GEF-8 REQUEST FOR CEO ENDORSEMENT/APPROVAL

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General Project Information

Project Title	
Environmentally sound management and disposal of excess mercury and mercury waste from removing mercury electrolytic cells in Brazil's chlor-alkali sector (Chlor-alkali Brazil)	
Region Latin America and the Caribbean	GEF Project ID 11697
Country(ies) Brazil	Type of Project FSP
GEF Agency(ies): UNEP	GEF Agency Project ID
Project Executing Entity(s) Fundação Educacional Ciência e Desenvolvimento (FECD)	Project Executing Type Others
GEF Focal Area (s) Chemicals and Waste	Submission Date 2/6/2026
Type of Trust Fund GET	Project Duration (Months) 60
GEF Project Grant: (a) 12,000,000.00	GEF Project Non-Grant: (b) 0.00
Agency Fee(s) Grant: (c) 1,080,000.00	Agency Fee(s) Non-Grant (d) 0.00
Total GEF Financing: (a+b+c+d) 13,080,000.00	Total Co-financing 274,106,856.00
PPG Amount: (e) 200,000.00	PPG Agency Fee(s): (f) 18,000.00
Total GEF Resources: (a+b+c+d+e+f) 13,298,000.00	
Project Tags CBIT: No NGI: No SGP: No Innovation: No Competitive Window: No	
Project Sector (CCM Only) Mixed & Others	

Taxonomy

Influencing models, Strengthen institutional capacity and decision-making, Convene multi-stakeholder alliances, Stakeholders, Private Sector, Large corporations, Communications, Awareness Raising, Type of Engagement, Information Dissemination, Partnership, Civil Society, Academia, Gender Equality, Gender Mainstreaming, Sex-disaggregated indicators, Gender results areas, Capacity Development, Integrated Programs, Focal Areas, Chemicals and Waste, Mercury, Waste Management, Sound Management of chemicals and waste, Hazardous Waste Management, Best Available Technology / Best Environmental Practices, Capacity, Knowledge and Research, Learning, Theory of change, Indicators to measure change, Adaptive management

Rio Markers

Climate Change Mitigation	Climate Change Adaptation	Biodiversity	Land Degradation
No Contribution 0	No Contribution 0	No Contribution 0	No Contribution 0

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. (max. 250 words, approximately 1/2 page)

Brazil still hosts three chlor-alkali plants operating with mercury cells, whose conversion to membrane technology financed by these companies is currently underway and will lead to the discontinuation of mercury operations by the end of 2025. This transition will generate approximately 175 tons of excess metallic mercury and mercury waste requiring management and disposal in line with the Minamata Convention. In parallel, recent law enforcement actions have led to the seizure of almost 2 tons of metallic mercury, which remain inadequately stored, creating pressure on authorities to ensure its safe management and disposal.

The objective of the project is to reduce negative environmental and social impacts by ensuring the safe decommissioning of mercury-cell facilities and the environmentally sound management (ESM) of excess mercury, mercury waste and mercury-contaminated materials derived from electrolytical cells and other stocks of obsolete metallic mercury. This will enable Brazil to comply with its international commitments and avoid long-term liabilities. This will be achieved through: a) strengthening institutional and technical capacity with harmonized guidance, monitoring systems, and regulatory coherence; b) introducing Best Available Techniques and Best Environmental Practices (BAT/BEP) for decommissioning and recovery mercury from contaminated equipment; c) contracting specialized services for interim storage, stabilization, safe transport and final disposal of up to 175 tons of metallic mercury; and d) consolidating knowledge, communication, and capacity building. Capacity building and awareness raising activities will apply gender-responsive approaches, ensuring equal protection from exposure risks and promoting women's participation in technical and decision-making roles. South-South cooperation and exchange is expected to take place with other Latin American countries facing similar challenges such as Argentina, Peru, and Uruguay. Special emphasis will be placed on providing urgent interim storage conditions in the early stages of the project, as both the excess mercury from the chlor-alkali industry and seized metallic mercury stocks are currently in provisional storage conditions, subject to high risks, including theft.

The project builds on a gender analysis that identified differentiated exposure risks, persistent underrepresentation of women in technical roles, and gaps in institutional capacity to integrate gender considerations into chemicals and waste management. In response, the project incorporates targeted gender-responsive capacity building, promotes women's leadership in environmental monitoring and decision-making, and ensures that all BAT/BEP, ESM, and stakeholder engagement processes address gender-differentiated vulnerabilities and opportunities.

The project will eliminate a major source of mercury emissions and releases eliminating 275 tons of mercury (175 tons of mercury disposed of and 100 tons of mercury avoided as a result of technology conversion during project duration), thereby safeguarding an estimated 6.4 million people. The ongoing plant conversions—financed by industry—also deliver important climate co-benefits: annual reductions of 53,670 tCO_2 eq and energy savings of 189,600 MWh, totaling over 268,000 tCO_2 eq and nearly 950,000 MWh over the five-year period. By embedding BAT/BEP, innovative technologies, and inclusive capacity building, the project will secure enduring institutional, environmental, and social benefits.

Project Description Overview

Project Objective

To reduce negative environmental and social impacts caused by mercury and mercury wastes from the chlor-alkali sector and other stocks of obsolete metallic mercury in Brazil.

Project Components

Component 1: Strengthening national capacity for managing hazardous chemicals facilities and mercury-contaminated materials

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
2,098,000.00	47,918,612.00

Outcome:

Outcome 1: Institutional and technical capacity to oversee chlor-alkali mercury-cell decommissioning and ensure environmentally sound management of mercury and associated contaminated materials is strengthened.

Output:

Output 1.1: A good practice guide including policy recommendations for monitoring and managing the decommissioning of chlor-alkali mercury cells, mercury waste management, and related potentially contaminated sites is available.

Output 1.2: A monitoring programme for emissions and releases from all sites is developed and implemented in agreement with key stakeholders, and throughout the decommissioning process.

Component 2: Introducing BAT/BEP during environmentally sound decommissioning of mercury-cell chlor-alkali plants and decontamination of waste materials.

Component Type	Trust Fund
Technical Assistance	GET

GEF Project Financing ($)	Co-financing ($)
3,075,000.00	70,233,428.00

Outcome:

Outcome 2: Decommissioning of mercury-cell chlor-alkali facilities is carried out in accordance with BAT/ BEP, ESM principles and Minamata requirements.

Output:

Output 2.1: BAT/BEP requirements integrated into company site-specific decommissioning plans and regulatory oversight.

Output 2.2: Contract for recovered mercury from contaminated equipment issued and overseen ensuring BAT.

Component 3: Environmentally sound management, treatment, and final disposal of excess mercury and mercury waste.

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
4,775,000.00	109,061,665.00

Outcome:

Outcome 3: Up to 175 tons of metallic mercury are safely stored, transported, treated and disposed of through environmentally sound management options in line with the Basel Convention technical guidelines.

Output:

Output 3.1. Excess mercury/mercury stockpiles are transferred to secure interim storage.

Output 3.2. Contract for the collection, transport, stabilization, solidification and disposal of excess, seized, and recovered mercury is issued and delivered in compliance with best international standards.

Component 4: Knowledge management, communications and capacity building.

