeted measures for temperature control at filters-level to prevent formation of metalic state mercury. Furthermore, the project will facilitate the transfer of knowledge and technology from experts to cement industry stakeholders, including women-led companies and experts, ensuring effective implementation and utilization of energy-efficient practices. By combining audits, feasibility studies, and technology transfer, the project aims to empower cement manufacturers to optimize their kiln operations, reduce energy consumption, and enhance environmental sustainability with strict preventions of conditions enabling mercury emissions. Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities

Output 3.1.3: Technology transfer to support the increase of supplementary cementitious materials in primary production

As a result of feasibility studies conducted as part of Output 3.1.1, Output 3.1.3 focuses on technology transfer initiatives aimed at facilitating the increased utilization of supplementary cementitious materials (SCMs) in primary cement production while ensuring no increase in mercury emissions potential. This strategic approach underscores a commitment to implementing sustainable and environmentally friendly practices within the cement industry. By leveraging the findings and insights obtained from the feasibility studies, the project aims to enable cement manufacturers to effectively integrate SCMs into their primary production processes. SCMs, such as fly ash, slag, and silica fume, identified through these studies, offer viable alternatives to traditional cement materials, contributing to reduced greenhouse gas and mercury emissions from clinker production and conservation of natural resources. Through Output 3.1.3, the project seeks to support cement industry stakeholders in incorporating SCMs into their primary production operations, thereby enhancing the sustainability and environmental performance of cement manufacturing processes.

Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities. Gender criteria will be considered when selecting private partners engaged in project activities for technology transfer. These could include the inclusion of gender equality and diversity in corporate governance, fair representation of women at all levels of the company and zero-tolerance policy for workplace gender discrimination. Feasibility studies will also look at social aspects of the materials supply chain with considerations on gender aspects on inclusion and employment.

Output 3.1.4: Advancing circular approaches for the recovery of cement from construction and demolition waste in production

Successful initiatives of using recycled clinker have relied on sourcing from a wide range of secondary materials including wood ash and mineral waste. However, any input in the clinker production lead to risks of introducing material with higher mercury content and result in increased emissions.The Project will ensure that sources of secondary material and production of recycled clinker is in line with input control and categorization to enable the cement kilns. This initiative will promote collaboration with sustainable practices in the construction industry, demonstrating low-carbon concrete use. By implementing circular approaches, the project aims to recover cement from Construction and Demolition Waste (CDW), reducing waste generation and conserving natural resources. Through innovative technologies and processes, the project will facilitate the recovery and reuse of cement from CDW, contributing to the circular economy and minimizing environmental impact.

Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities. Gender criteria will be considered when selecting private partners engaged in project activities for technology transfer. These could include the inclusion of gender equality and diversity in corporate governance, fair representation of women at all levels of the company and zero-tolerance policy for workplace gender discrimination. Feasibility studies will also look at social aspects in post-use and recovery of secondary materials. The informal sector is usually over-represented in waste management and women are often even more impacted by having low access to decision-making spheres of these organizational schemes.

Component 4: Knowledge management and partnerships

Outcome 1: Promotion of knowledge, experience and lesson sharing and environmental awareness raising among stakeholder groups

In particular, these events would aim to offer Brazilian businesses the possibility to meet international eco-solutions companies and discuss potential cooperation, commercial collaborations and/or industrial partnerships. The transfer of technology would facilitate the uptake of new processes and materials that should ultimately accelerate the transformation of the sector through new technological solutions. This would allow the construction industries in the country to increase their profitability and environmental compliance in regional and global markets. Considering the export potential of cement from brazil in the region, this acitivty will be critical to build sustainable partnerships. An equal representation of women will be ensured in the participants benefitting from South-South or North-South cooperation, and women-led businesses will be particularly encouraged by including their fair-representation as a screening criteria for participation.

The project will support and target the representation of women-led businesses and female speakers in all conferences and events.

<u>Output 4.1.1: Targeted outreach for the general public, decision-makers and industry experts with gender-specific communication</u>

Training sessions will be conducted focusing on various aspects of mercury emissions control regulatory systems, monitoring methods, supervision and management capabilities, and best available techniques/best environmental practices (BAT/BEPs). These sessions aim to equip municipal-level monitoring stations with the necessary capacity to monitor atmospheric mercury emissions effectively. Furthermore, they will ensure that government officials are proficient in supervising mercury emissions from cement plants. Additionally, the public will receive education on mercury emissions from cement production, the effects of mercury exposure on human health and the environment, and will be encouraged to participate in supervising mercury pollution control in cement plants. Moreover, the training will provide cement plants with the knowledge required to independently select, utilize, and manage BAT/BEP technologies for controlling and reducing mercury emissions during cement clinker production. Questionnaires will be designed and distributed to gather feedback for the continuous improvement of future capacity-building activities.

Capacity-building activities will be conducted with a focus on women engagement to a minimum of 40% of representation. Gender will be mainstreamed in all indicators pertaining to these activities. Awareness-raising activities will include specific materials for women as a target group and focusing on (i) specific impacts of mercury with more adverse effects on women (ii) ensuring fair representation of women in the workplace and fighting gender discrimination.