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
1,281,000.00	29,258,218.00

Outcome:

Outcome 4: Knowledge and capacity on the phase-out of mercury-cell chlor-alkali technology and mercury waste management is improved, consolidated and disseminated nationally and internationally in a gender-responsive and inclusive manner.

Output:

Output 4.1: Communication and knowledge management strategy to support awareness, transparency, and gender-responsive engagement implemented.

Output 4.2: Guidance to relevant national stakeholders in Brazil for the development of a safe process for decommissioning chlor-alkali mercury cells aligned with the Minamata Convention provided and internationally shared.

Output 4.3: Strategy for generating, disseminating, and sharing knowledge and capacity building implemented.

M&E

Component Type	Trust Fund
Technical Assistance	GET
GEF Project Financing ($)	Co-financing ($)
234,000.00	4,568,028.00

Outcome:

Outcome 5: Project is responsive to ongoing monitoring and evaluation.

Output:

Output 5.1: Project is monitored and evaluated.

Component Balances

Project Components	GEF Project Financing ($)	Co-financing ($)
Component 1: Strengthening national capacity for managing hazardous chemicals facilities and mercury-contaminated materials	2,098,000.00	47,918,612.00
Component 2: Introducing BAT/BEP during environmentally sound decommissioning of mercury-cell chlor-alkali plants and decontamination of waste materials.	3,075,000.00	70,233,428.00
Component 3: Environmentally sound management, treatment, and final disposal of excess mercury and mercury waste.	4,775,000.00	109,061,665.00

Component 4: Knowledge management, communications and capacity building.	1,281,000.00	29,258,218.00
M&E	234,000.00	4,568,028.00
Subtotal	**11,463,000.00**	**261,039,951.00**
Project Management Cost	537,000.00	13,066,905.00
Total Project Cost ($)	**12,000,000.00**	**274,106,856.00**

Please provide Justification

PROJECT OUTLINE

A. PROJECT RATIONALE

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

Changes from the PIF

During the project preparation phase, several adjustments were made to the concept presented in the PIF. The overall objective remains unchanged, but the operational logic has been refined for greater clarity and alignment with national priorities. The scope of mercury management has been expanded to include not only excess mercury and mercury wastes from the chlor-alkali sector, but also the mercury stocks of approximately 2 tons of metallic mercury resulting from seizure operations by the Brazilian authorities. This revision, driven by urgent demands from the Ministry of Environment, ensures a more comprehensive approach to environmentally sound management and disposal of mercury stocks within the country.

The GEB was corrected from 340 to 275 tons of mercury eliminated, following the identification of calculation errors in the companies' preliminary surveys of excess mercury quantities. While the PIF suggested support for technology conversion, this was never intended as part of the project scope, since the chlor-alkali companies are financing their own transition to membrane technology. Instead, the project focuses on ensuring Minamata-compliant decommissioning and the environmentally sound management of mercury. The technological transition in which this project is included is equivalent to avoiding the use of 100 tons of mercury over the five years of its duration, since the chlor-alkali plants involved had a combined demand of approximately 20 tons/year of this metal while operating with the technology being replaced (the elimination of the use of these 100 tons of mercury is therefore a counterpart benefit facilitated by this project).

Under Component 1, the project will no longer develop site-specific remediation or decommissioning plans, as these are already under elaboration and remain under the responsibility of the companies. Consistent with the PIF, this component will deliver a good practice guide and policy recommendations to strengthen national capacities, with a strong emphasis on the application of BAT/BEP during implementation. Monitoring programmes remain central to ensure that supported measures, such as BAT/BEP for decommissioning and waste disposal solutions, are implemented in an environmentally compliant manner.

Component 2 will provide direct support for the application of selected BAT/BEP measures through service contracts, focusing particularly on innovative technologies for decontamination and recovery of mercury from contaminated materials. To cover these additional costs associated with these activities, resources have been reallocated from Component 3.

Under Component 3, the project design was also updated to reflect a more coherent structuring of the activities related to the environmentally sound management of mercury. The outputs were reorganized to clearly distinguish between (i) the transfer of excess mercury from the chlor alkali industry and seized mercury from public entities to secure interim storage and (ii) the stabilization, solidification, transport, and final disposal of mercury and mercury-containing materials, both through service contracts. This restructuring responds to technical recommendations received during the preparatory phase and ensures closer alignment with the Minamata Convention, Basel Convention requirements, including Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with mercury or mercury compounds, and national expectations expressed by the Ministry of Environment and the private-sector partners. The revised outputs also allow improved traceability across the sequence of operations—interim storage, stabilization, and final disposal—regardless of whether disposal is ultimately carried out nationally or through export.

Under Component 4, the scope of stakeholder engagement and knowledge generation was broadened to explicitly include formal collaboration with the UNEP Global Mercury Partnership (GMP), particularly the chlor-alkali and mercury waste partnership areas. This reflects the strengthened emphasis on international cooperation introduced during project development. GMP will support knowledge exchange, dissemination of best practices, and the positioning of Brazil's experience within global mercury-management platforms. This inclusion was considered necessary to ensure that lessons learned—especially on decommissioning, stabilization technologies, and regulatory harmonization—are shared across countries facing similar challenges, including ongoing initiatives in Mexico, Argentina, Uruguay, and Peru.

The budget allocation per project component was readjusted to respond to the new organization of activities within them and, mainly, to the reduction in resource requirements for mercury management due to the correction of estimates of the volumes to be treated. Component 1 maintained approximately the same estimated cost, while Component 3 had its budget reduced (by transferring significant part of its activities to Component 2 and reducing the scope of mercury management), while Components 2 and 4 received budget increases commensurate with new activities related to the implementation of mercury waste decontamination technologies. M&E and PMC maintained its original estimated budget.

1. Introduction

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The chlor-alkali industry produces chlorine and caustic soda, essential inputs across critical sectors such as drinking water treatment, pharmaceuticals, agriculture, food processing, and industrial manufacturing. While economically strategic, this industry has historically relied on mercury-cell technology, a method with considerable environmental and health risks due to mercury emissions, site contamination, and the generation of an environmental liability of excess elemental mercury.

Although not the largest source, the chlor-alkali sector has emitted an estimated 1.4 tons of mercury annually in the world since 2020[1]. These emissions contribute to mercury accumulation in ecosystems and pose serious occupation and public health risks. Consequently, Article 5 of the Minamata Convention on Mercury mandates a global phase out of mercury use in industrial processes such as chlor-alkali production by 2025. Brazil, a Party to the Convention since 2017, internalized this requirement through Decree No. 9470/2018[2].