Furthermore, the project will conduct a comprehensive analysis to identify the participation of women in the whole supply chain, analyzing working conditions, good practices, and barriers to gender equality. This analysis will inform decision-making processes and facilitate the development of targeted interventions to promote gender equality and inclusion within the industry.

<u>Output 4.1.2: Knowledge platform to disseminate solutions and information</u>

The project will disseminate its outputs nationwide and to other countries through various channels such as websites, the media, publications, and other platforms. To facilitate effective sharing of information and experiences among agencies, reporting mechanisms will be established with standardized content forms and reporting timelines. These mechanisms will aid in the national implementation process. Additionally, international trips will be organized to facilitate knowledge exchange on relevant topics and allow for learning experiences from other countries.

To promote gender-equality in the sector, the project will prioritize gender mainstreaming throughout all aspects, including in the selection of partners and stakeholders. This entails considering gender criteria in all its training sessions to ensure diverse representation and perspectives in decision-making processes. All content developed with a specific gender aspects will be advised with particular attention on the knowledge platform

<u>Output 4.1.3: Business to business events to exchange best practices and establish linkages in the area of technology transfer and cooperation</u>

Output focuses on organizing business-to-business, including women-led, events aimed at facilitating the exchange of best practices and establishing linkages in the field of technology transfer and cooperation. These events provide a platform for industry stakeholders, technology providers, and experts to come together, share insights, and forge partnerships. Through interactive workshops, seminars, and networking sessions. The project will encourage the participation of women-led businesses and women speakers in expert groups and business-to-business activities.

Output 4.1.4: Connection with development banks to support financing of investment in the sector, including gender-responsive finance

The PPG will conduct an assessment of current products offered by the financing sector to support investment benefitting climate transition and environment production. The Project will offer technical support for the integration of gender considerations into finance initiatives. Recognizing the significance of gender criteria in the decision-making processes of multilateral investors, the Project will seek to enhance the capacities of national financing facilities, the private sector, and policymakers in this regard, thereby facilitating improved access to finance.

The Project will undertake various activities, including:

- Providing training on gender disparities in accessing finance and adhering to existing gender-sensitive incentive structures mandated by regional development banks and multilateral funds.
- Delivering training on the evaluation of gender-specific climate and environmental risks.
- Collecting sex-disaggregated and gender-specific data as required by investors and regulators.
- Developing gender-based criteria for the allocation of funds.

Component 5: Monitoring and Evaluation

This component will ensure the smooth implementation of project activities through internal periodical communication, evaluation and external review. The project will support the International Environmental Cooperation Center (IECO, formerly the Foreign Economic Cooperation Office) of Ministry of Ecology and Environment (MEE) and all stakeholders to monitor and evaluate project progress and take the necessary action to ensure the appropriate and timely implementation of all agreed project activities if needed. This section will provide technical assistance support to enhance the management and implementation capacity on projects of the International Environmental Cooperation Center of Ministry of Ecology and Environment.

Outcome 1: M&E

Output 5.1.1: Periodic monitoring and evaluation supporting gender mainstreaming

This project will draft and submit implementation reports to track progress and summarize achievements following results-based management practices and monitoring standards of GEF and UNIDO. The logical framework of the project will include gender-disaggregated indicators and activities with a gender focus

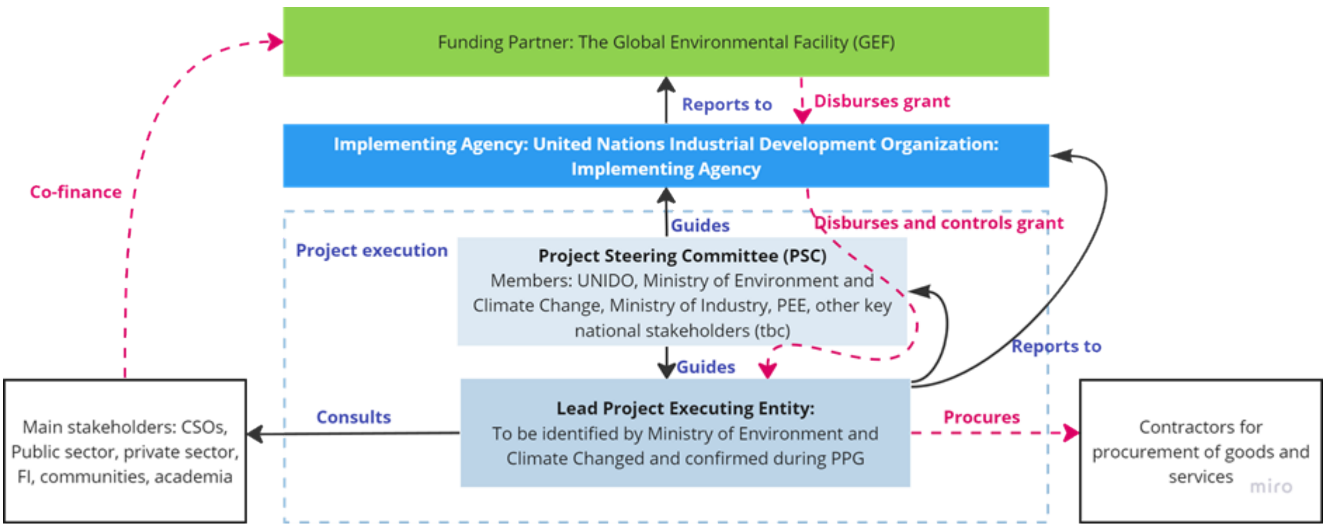
Output 5.1.2: Midterm and terminal evaluation report