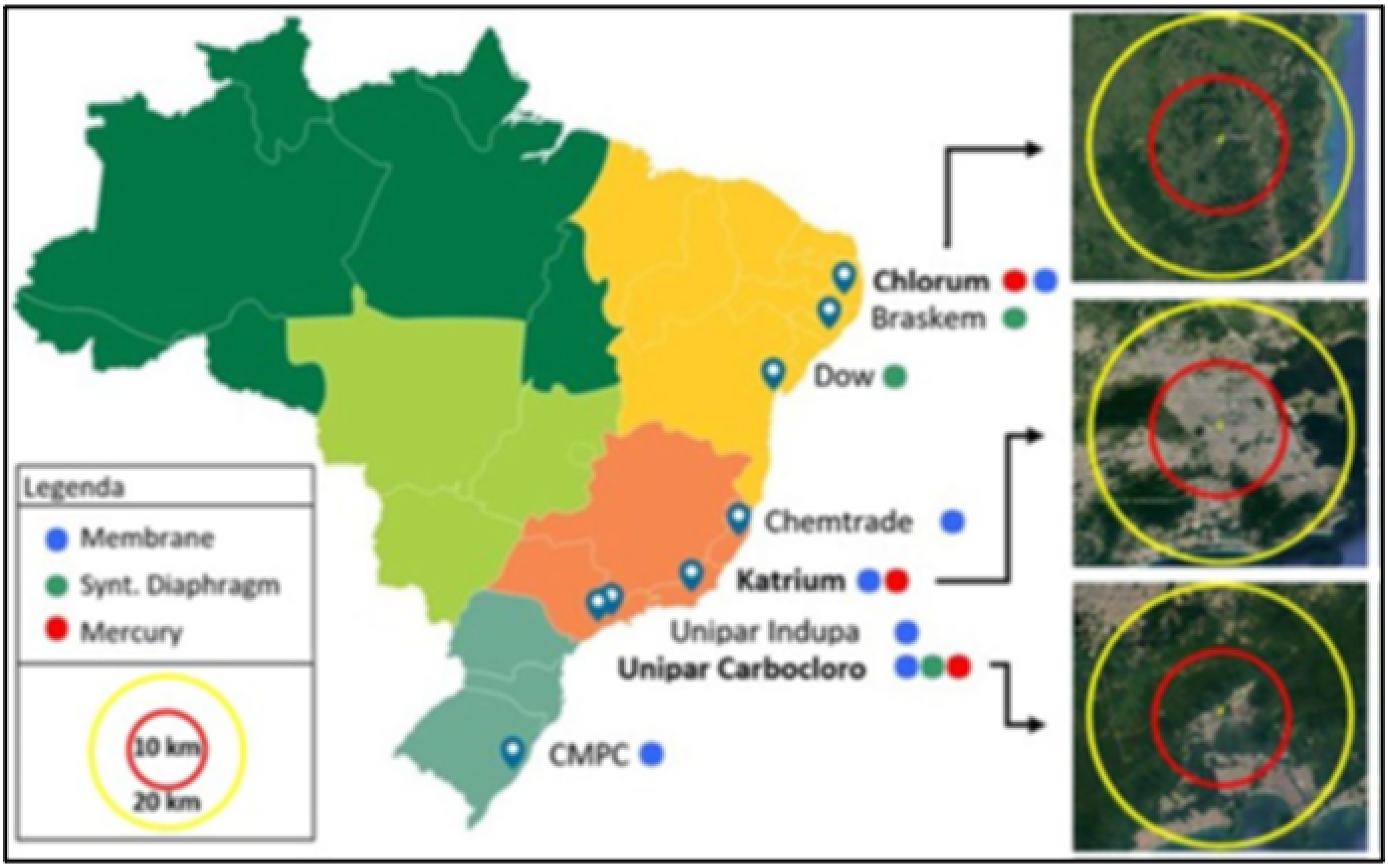

FIGURE 1: CHLOR-ALKALI PRODUCTION SITES IN BRAZIL AND LOCATION OF MERCURY CELL PLANTS

2. Baseline and Urgency for Intervention

Brazil is home to three remaining chlor-alkali plants that use mercury-cell technology. These facilities (Chlorum, Katrium and Unipar Carbocloro) together store approximately 175 tons of mercury, 10-15% of which is in the form of contaminated infrastructure and equipment of the electrolytical cell structures (Table 1). This material consists mainly of steel, copper, and aluminum parts whose exact nature and composition have yet to be surveyed.

The chlor-alkali industry in the country employs a significant number of workers (1440 in 2019)[3] and plays an important role in the national economy, with plants located near densely populated areas and vulnerable ecosystems that together are home to approximately 17.2 million people (Figure 1). Within these facilities, women represent between 19 and 27% of the workforce (Table 1). Despite their relatively limited participation, women may face distinct exposure risks associated with specific operational roles. In order to assess the potential impact of the project on gender mainstreaming, a gender assessment and action plan have been conducted during the project preparatory phase. Based on the main gaps identified, the Gender Action Plan will contribute to addressing the specific vulnerabilities of women and promote their participation in project activities and decision-making mechanisms (see Annex 5a).

Beyond workforce participation, the gender analysis identified additional gaps, including limited representation of women and Indigenous Peoples and Local Communities (IPLCs) in STEM fields, heightened exposure risks linked to social roles, and uneven access to occupational health information. These gaps are compounded by broader structural challenges: Brazil’s Minamata Initial Assessment, National Action Plan (NAP) for ASGM, and climate-related instruments (NAPs, NDCs, BTRs) all note gender dimensions but highlight the need for stronger institutional mechanisms to operationalize gender equality in pollution and chemicals management. The project responds by embedding gender considerations into regulatory strengthening, monitoring systems, and capacity development measures to ensure equitable benefits and protections

In order to comply with Minamata Convention obligations, the Brazilian chlor-alkali plants – Chlorum, Katrium and Unipar Carbocloro – which together consumed an average of 20 tons of mercury per year to operate their electrolytic cells - began transitioning away from mercury in 2021 towards membrane technology, aiming at a full phase out financed by their own resources by December 2025. In all three sites which now are being converted to membrane technology, electrolytical cell houses will need to be decommissioned, dismantled, demolished, and consequently not re-used (Table 1).

Decommissioning plans for all three sites have been submitted to state environmental authorities. However, at the time of project submission, approval is still pending. Decommissioning approval requires – besides a thorough investigation of environmental legacies in soil and water – a clear mandatory plan for the disposal measures proposed for all waste materials (excess mercury, mercury waste, other waste streams). Since these depend on the contribution of the project in preparation, these plans have not yet been completed.

The total investment estimates for technology conversion, waste treatment and the related activities exceed are estimated by the companies to USD 263 million, with over USD 6.5 million specifically required for the management, stabilization and disposal of mercury (excess mercury and mercury waste recovered from equipment decontamination)[4].

Company	Total mercury in waste (t)	Excess metallic mercury in cells (t)	Stored mercury (t)	Estimated quantity of mercury to be recovered during in decontamination (t)	Types of waste to be decontaminated	Decom-missioning Plan	Cell house	Staff (male/ female)
Chlorum	43	38	1.1	3.9	Mostly steel, copper and aluminium equipment, pipework, anodes etc	submitted	To be demolished	125/34
Katrium	50	28.3	6.7	15	ND	submitted	To be demolished	ND
Unipar/Carbochloro	70	60	-	10	Pipework incl. sludges; equipment incl.	Submitted	To be demolished; rubble to be sent to class 1 landfill	311/58
TOTAL	163	126.3	7.8	28.9				

TABLE 1: ESTIMATED MERCURY WASTE QUANTITIES, STAFF COMPOSITION OF CHLOR-ALKALI PLANTS. SOURCE: DATA PROVIDED BY COMPANIES, 2025

Recent law enforcement actions have led to the seizure of significant quantities of metallic mercury linked to illegal ASGM operations. As of October 2024, IBAMA reported approximately 2 tons of mercury stored across several superintendencies[5], with the largest amounts located in Amazonas, Mato Grosso, and Santa Catarina. While storage conditions have improved since 2023, environmental and health risks remain, especially where temporary facilities are still in use. Mercury seized by other agencies, such as the National Mining Agency (ANM), is stored separately, but record-keeping remains inconsistent. Since 2019, mercury seizures have steadily increased – a trend expected to continue as government action against illegal mining intensifies.