This project will draft and submit the implementation reports to introduce the progress summarize the outputs achieved in the midterm and terminal stage of the project. And evaluation meetings will be held and visiting to demonstration plants will be organized. Mid term and terminal evaluation will include specific actions on :

- Gender aspects related to the incorporation of knowledge and the assimilation of new capacities
- Gender aspects related to observed behavioral change related to the perceived risks of mercury
- Women representation in training activities
- Empowerment of women-led companies in access to finance and linkages with other businesses

Implementation arrangements for the project

- The foreseen governance structure of the project is presented below:



Implementing Agency: UNIDO is the GEF Implementing Agency for the project. As such, UNIDO will maintain oversight on the project implementation, manage the overall budget and supervise project execution. A project manager will be appointed in UNIDO HQ to oversee the implementation of the project.

Project Execution Entity (PEE): Project execution will be led by a national entity appointed by the Ministry of Environment and Climate Change of Brazil, to be identified and confirmed during the PPG as an executive body for day-to-day management of the project. The PEE will be responsible for the full execution of the project under a contractual arrangements with UNIDO. A HACT assessment will determine that the identified executing partner will meet the requirements to act as a Project Executing Entity (PEE). The functions of the PEE include, inter alia:

- Execution of services as planned in the GEF project document including with timely procurement of goods and services
- Management of GEF grant as per approved project budget
- Reporting to UNIDO as established in the executing agreement
- Providing timely reports as established in the M&E plan
- Consulting stakeholders for successful achievement of the project objective and maximized ownership at national level

Project Steering committee: will be chaired by the Ministry of Environment and Climate Change of Brazil and will review and monitor project execution progress, provide strategic advice, facilitate co-ordination between project partners, provide transparency and guidance, and ensure ownership and sustainability of the project results. The PSC will also share major project results to relevant stakeholders and ensure dissemination of project activities.
The primary roles of the PSC are: (1) to provide overall guidance to the execution of the project; (2) to ensure good coordination among participating agencies and other organizations; and (3) to approve any substantial change, or request no-cost extensions for consideration by the GEF. The PSC will meet at least once yearly to review and monitor the progress of the project implementation and to approve the work plan for subsequent years. The GEF Operational Focal points of Brazil will also be invited to the PSC meetings and will be regularly informed about the project progress.

Coordination and Cooperation with Ongoing Initiatives and Project.

Does the GEF Agency expect to play an execution role on this project?

If so, please describe that role here. Also, please add a short explanation to describe cooperation with ongoing initiatives and projects, including potential for co-location and/or sharing of expertise/staffing

Baseline intervention	Potential contribution to an alternative scenario
UN/UNIDO: GEF Biogás Brasil	The current biomethane cost per Gcal seems to be not competitive compared with Petcoke and others alternative fuels, but it would be useful to know the breakeven taking into consideration the new regulatory market with potential compulsory targets for the

	cement industry. On top of that, it could be in some places a strategic approach to leverage the biogas business in some places Project approved for implementation: 2017 Project duration: 60 months Co-financing Total: 58,392,070 GEF Project Grant: 7,000,000 GEF Agency Fees: 665,000
Health Ministry of Brazil: Implementation of the Minamata Convention by the health sector in Brazil | Case study: implementation of the Minamata Convention by the health sector in Brazil (who.int)	Approach: From the moment of its establishment, the Working Group developed the Sectorial Plan, which consists of 29 strategies to be executed, distributed into six guiding axes: Axis 1 – Measures to strengthen the normative framework and institutional capacity to contribute to the implementation process of the Minamata Convention on Mercury. In this Axis 1, there is an action 1.5(Page 10) to Establish a Network National for Implementation Sector of Convention. The objective of the Network is to map partners; facilitate exchange of information; the preparation and monitoring indicators; the disclosure of documents and integration between public bodies and civil society. The modeling of the network will be organized by UFF. Intersection with Alternative Scenario: To cross check in advance whether any changes in the normative framework related to Hg emissions in the cement sector is feasible or not and/or the implications of suggested changes in the Hg emission limits of the cement sector The Brazilian Government signed the Convention in 2013, and the Health Ministry of Brazil released the Sectoral Implementation Plan for the Convention of Minamata on Mercury in 2020.
NGO: Zero Mercury Working Group – ZMWG | Home page - Zero Mercury	Not clear how they intend to achieve their targets. But as a vision, it might be useful to understand their actioning looking for synergies.

https://www.zeromercury.org/about-mercury/mercury-in-processes/cement-production/	
ABNT: Brazilian association for Norms and Standards	To follow the review process of any potential change of the Norm NBR 16.849 in terms of Hg limits into solid waste for energy purposes Classes definitions and their implications

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)	3000000	0	0	0
Expected metric tons of CO_2e (indirect)	0	0	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)				
Expected metric tons of CO_2e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)	3,000,000			
Expected metric tons of CO_2e (indirect)				
Anticipated start year of accounting	2026			
Duration of accounting	4			

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)

Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Indicator 9 Chemicals of global concern and their waste reduced