Brazil is currently implementing a cofinancing project funded under the Amazon Fund which aim to establish a computerized mercury chain control system to strengthen regulatory oversight, management, and safe handling of mercury across Brazil. It includes reviewing and proposing updates to existing regulations, defining system requirements, developing and validating the software, and disseminating it among relevant institutions. Complementary activities involve conducting studies on alternatives for mercury disposal and assistance with decommissioning processes, acquiring packaging kits for seized mercury, and contracting logistics services for transport to disposal sites. While the Amazon Fund project will support system development and logistics, the actual disposal of mercury will require additional resources which could be included in the FSP as a logical synergy and contingency measure, given the inadequate storage conditions and the urgent need for environmentally sound disposal.

Therefore, while 163 tons were reported by the companies (Tab. 1), an additional 12-ton tolerance has been included to account for unforeseen quantities, bringing the total to 175 tons, taking into account the additional stocks of mercury seized by the enforcement authorities (approximately 2 tons). To determine the most appropriate solution to this challenge, a detailed assessment was undertaken during the project preparatory phase in the form of a technical study[6] (appendix 14) to assess disposal alternatives against technical-operational, legal-regulatory, environmental and public health, logistical-institutional and economic-financial criteria. The study evaluated two options: a) Export of metallic mercury under the Basel Convention, followed by stabilization through blending liquid mercury with sulphur to generate an inert solid (cinnabar), which is then disposed of; and b) National stabilization and disposal, through imported stabilization technology installed in Brazil and final disposal of cinnabar in specially engineered landfills in the country. Both alternatives demonstrated technical feasibility and environmental safety. Export is likely to provide the fastest operational solution, subject to service provider availability. However, it will not contribute to lasting national capacity, thereby posing a sustainability risk. The national option offers lower estimated costs and strengthens domestic capacity for Hg0 waste management in line with BAT/BEP, but it faces specific logistical and administrative constraints including the need to establish the necessary regulatory conditions.

The removal and safeguarding of excess mercury from electrolytic cells and deposits in chlor-alkali facilities, as well as the removal and safe storage of seized mercury from its provisional storage locations, is a priority of the highest urgency and will be addressed as quickly as possible. This will be conducted ensuring mercury's safe storage in line with Minamata Convention for as long as necessary until it can be sent for stabilization and final disposal. Stabilization and proper final disposal, planned as part of the current proposal, will take place during the project's lifetime.

Preliminary cost estimates obtained from two service providers – Company A (for national solution involving technology transfer) and Company B (for export, stabilization and disposal in Europe) – indicate that, in the case of purchase of equipment and local management, stabilization and final disposal in legally-complaint domestic landfills (approximately USD 1.8 million) is significantly more cost effective than the export alternative (approximately USD 3.6 million). Given the risks associated with the current provisional storage of excess mercury in the partner companies' mercury cells, the time required for its collection has been identified by national authorities as a key technical criterion in determining the disposal route, which will guide project implementation over cost-based considerations.

The decommissioning of mercury contaminated chlor-alkali plants and the decontamination of mercury-contaminated waste resulting from the dismantling of equipment also pose technological challenges for environmentally sound waste management. These processes require technologies that are not yet available in Brazil as well as the engagement of specialized service providers with established expertise in the field of mercury contamination. A range of specialized service providers in mercury waste management, stabilization, decontamination, and final disposal will be invited to engage in relevant project activities and potential contracting opportunities. These include, among others: Curium (France), Econ Industries (Germany), Remondis (Germany), Nomura Kohsan (Japan), BMT – Best Mercury Technology (Netherlands), Tauw (Netherlands), Mayasa (Spain), RVA Group (United Kingdom) and Batrec Veolia (Switzerland).

Best Available Technologies (BAT) and Best Environmental Practices (BEP) encompass technical solutions for the decontamination of mercury-contaminated equipment and infrastructure[7], as well as environmentally responsible procedures during decommissioning, in accordance with international frameworks and guidance (Figure 2). Unipar Carbocloro has reported the use of sodium hypochlorite (Na-Hypochlorite) for the cleaning of mercury-contaminated pipe system as well as the presence of an outdated small-scale retort unit, likely no longer in operation.

The accumulation of unsecured mercury stocks and waste after decommissioning, without appropriate storage and environmentally sound management (ESM) measures, may result in considerable risks to human health and the environment due to mercury emissions and releases resulting from theft and other criminal activities. These risks are further exacerbated by the absence of authorized national facilities for the stabilization and final disposal of metallic mercury and by technological bottlenecks in mercury waste treatment and disposal. All these factors hinder the timely and effective elimination of mercury from exposure pathways.

Dismantling, demolition and decontamination

Best Environmental Practices to reduce mercury emissions during dismantling, demolition and decontamination

- Inclusion of some of the staff experienced in running the former plant;
- Replacement of hot cutting of equipment by cold cutting, if possible;
- Precautions against the dispersion of mercury droplets if high pressure is used for the cleaning of surfaces (e.g. confined areas with treatment of waste gases);
- Storage of contaminated equipment in suitable areas (e.g. steel can be highly contaminated with mercury which can sweat out during storage);
- Frequent washing of the floor of the working area;
- Rapid clean-up of mercury spills by using aspiration equipment with activated carbon filters;
- Accounting of waste streams (origin, mass, volume, mercury concentration and destination).

Best Available Techniques (BAT)-Reference Document for the Production of Chlor-alkali Industrial Emissions Directive 2010/75/EU Integrated Pollution Prevention and Control) 2014

Material	Typical Hg content in wt-%	Remarks	Possible decontamination technique		
			Mechanical and physical treatment	Chemical treatment	Thermal treatment
Sludge from storage tanks and sumps	10–30	Wet	Yes	No	Yes
Sludge from settling catch pits, drains, etc.	2–80	Wet	Yes	No	Yes
Sulphurised or iodised activated carbon from hydrogen purification	10–20	Dry	Yes (1)	Yes	No
Activated carbon from caustic filters	≤ 40	Wet	Yes	No	Yes
Graphite from decomposers	2	Porous	Yes	Yes	Yes
Rubber/packing	variable	No remarks	Yes	Yes	No
Brickwork/concrete	0.01–0.1	Dry	Yes	Yes	Yes
Ebonite-lined cell components (anodes covers, end-boxes, side walls, pipework)	variable	Inhomogeneous contamination	Yes	Yes	No
Steel (cells, decomposers, baffles, H_2 coolers, base plates, Hg pumps, pipework)	0.001–1	Surface contamination	Yes	Yes	Yes
Plastic equipment	< 0.1	Surface contamination	Yes (2)	No	No
Copper conductors	0.04	Surface contamination	Yes	No	Yes (3)
Cell sealant (layers concrete)	0.01	No remarks	Yes (1)	No	No
Asphalt	1–20	Inhomogeneous contamination	Yes	No	No
Concrete and subfloor	variable	Inhomogeneous contamination	Yes	No	Yes
Wood	variable	No remarks	Yes	No	No
Soil	variable	Inhomogeneous contamination	Yes	No	Yes
Decomposer lagging (thermal insulation)	0.03	No remarks	No treatment before disposal		
Retort residues	≤ 0.1	Dry, porous			
Wooden floorboards	0.05–0.08	Inhomogeneous contamination			