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
7.80	0.00	0.00	0.00

Indicator 9.1 Solid and liquid Persistent Organic Pollutants (POPs) removed or disposed (POPs type)

POPs type	Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.2 Quantity of mercury reduced (metric tons)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
7.80			

Indicator 9.3 Hydrochloroflurocarbons (HCFC) Reduced/Phased out (metric tons)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.4 Number of countries with legislation and policy implemented to control chemicals and waste (Use this sub-indicator in addition to one of the sub-indicators 9.1, 9.2 and 9.3 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 9.5 Number of low-chemical/non-chemical systems implemented, particularly in food production, manufacturing and cities (Use this sub-indicator in addition to one of the sub-indicators 9.1, 9.2 and 9.3 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Indicator 9.6 POPs/Mercury containing materials and products directly avoided

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.7 Highly Hazardous Pesticides eliminated

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.8 Avoided residual plastic waste

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	1,200			
Male	1,800			
Total	**3,000**	**0**	0	**0**

Explain the methodological approach and underlying logic to justify target levels for Core and Sub-Indicators (max. 250 words, approximately 1/2 page)

In Brazil, 64 million tons of cement are produced annually. According to UNEP, the emission factor for mercury emissions in cement production is estimated at 0.1 g Hg/tonne of cement. This factor is in line with range of emisson factor estimated for mercury in Brazil (from 0.060 to 1,000 gHG/ton cement for kilns using alternative fuels), as per table included on p.19. Baseline emissions of mercury are therefore estimated at 6.4 tonnes annually. When the share of co-processing kilns reaches 100% as per current goals for fuel substitution and ongoing efforts from the industry, mercury emission will increase approx. 23%, resulting in 7,8 tons of mercury emissions per year.

It is projected that if co-processing plants were to implement dust shuttling techniques, an overall reduction of approximately 20% in mercury emissions could be anticipated. Furthermore, when considering the integration of additional abatement technologies, such as Selective Non-Catalytic Reduction (SNCR), Selective Catalytic Reduction (SCR), and the use of sorbents, the potential for mercury emission reduction could escalate to approximately as much as 80%. Consequently, with a conservative assumption of 50% reduction of emissions on 50% of the production of Brazil, the Project would achieve a reduction of 1.9 tonnes of mercury/year, or a total of 7.8 tonnes of mercury for 4 years of implementation.

The project shall aim to determine the levels of mercury in most fuels and alternative fuels used in Brazil and later, determine a threshold that would be acceptable to set an input control for co-processing plants.

This project will also result in a significant direct and indirect reduction of CO_2 emission from cement industry. By then end of this project, at least 3,000,000 tons of CO_2 will be reduced from the cement industry in Brazil, due to combined measures introducing clinker substitutes, alternative bio-mass fuels and energy efficiency. The recycled clinker from construction demolition waste in particular could become more important due to the limits of slag ash availability; indeed, 95% of the country's production is already used by the cement industry. Recycled clinker is expected to result with 10% lower GHG emissions (as per experience of Holcim in pilot projects). Based on the specific context of the Brazil cement industry with 3.5 GJ thermal energy per ton of clinker using obtained with 85% petroleum coke, as well as the 65% clinker ratio in cement - the total GHG emissions just for thermal energy in clinker production amount to 9.5 million tons of CO2 from fossil fuels. With support of the national capacity for recycling construction aggregate (50 million tons in 2019[1]) and targeting annual recycled clinker substitute level of 2.5% over 4 years, the project intervention would result in 1 million tons of CO2 reduction from measures consistent with mercury control and reduction.

Furthermore, the Cement Industry Roadmap foresees transition from petroleum coke to municipal and non-hazardous solid waste, which has 55% of the GHG emissions per unit of thermal energy, but also poses a risk in terms of mercury content. The project will focus on the introduction of efficient control measures for mercury content in such alternative fuels, facilitating the alternative fuel use in 5% of the national annual cement production. Based on 40 kg of CO2 reduction in emissions per GJ from MSW over the same energy from petroleum coke, the project will aim at a 25% MSW substitution rate for petroleum coke necessary for 2 million tons of cement production per year, achieving a 2 million CO2 tons reduction in 4 years enabled by mercury control techniques.

Through targeted capacity-building activities, awareness raising and knowledge generation activities, the project will benefit at least 3000 people with a target of 40% women engaged in the project.

[1] https://movimentocircular.io/en/noticias/brazil-produces-48-million-tons-of-construction-and-demolition-waste

Key Risks

	Rating	Explanation of risk and mitigation measures
CONTEXT		
Climate	Low	Due to a combination of political, geographic, and social factors, Brazil is recognized as vulnerable to climate change impacts, ranked 96th out of 181 countries in the 2020 Notre Dame Global Adaptation Index (ND-GAIN Index). Brazil faces multifaceted challenges stemming from climate change, which pose significant threats to its economic growth, social stability, and environmental sustainability. The country's vast territory encompasses diverse ecosystems, each susceptible to distinct climate-related risks. Extreme temperatures, rising sea levels, water scarcity, and heavy rainfall intensify pressure on vulnerable communities, urban infrastructure, economic sectors, and invaluable ecosystems. Projected climate change impacts in Brazil include significant temperature increases, ranging from 1.7°C to 5.3°C by the end of the century, with notable rises expected in January and July. Central regions will bear the brunt of these effects, warming faster than coastal areas. Additionally, the Amazon region faces heightened risks, with projections indicating a substantial increase in the frequency and duration of heat waves by as much as 214 additional days by the 2090s.