(1) Washing with water is not effective.
(2) Only washing with water is effective.
(3) For flexible connections made of several copper sheets.
Source: [94, Euro Chlor 2009]

FIGURE 2: BEST AVAILABLE TECHNIQUES AND PRACTICES IN DECOMMISSIONING OF CHLOR-ALKALI PRODUCTION INFRASTRUCTURE[8]

3. Barriers and Drivers of Environmental Problems

Several key barriers hinder Brazil's ability to achieve Minamata compliance and manage its excess mercury and mercury waste from the chlor-alkali industry and other sectors:

a) Regulatory gaps:

The recently published terms of reference[9] for the decommissioning of chlor-alkali plants issued by the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) represent an important step forward to comply with Minamata-conform protocols and BAT/BEP. It sets out guidelines for the closure, decommissioning, decontamination and safe disposal of metallic mercury from Brazil's chlor-alkali industry, in compliance with the international (Basel, Minamata Conventions) and national frameworks. In addition, Article 56 of the Sao Paulo Decree Nº 59 (5 June 2013)[10] made technical investigations and waste management during decommissioning of industrial plants with contamination potential mandatory. However, Brazil lacks specific technical guidelines, protocols and norms as well as the necessary infrastructure and equipment to fully comply with the above norms and guidance (see *Lack of technical infrastructure*).

Regarding management of mercury waste, there is no legally binding requirement or disposal criteria regarding pre-treatment and stabilization of mercury waste prior to disposal in landfills. Stabilized forms like mercury sulphide (HgS) are not clearly classified in national waste legislation, and disposal criteria for mercury-contaminated waste must be updated. Technical guidance for mercury waste management, transport, storage and disposal is insufficient (see *Lack of technical infrastructure* and *Knowledge gaps*). Licensing procedures for mercury treatment infrastructure have no precedents and remain undefined, particularly for retorts and mobile treatment units.

Furthermore, the growing quantities of mercury seized by authorities from illegal use – often stored temporarily in unsafe or inadequate facilities – remain without a defined legal or technical pathway for stabilization or disposal. These seized stocks add to the overall national burden of mercury waste and highlight the urgent need for coherent management regulations.

Although regulatory gaps in mercury waste management still exist, they do not turn the safe handling of such waste impossible. However, these gaps hinder the immediate national disposal of larger quantities and the development of long term, Minamata-compliant waste management strategies. These challenges are expected to be addressed through the outcomes of a medium-sized project on the environmentally sound management of mercury in Brazil, which is also anticipated to generate synergies with the here proposed project.

b) Institutional fragmentation and lack of coordination:

Mercury management involves overlapping competencies between IBAMA (federal level) and state environmental agencies, without a harmonized regulatory and operational framework. Licensing of mercury treatment units and permits for disposal remain under state authority and must be streamlined across the three states where the chlor-alkali plants are located (Pernambuco, Rio de Janeiro and Sao Paulo). Inter-state mercury and waste transport, necessary for the project, requires clearer national regulation and improved coordination across agencies and government levels.

In addition, the management of mercury seized during enforcement operations is often unclear due to fragmented institutional responsibilities. Federal and state agencies frequently lack agreed procedures for recording, storing and transferring confiscated mercury to safe, long-term management facilities. As a result, seized stocks remain dispersed and poorly tracked.

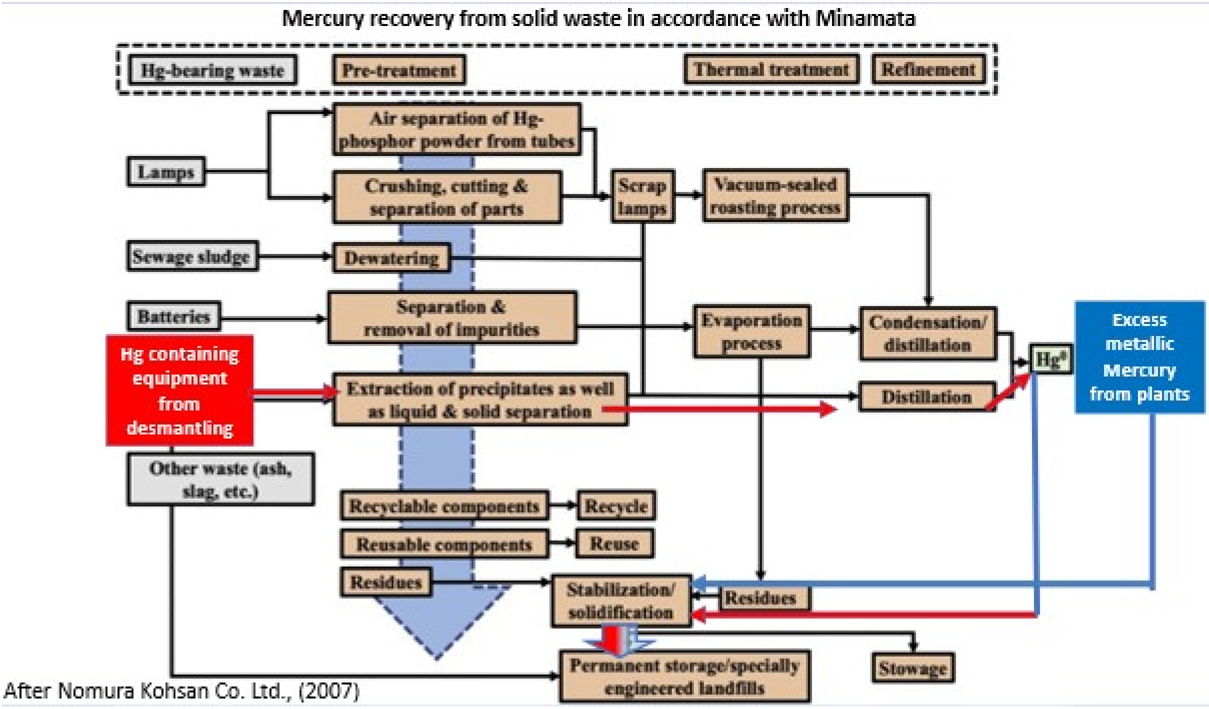

FIGURE 3: MANAGEMENT OF MERCURY WASTE. SOURCE: (UNEP, 2022)[11]

c) Lack of technical infrastructure, technology and human capacities:

The Minamata Convention, under Article 11, defines mercury waste as substances or objects: a) consisting of mercury or mercury compounds; b) containing mercury or mercury compounds; or c) contaminated with mercury or mercury compounds above the relevant thresholds set by the Conference of the Parties. Metallic excess mercury from chlor-alkali plants falls under category (a), while mercury-containing equipment from dismantling such as cells and falls under category (c). Each waste category requires specific disposal protocols to ensure its ESM. The recommended disposal operations (Figure 3) aim to eliminate mercury from circulation, preventing resource recovery, recycling, reclamation, direct re-use or alternative uses.

Brazil lacks operational infrastructure and technology for mercury waste treatment (e.g, distillation, retorting) and stabilization prior to landfill disposal. Engineered hazardous waste landfills (e.g., Essencis/Solvi in Sao Paulo) comply with the requirements of Article 11 of the Minamata Convention and the technical guidelines on hazardous waste landfills of the Basel Convention. These facilities are authorized to accept mercury-contaminated waste below certain thresholds, as defined under Brazilian standard NBR10004[12]. However, they are not permitted to receive untreated elemental mercury, which lacks a legally recognized disposal route in the country.

This limitation also affects the management of mercury seized by authorities, which cannot currently be stabilized or permanently disposed of domestically due to the absence of licensed treatment infrastructure. Consequently, confiscated mercury remains in interim storage, often in suboptimal conditions, increasing the risks of leaks, contamination, and occupational exposure.

Thus, export of metallic mercury and its stabilization and disposal outside Brazil under the Basel Convention appears as an immediate safe disposal solution. National stabilization and disposal in existing industrial landfills would require technology transfer and equipment investment and appears to be an equally feasible medium-term solution. Given the ongoing and projected waste arisings from the ASGM, medical and other sectors in the future, the technology transfer solution would also provide national capacity for these future stocks. A detailed assessment has been conducted during the project preparatory phase and is available in Appendix 14.

d) Knowledge gaps:

Significant knowledge gaps hinder the development of a comprehensive and effective mercury management strategy in Brazil. There is limited domestic understanding of the health and environmental impacts associated with long-term exposure to metallic mercury from storage and decommissioning processes, as well as limited technical knowledge regarding mercury waste streams, stabilization technologies, and BAT/BEP-compliant management practices.

In particular, the handling and long-term storage of mercury seized from illegal use remains poorly documented, with limited guidance available for environmental authorities on appropriate containment, labeling, and transfer procedures. The absence of clear protocols increases the likelihood of unsafe storage conditions and complicates the traceability of seized stocks.

Brazil lacks documented experience with the decommissioning of mercury-cell chlor-alkali facilities, as most other plants in the country were originally built using membrane technology and thus did not require conversion or mercury-specific decommissioning. No historical conversion cases have been systematically recorded or analyzed. Furthermore, there is insufficient national data on post-decommissioning mercury flows, after-use scenarios for dismantled plant infrastructure and land, and lessons learned from international decommissioning projects—such as those in Europe—which could otherwise serve as valuable references.

In addition to global initiatives, several regional efforts in Latin America form part of the baseline for this project. These include the GEF-supported projects “Environmentally Sound Management of POPs, mercury and other hazardous chemicals in Argentina” (GEF ID 10094) and “Reducing UPOPs and mercury releases from healthcare waste management, e-waste treatment, scrap processing and biomass burning in Colombia” (GEF ID 6928). Both projects have strengthened regulatory and institutional frameworks for mercury management and promoted the adoption of either environmentally sound practices for chlor-alkali decommissioning and mercury stabilization. They have also generated valuable technical information and lessons that are directly relevant to Brazil's ongoing phase-out efforts. Moreover, Argentina and Uruguay have emerging mercury stabilization and disposal capacities, which may offer regional cooperation opportunities for cost-effective waste management solutions. The present project will build on these experiences by fostering dialogue and technical exchange with these countries to identify feasible regional approaches and share good practices.

Gender-related knowledge gaps also hinder effective mercury management. Environmental authorities and operators lack guidance on identifying differentiated exposure risks, engaging women and vulnerable groups, and integrating gender-responsive occupational health practices into decommissioning and mercury-waste management. This project will help fill these gaps by developing gender-sensitive tools, training modules, and communication materials aligned with the Minamata Convention Gender Action Plan.

UNEP brings a long-standing and globally recognized comparative advantage in chemicals and waste management, particularly in mercury reduction and Minamata Convention implementation. As the host of the Global Mercury Partnership (GMP) and the agency responsible for several GEF mercury related projects worldwide – including in Mexico (GEFID 10526), Brazil's Minamata Initial Assessment (GEFID 5861), Brazil's National Action Plan (GEFID 10860) – UNEP provides direct access to technical expertise, global BAT/BEP guidance, and a broad network of specialized institutions. UNEP's involvement ensures that Brazil benefits from consolidated lessons and methodologies generated through comparable decommissioning, stabilization, and disposal initiatives, including the ongoing chlor-alkali phase-out in Mexico.
UNEP maintains established institutional relationships with Brazil's Ministry of the Environment, IBAMA, and state regulatory authorities, built through multiple GEF projects and national partnerships, facilitating coordinated regulatory strengthening and alignment with international commitments. UNEP also mobilizes internal expert networks—including Minamata Convention specialists, mercury waste management experts, and GMP technical groups—ensuring that the project has immediate access to informed technical advice, peer reviewers, and specialized knowledge that is not available domestically.

The project also benefits from UNEP's internal mechanisms for outsourcing specialized knowledge, such as global framework agreements, expert rosters, and South–South knowledge exchange platforms, enabling the rapid mobilization of expertise for decommissioning, mercury stabilization, and regulatory coherence. This combination of normative leadership, operational experience, and cross-country lesson-sharing positions UNEP as the most suitable Implementing Agency to guide Brazil's transition toward full Minamata compliance.

4. Future narrative and project justification

In a plausible future, without this intervention, the decommissioning of chlor-alkali plants and management of elemental mercury – following technology conversion (not part of the project) – will result in unmanaged mercury waste accumulation, regulatory bottlenecks and institutional misalignment. Public health risks will escalate, and environmental liabilities will remain unresolved, threatening the country's compliance with its international obligations. The project has been developed to craft an alternative future which will introduce a structured path to support the ESM of excess mercury and mercury waste generated through the decommissioning processes of the three plants undergoing conversion from mercury cells to diaphragm technology and law enforcement operations. Specifically, the project will:

- Safely dispose of excess metallic mercury in line with the Basel and Minamata Conventions, either through export and disposal abroad or national stabilization, solidification and disposal;
- Enable safe decommissioning of chlor-alkali installations by establishing and implementing BEP for dismantling and transport of mercury-containing equipment, introducing BAT through advanced technologies (e.g., retorts), and implementing environmental and health monitoring systems;

- Strengthen the laboratory and analytical capacity of Brazil to ensure robust monitoring, assessment and management of mercury and other hazardous substances;
- Contribute to regulatory development and guidance for technology licensing, monitoring, and enforcement;
- Establish interim and permanent infrastructure for mercury management and monitoring;
- Promote capacity building and knowledge sharing to ensure sustainability of project measures, including a gender-responsive health protection and multi-stakeholder engagement strategy.

This approach has been selected due to its alignment with existing government priorities to safely and rapidly manage mercury stocks in accordance with international commitments (Minamata), build national capacities for mercury management and waste decontamination, enable rapid deployment of scalable solutions and its feasibility across public and private institutional frameworks to ensure long-term sustainability.