		Brazil, boasting the second-largest forested area globally, faces unprecedented biodiversity loss due to agricultural activities, contributing to the highest net forest loss worldwide. The agricultural sector, pivotal to Brazil's economy, generates a considerable portion of greenhouse gas emissions. The operation of investment should be shielded from the adverse effects of climate change, such as extreme temperatures and heat stress, which pose significant risks to their productivity and workforce well-being. Evaluation during the PPG will systematically gather data on flooding vulnerabilities in specific regions, while environmental assessments throughout project execution will meticulously evaluate the impacts of soil erosion, flooding, and seismic risks prior to any financial investment. During the permitting process for company installations, pilot companies will undergo scrutiny to assess their susceptibility to flooding or heat stress. Given the projected increase in temperatures and frequency of extreme heat waves, which can have detrimental health effects, integrating green spaces for cooling effects becomes paramount. Utilizing geospatial information will be instrumental in identifying suitable locations for project intervention, taking into account climate risks and vulnerabilities specific to Brazil's context. Moreover, comprehensive reviews of climate risk information within existing environmental and social management plans of the companies will inform the design of additional mitigation measures, ensuring resilience against climate-related challenges. The development of evacuation plans will be pivotal in enabling site of intervention to effectively manage climate change-related risks. Furthermore, considering features such as permeable structures in building designs as part of co-financing arrangements will enhance the resilience of companies, facilitating adaptation to excess precipitation events.
Environmental and Social	Moderate	Risk of non-acceptance of the Project, persistent habits regarding management of construction waste and chemicals The co-processing of waste can strongly affect relations with surrounding communities. Due to lack of information, people frequently associate the use of waste with the increase in harmful emissions, when in reality the contrary is true. The project will deploy awareness-raising activities to increase social acceptance and ensure replication of results.
Political and Governance	Moderate	Political support is insufficient to promote the required regulatory and institutional framework and drive strong engagement from key stakeholders Difficulty in establishing long term contracts for supply of municipal solid waste with public agents Representatives of different levels will be involved in the steering committee; the tasks of the PMU will include ensuring adequate communication with all project partners; roles and composition of each project institution will be clarified and agreed since the inception of the project. The risk will also be mitigated through building understanding and capacity of project counterparts and stakeholders during project preparation and implementation to ensure

		stronger ownership of project, and a clear definition of roles and responsibilities of counterparts, continuous monitoring and periodic reporting to main Government counterparts and partners.
INNOVATION		
Institutional and Policy	Moderate	Policies, regulations, and programs may not be adequately adopted and implemented, weakening of political commitment. This risk will be substantially mitigated by: (i) Engaging decision makers early in the project preparation phase, building their understanding and keep them involved during the implementation (ii) Carefully designing and providing capacity building programs tailored to policymakers and institutional specific needs.
Technological	Low	Technological innovation delivered by the project is not adequately absorbed by the beneficiaries, leading to waste of resources and remaining barriers in the area of capacity-building preventing moving towards the alternative scenario. The project will conduct thorough initial assessments of beneficiaries to ensure that technology transfer is accompanied by adequate training. Training refreshers will be regularly conducted to ensure that capacities are aligned with the expectations. These measures will be planned for enforcement authorities of local governments using the monitoring stations and the private sector (cement producers) benefitting from technology transfer to ensure control and reduction of mercury including in innovation on the way in the area of cement production
Financial and Business Model	Low	The low cost of disposal in landfills and dumps affect competitiveness with other material recovery initiative. In the context of the project, this could affect innovation in the area of co-processing, reduced clinker ratio and the use of SCM for reduced clinker ratio. However, this innovation is already part of the cement sector strategy. The objective of the project being to ensure that the innovation pathway of the industry, which currently includes broadening the secondary sources used as additives or inputs to cement production, the risk of harmful subsidies or inadequate public taxes affecting Project execution is unlikely. The adequate monitoring of mercury will include CAPEX and OPEX costs for the private sector, which will need to adequately budget these investment into their planning. The Project will supporting the enabling environment that would link these investment to ESG regulatory compliance for the private sector. Considering that cement producers are fairly large corporations, the risk of financial and business models negatively impacting the project is low
EXECUTION		
Capacity	Low	Project partners may not have the capacity to execute the project activities, hindering the quality of the deliverables and the timeliness and efficiency of the delivery Capacities of partners to execute the Project will be assessed during the PPG through a HACT assessment. Capacity

		to execute the project in line with results-based management will be carefully evaluated. UNIDO will also support the Project managing agreements of executing partners. Co-financing will be regularly monitored by the Project Executing Entity (PEE) as part of its agreement with UNIDO.
Fiduciary	Low	Project funds are not adequately managed, the Project faces delays in the mobilization of co-financing. Capacities of partners to execute the Project will be assessed during the PPG through a HACT assessment. Procurement and financial management will be carefully evaluated during this assessment prior to signing any execution agreement. The Project will be managed according the financial and procurement procedures of the executing partners, and will therefore not be impacted by disharmonized rules and regulations between the implementing agency and the executing partners
Stakeholder	Moderate	Stakeholders are not properly involved and/or there is weak coordination among stakeholders, leading to inadequate project implementation. A detailed logical framework, with budget and indicators, will be integrated in the project. targets will be considered as core project targets

Other		Not applicable

Overall Risk Rating	Moderate	The overarching risk to this project is low-moderate. Close monitoring of the identified risks and effective implementation of mitigation measures will ensure that the risks do not adversely impact the success and durability of the project.