5. Project cost-effectiveness

The project is cost-effective in both its design and implementation. By supporting the environmentally sound decommissioning of mercury-based facilities, the project eliminates ongoing mercury emissions and mitigates the need for future costly remediation. Early stabilization and disposal of excess mercury significantly reduce long-term storage expenses and associated risks, while decontamination of contaminated equipment reduces hazardous waste volumes and disposal costs. The project also strengthens national capacity for mercury management, ensuring future wastes can be handled efficiently. Finally, technology transfer and capacity building will allow the continued use of innovative decontamination methods beyond the project's duration, ensuring long-term sustainability and value for money.

A Stakeholder Engagement Plan (Appendix 5) has been developed and will be implemented throughout implementation.

[1] World Chlorine Council (WCC) (consulted June 2024) WCC Report to UNEP on chlor-alkali partnership, mercury reporting 2002-2023 data. Available at: https://worldchlorine.org/unep-chlor-alkali-mercury-partnership/reporting-on-mercury-use/

[2] Brazil. (2018, August 14). Decreto nº 9.470, de 14 de agosto de 2018: Promulga a Convenção de Minamata sobre Mercúrio. Diário Oficial da União. Available at: https://www2.camara.leg.br/legin/fed/decret/2018/decreto-9470-14-agosto-2018-787075-publicacaooriginal-156192-pe.htm

[3] Rota estratégica da indústria de Cloro-Álcalis [Associação Brasileira da Indústria de Álcalis, Cloro e Derivados, SENAI. Departamento Regional do Paraná]. -- 1. ed. -- São Paulo: Associação Brasileira da Indústria de Álcalis, Cloro e Derivados - ABICLOR, 2023. Available at: https://www.abiclor.com.br/wp-content/uploads/2024/01/Livro_Abiclor_Rota-Estrategica_da_Industria-de-Cloro-Alcalis.pdf

[4] Estimates provided by the companies during the project preparatory phase.

[5] UOL (2018) Ibama apreende 1,7 tonelada de mercúrio que seria lançada nos ríos da Amazônia por garimpeiros. Available at: https://noticias.uol.com.br/meio-ambiente/ultimas-noticias/ag-estado/2018/05/10/ibama-apreende-17-tonelada-de-mercurio-que-seria-lancada-nos-rios-da-amazonia-por-garimpeiros.htm

[6] FECD (2025) Avaliação das Alternativas para Destinação Ambientalmente Adequada e Segura do Mercúrio Metálico (Hg^0) da Indústria de Cloro-Álcalis no Brasil, Technical Report GEFID 11697 - S1-32GFL-001002).

[7] The Best Available Techniques (BAT) Reference Document for the Production of Chlor-Alkali (CAK BREF), adopted under the Industrial Emissions Directive 2010/75/EU (European Commission, 2014), specifies in BAT 3 (p. 254) that "oxidising agents such as hypochlorite, chlorine or hydrogen peroxide are used to fully convert mercury into its oxidised form, which is subsequently removed by ion-exchange resins or by precipitation as mercury sulphide followed by filtration." The associated emission levels (BAT-AELs) for mercury in treated wastewater during decommissioning are set at 3–15 µg/L.

[8] European Commission, Joint Research Centre (JRC). Best Available Techniques (BAT) Reference Document for the Production of Chlor-alkali. Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control). Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC91156

[9] Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), Reference Term: Guidance for the decommissioning of mercury use by chlorine and caustic soda manufacturers, Process No. 02001.029580/2024–18, published in Brasília on May 23, 2025. Available at: www.gov.br/ibama/pt-br/assuntos/notas/2025/ibama-orienta-desativacao-do-uso-de-mercurio-pelos-fabricantes-de-cloro-e-soda-caustica/sei_ibama_3271196_termo_de_referencia.pdf

[10] https://cetesb.sp.gov.br/areas-contaminadas/wp-content/uploads/sites/17/2013/11/decreto-59-263-05062013.pdf

[11] UNEP, *Technical Guidelines on the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with Mercury or Mercury Compounds*, UNEP/CHW.15/6/Add.6/Rev.1, 2022. Available at: https://www.unep.org/resources/report/technical-guidelines-environmentally-sound-management-wastes-consisting-containing-or

[12] ABNT NBR 10004-1:2024 Waste classification Part 1: Requirements for classification Publication Date: 27/11/2024. Available at: https://www.abntcatalogo.com.br