C. ALIGNMENT WITH GEF-8 PROGRAMMING STRATEGIES AND COUNTRY/REGIONAL PRIORITIES

Describe how the proposed interventions are aligned with GEF- 8 programming strategies and country and regional priorities, including how these country strategies and plans relate to the multilateral environmental agreements.

Confirm if any country policies that might contradict with intended outcomes of the project have been identified, and how the project will address this.

For projects aiming to generate biodiversity benefits (regardless of what the source of the resources is - i.e., BD, CC or LD), please identify which of the 23 targets of the Kunming-Montreal Global Biodiversity Framework the project contributes to and explain how. (max. 500 words, approximately 1 page)

This project is aligned with the GEF-8 programming strategy and the Chemicals and Waste Focal area, program 1 with a focus on reducing emissions of Mercury, as mandated under the Minamata Convention on Mercury, through activities that will reduce and enhance management of mercury emissions from cement production industry. This project will work on the demonstration of technical transfer to control and reduce mercury emission and other air pollutants ($SO2$, NOx, $CO2$, etc.) in cement industry. This project will also strengthen relevant laws and regulation to better manage the use of cement kilns and control their emissions and develop BAT/BEPs technology performance standards and demonstrate them.

This project is aligned with the GEF-8 principles of cost-effectiveness; sustainability; innovation; private sector engagement and building on the use of existing national framework. The selected demonstration sectors will be an entry point to address the reduction of mercury with commercially viable solutions for critical sectors of emission.

The project is aligned with national priorities, particularly in relation to MEA obligations of the Stockholm Convention National Implementation Plans, Paris Agreement Nationally Determined Contributions (NDC), the Minamata Convention on Mercury.

D. POLICY REQUIREMENTS

Gender Equality and Women's Empowerment:

We confirm that gender dimensions relevant to the project have been addressed as per GEF Policy and are clearly articulated in the Project Description (Section B).

Yes

Stakeholder Engagement

We confirm that key stakeholders were consulted during PIF development as required per GEF policy, their relevant roles to project outcomes and plan to develop a Stakeholder Engagement Plan before CEO endorsement has been clearly articulated in the Project Description (Section B).

Yes

Were the following stakeholders consulted during project identification phase:

Indigenous Peoples and Local Communities:

Civil Society Organizations: Yes

Private Sector: Yes

Provide a brief summary and list of names and dates of consultations

The following stakeholders were identified during initial consultations

Stakeholders	Role in the project

Cement Companies: Votorantim Cimentos CSN Cimentos Cimento Nacional Intercement Cimento Itambé Secil Supremo	Companies responsible for cement production Role in the project: Key role in leading activities on reduction of the mercury and GHG emissions related to the cement production. Critical role in scaling up any investment made by the GEF Project. Strategic role in knowledge management and sharing and provision of inputs useful to the development of technical guidelines by the Project. Provision of co-financing
Ministry of Environment and Climate Change of Brazil	The Ministry of the Environment of Brazil 'Ministério do Meio Ambiente' (MMA), plays a significant role in addressing environmental issues within the country, including the regulation of mercury. Responsible for developing and enforcing regulations and legislation related to mercury use, emissions, and pollution prevention. This includes setting standards for mercury emissions from industrial processes, waste management, and other sources. Oversees monitoring programs to assess mercury levels in the environment, including air, water, soil, and biota. This monitoring helps to identify sources of mercury pollution and evaluate the effectiveness of pollution control measures. Role in the project: Main executing partner Chair of the Steering Committee Supporting the development, adoption and political support of policies and regulations planned under component 1

	Ensuring the use of monitoring equipment for mercury emissions to quantify and evaluate the global environmental benefits of the Project Supporting the development of technical guidelines planned under component 1 Providing inputs for targeted awareness raising
Ministry of Industry of Brazil	The Ministry of Industry is responsible for formulating and implementing industrial policies aimed at promoting the growth, competitiveness, and diversification of Brazil's industrial sector. The ministry is responsible for developing and enforcing regulations related to mercury use in industrial processes, equipment, and products. These regulations may include restrictions on mercury-containing materials, equipment, and industrial processes to minimize mercury emissions and releases. The ministry promotes the adoption of cleaner production practices and technologies that reduce or eliminate mercury use in industrial processes. Role in the project Member of Project Steering Committee Provide support to the development of sectoral guidelines and ensure their dissemination to actors of the sector Contribute to the monitoring of innovation on control of inputs for co-processing and increase use of SCM for clinker reduction
SNIC/ABCP: Brazilian Cement Association	The Brazilian Cement Association, known as ABCP (Associação Brasileira de Cimento Portland), plays a significant role in the cement industry in Brazil. It serves as a representative body for the cement industry and advocates for the interests of its member companies The association provides technical support and guidance to its members, helping them navigate regulatory requirements, adopt best practices, and enhance operational efficiency and sustainability in cement production.

	Role in the project: Promotes standards, guidelines and regulations to cement companies Serves as knowledge dissemination platform via its links with international cement companies and equipment suppliers
ABNT | Brazilian Association of Norms Techniques	The Brazilian Association of Technical Standards (ABNT - Associação Brasileira de Normas Técnicas) plays a crucial role in standardization and quality assurance in Brazil. ABNT develops technical standards across various industries and sectors, covering a wide range of products, services, processes, and systems. These standards establish specifications, guidelines, and requirements to ensure quality, safety, efficiency, and interoperability. ABNT provides certification and conformity assessment services to verify compliance with technical standards and regulatory requirements. This includes product certification, management system certification (e.g., ISO 9001 for quality management), and testing and inspection services. Role in the project Adopt norm for cement produced with increased use of SCM and enables the wider use of this material at national level, including by enabling its use in sustainable public procurement Development of new standards for waste treatment and valorization applicable to co-processing

ABREMA | Brazilian Association of Waste Management Companies	The Brazilian Association of Waste Management Companies (ABRELPE - Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais) plays a significant role in the waste management sector in Brazil and serves as a representative body for waste management companies in Brazil. The association actively participates in the development of waste management policies and regulations at the local, regional, and national levels. The association conducts research and collects data on various aspects of waste management and promotes sustainable waste management practices, including waste reduction, recycling, composting, and the use of environmentally sound technologies. Role in the project: Definition and implementation of appropriate measures for treatment of inputs for co-processing in cement kiln to avoid any negative impact of mercury emissions
ENVEA | Hg Continuous Emissions Monitoring System	ENVEA is a remarkable supplier of continuous emission monitoring system (CEMS) in the EU with experience in the cement sector with several practical experiences. Role in the project: Provide technical inputs with regards to the establishment of a monitoring network targeting mercury emissions Technical training Technical inputs with regards to the CEMS
Academic: Federal University of São Paulo, Federal University Fluminense, Federal University of Minas Gerais	These universities have ongoing work on the impact of pollutants Role in the project: Execution support, through the laboratory networks of these institutions, to provide analysis

	prior to implementation of BAT/BEP measures or other investment in order to confirm baseline emissions and reduction Strengthen mercury inventory with use of data from monitoring equipment provided by the Project
CETESB: Environmental Fiscal/Control Authority from São Paulo state	The São Paulo state environmental authority is the most active in Brazil and plays a key role for the other environmental agencies at the state level. Role in the project: Contribute to the analysis and discussions of current parameters related to emissions limit of the current legislation. Support adoption of norms by environmental agencies

Stakeholder consultations were made when preparing the PIF, In particular, UNIDO national expert in Brazil participated in the Congress of the cement association of Brazil in Sao Paula held from 6 to 8 November 2023 and gathered inputs from stakeholder regarding the baseline, the capacity and technological gaps and their engagement in the project. The participants listed below were consulted on that occasion:

- Paulo Camilo Pena: Brazilian Cement Association: President
- Daniel Matos: Brazilian Cement Association: Coprocessing Manager
- Gonzalo Visedo: Brazilian Cement Association: Sustainability Manager
- Rodrigo Rollemberg: State Secretary for Green Economy, Decarbonization and Bioindustry of Industry Ministry
- Gustavo Fontenelle: Industry Ministry | Brazilian Fed Gov: Decarbonization Manager
- Mario William Esper: ABNT | President
- Álvaro Lorenz: Votorantim Cimentos | Technical Director
- Osvaldo Ayres: Votorantim Cimentos | CEO
- Silvia Vieira: Votorantim Cimentos | R&D Manager
- Eduardo Porciúncula: Votorantim Cimentos | Coprocessing General Manager
- Edvaldo Rabelo: CSN Cimentos | CEO
- Adriano Rômulo: CSN Cimentos | Operation Director
- Ednaldo Gomes: CSN Cimentos | Operation Director
- Alexandre Magno: CSN Cimentos | Technical Director
- Juliano Menezes: CSN Cimentos | Coprocessing General Manager
- -José Eduardo: Cimento Nacional | CEO
- Frederico Vasconcelos: Cimento Nacional | Operations/Technical Director

- Edilson dos Santos: Cimento Nacional | New Business Development Manager
- Pedro Maranhão: ABREMA | President
- Roberta Travaglini: ENVEA (Hg CEMS) | Sales Manager
- Vanice Nakano: AmplumBiogás
- Bernd dos Santos: GIZ Brasil SP
- Thomas Guillot: GCCA President
- Arnauld Pinatel: Founding Partner On Field Investment Research
- Gesner Oliveira: Professor at FGV and Partner at GO Associados

In addition, UNIDO HQ held several meetings with the Ministry of Environment and Climate Change of Brazil, on January 16 2024 online and early February during the GEF Council in Washington. Following the approval of the PIF, the PPG would start with an inception workshop presenting the project to stakeholders from the civil society, the public sector and the industry and conduct a thorough identification of needs during the first three months of the PPG.

(Please upload to the portal documents tab any stakeholder engagement plan or assessments that have been done during the PIF development phase.)

Private Sector

Will there be private sector engagement in the project?

Yes

And if so, has its role been described and justified in the section B project description?

Yes

Environmental and Social Safeguard (ESS) Risks

We confirm that we have provided indicative information regarding Environmental and Social risks associated with the proposed project or program and any measures to address such risks and impacts (this information should be presented in Annex D).

Yes

Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate			

E. OTHER REQUIREMENTS

Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described in the Project Description (Section B)

Yes

ANNEX A: FINANCING TABLES

GEF Financing Table

Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	GEF Project Grant($)	Agency Fee($)	Total GEF Financing ($)
UNIDO	GET	Brazil	Chemicals and Waste	Mercury	Grant	12,000,000.00	1,080,000.00	13,080,000.00
Total GEF Resources ($)						**12,000,000.00**	**1,080,000.00**	**13,080,000.00**

Project Preparation Grant (PPG)

Is Project Preparation Grant requested?

true

PPG Amount ($)

300000

PPG Agency Fee ($)

27000

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	Grant / Non-Grant	PPG($)	Agency Fee($)	Total PPG Funding($)
UNIDO	GET	Brazil	Chemicals and Waste	Mercury	Grant	300,000.00	27,000.00	327,000.00
Total PPG Amount ($)						**300,000.00**	**27,000.00**	**327,000.00**

Please provide justification

Sources of Funds for Country Star Allocation

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Sources of Funds	Total($)
Total GEF Resources					**0.00**

Indicative Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing($)	Co-financing($)
CW-2	GET	12,000,000.00	72000000
Total Project Cost		**12,000,000.00**	**72,000,000.00**

Indicative Co-financing

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Recipient Country Government	Ministry of Environment and Climate Change	In-kind	Recurrent expenditures	9823000
Recipient Country Government	Ministry of Environment and Climate Change	Grant	Investment mobilized	2000000
Private Sector	Cement production company	In-kind	Recurrent expenditures	45000000
Private Sector	Cement production company	Grant	Investment mobilized	15000000
GEF Agency	UNIDO	Grant	Investment mobilized	177000
Total Co-financing				**72,000,000.00**

Describe how any "Investment Mobilized" was identified

Investment mobilized identified as a result of detailed analysis of the private sector involved in the cement production sector or transformation including existing capacities and ongoing strategies. Amount evaluated as a result of experience from country stakeholders, UNIDO and private partners in activities related to the cement value chain and monitoring of emissions.

ANNEX B: ENDORSEMENTS

GEF Agency(ies) Certification

GEF Agency Type	Name	Date	Project Contact Person	Phone	Email
GEF Agency Coordinator	Ganna Onysko	3/20/2024		+43 1 26026 3647	g.onysko@unido.org
Project Coordinator	Vladimir Anastasov	3/20/2024		+43 1 26026 3461	v.anastasov@unido.org

Record of Endorsement of GEF Operational Focal Point (s) on Behalf of the Government(s):

Name	Position	Ministry	Date (MM/DD/YYYY)

Livia Farias Ferreira de Oliveira	General Coordinator for Sustainable Finance	Ministry of Finance	3/20/2024
Livia Farias Ferreira de Oliveira	General Coordinator for Sustainable Finance	Ministry of Finance	4/19/2024

ANNEX C: PROJECT LOCATION

Please provide geo-referenced information and map where the project interventions will take place

Potential area of intervention	Geo reference
Sao Paulo	23.5475, -46.63611 3448439
Rio de janeiro	22.90642, -43.18223 3451190
Belo Horizonte	19.92083, -43.93778 3470127
Brasilia	15.77972, -47.92972 3469058

ANNEX D: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING

(PIF level) Attach agency safeguard screen form including rating of risk types and overall risk rating.

Title
Annex 3_List_Figures
Annex 2_Mercury_monitoring
Annex_1_Mercury_cement
Environmental and Social Screening

ANNEX E: RIO MARKERS

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Land Degradation
Significant Objective 1	No Contribution 0	Significant Objective 1	Significant Objective 1

ANNEX F: TAXONOMY WORKSHEET

Level 1	Level 2	Level 3	Level 4
Influencing Models	Transform policy and regulatory environments	(multiple selection)	(multiple selection)
	Convene multi-stakeholders alliance		
	Demonstrate innovative approaches		
	Strengthen institutional capacity and decision-making		
Stakeholders	Private sector	Large corporations	(multiple selection)
	Beneficiaries		
	Civil Society	Academia Trade Unions and Workers Unions Non-Governmental Organization Community Based Organization	
	Indigenous Peoples		
	Type of engagement	Participation Consultation Information Dissemination Partnership	
	Communications	Strategic Communications Behavior Change Awareness raising	

Capacity, Knowledge and Research	Capacity Development	(multiple selection)	(multiple selection)
	Knowledge Generation	Workshop Training	
	Knowledge and Learning	Knowledge Management Capacity Development Learning	
	Learning	Adaptive management Theory of change Indicators to measure change	
	Innovation		
	Knowledge exchange	South-South	
Gender Equality	Gender Results areas	Awareness raising Capacity development Knowledge generation and exchange	(multiple selection)
	Gender mainstreaming	Women groups Sex-disaggregated indicators Gender-sensitive Indicators Beneficiaries	
Focal Area/Theme	Chemicals and Waste	Mercury	Cement