B. 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 guidance document. (Approximately 3-5 pages) see guidance here

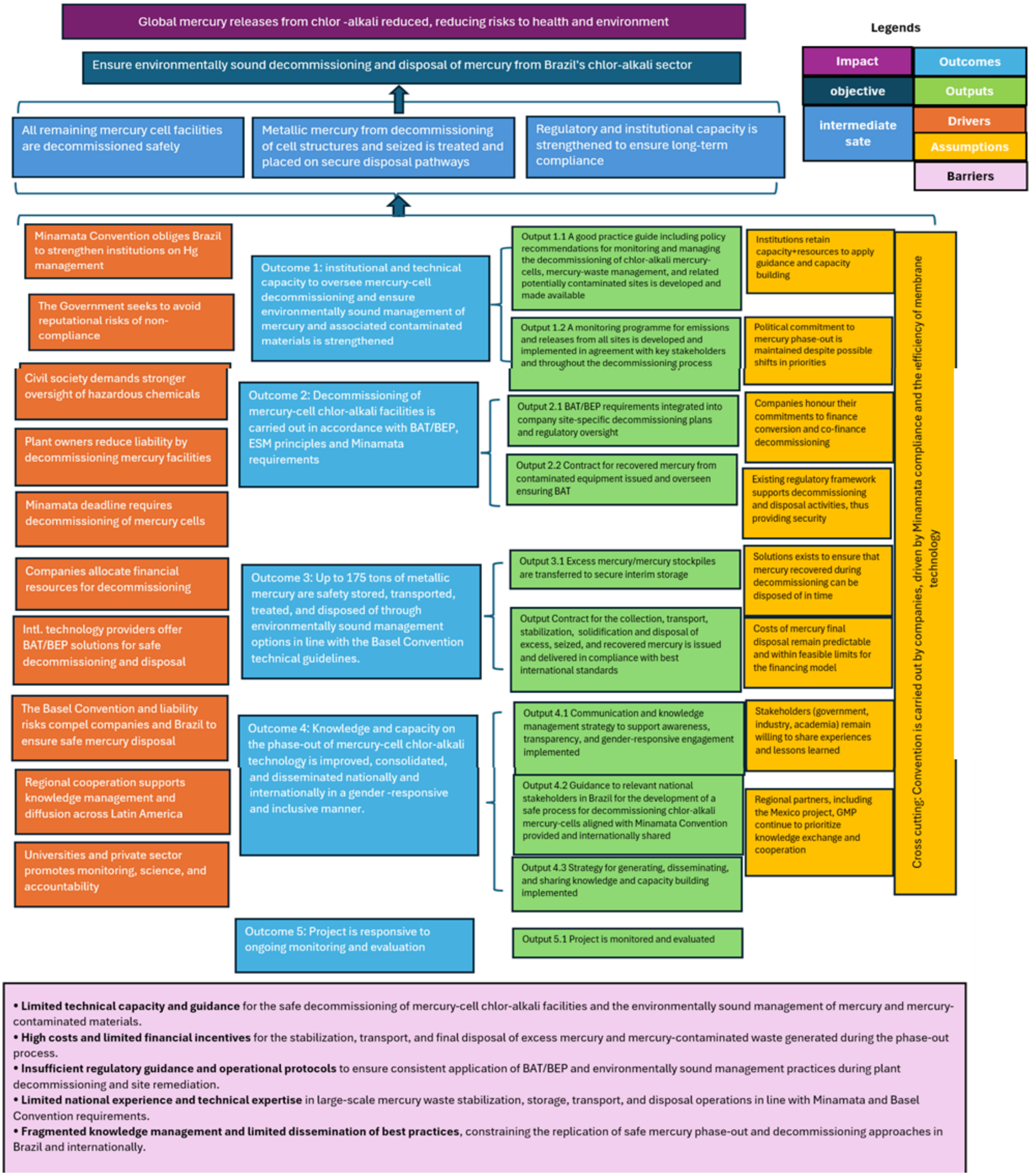

Figure 4: theory of change

By strengthening national capacity, introducing BAT/BEP into decommissioning, ensuring environmentally sound treatment and disposal of excess mercury, and generating and consolidating knowledge, Brazil will establish a sustainable framework for managing mercury from the chlor-alkali sector and other sectors.

The expected global environmental benefits are the elimination of approximately 175 tons of metallic mercury, preventing significant emissions and releases to air, soil, and water, benefitting a population of estimated 6.4 million individuals (being 3.4 million women and 3 million men) from the GEF-financed investments (Figure 5). Additionally, estimated 53,670 tons of CO_2e of Greenhouse Gas Emissions will be mitigated and 189.6 MWh of energy will be saved just in the first 5 years due to the technology transition that is the counterpart of this project.

Gender equality considerations are embedded throughout the project's theory of change. The project not only ensures balanced participation but also addresses structural gender gaps in technical capacity, decision-making, and access to information. All components include gender-responsive actions, such as training on occupational health and ESM practices tailored for women workers, community outreach designed to reach marginalized groups, and ensuring women's representation in oversight and technical validation processes.

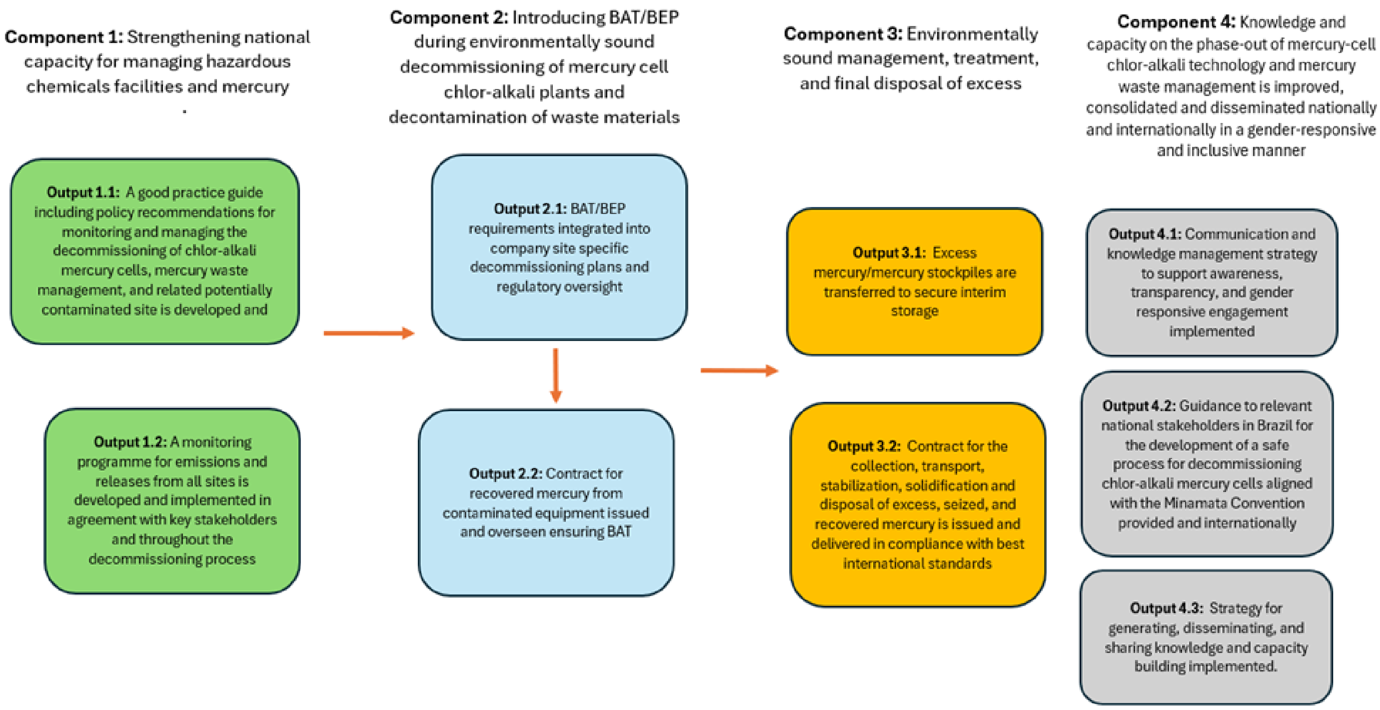

Figure 5: causal pathways and logical relations of outcomes and outputs

Component 1 develops guidance documents on decommissioning of mercury contaminated industrial installations and the ESM of related waste streams as well as a mercury monitoring programme during decommissioning and waste management. These tools will enable regulators (IBAMA and the state agencies of Pernambuco, Rio de Janeiro and Sao Paulo) and companies to apply coherent procedures, while monitoring ensures accountability and compliance with legal standards, and early detection of risks. The component assumes active cooperation from environmental agencies and technical experts to adopt and update the guidance, and that authorities will use monitoring data to control environmental quality standards. In alignment with the Gender Action Plan (Appendix 5a), Component 1 will ensure gender mainstreaming through the inclusion of gender-responsive measures in the Good Practice Guide and national training activities. These will address the differentiated impacts of mercury exposure on women and men and promote balanced participation of female professionals (target ≥ 40%) in technical and monitoring roles. Participating companies will also be encouraged to adopt or strengthen gender equity and anti-harassment policies in their institutional frameworks.

Capacity-strengthening activities will integrate gender-responsive approaches, including training modules that address differentiated health risks for women and vulnerable groups, and guidance to regulatory bodies on mainstreaming gender equality within mercury-related policies and enforcement frameworks.

Component 2 updates and supports company decommissioning plans to incorporate BAT/BEP and contract service providers for the technology to recover mercury from contaminated equipment of chlor-alkali plants. Oversight by project consultants ensure compliance, while financial and legal responsibility for effective decommissioning remains with the companies. The assumption is that service providers are available and reliable, technologies efficient and that state agencies have capacity to supervise the decommissioning process. Gender considerations are integrated into this component through the development of communication materials and awareness-raising tools in accessible and inclusive formats for both women and men. Training, audits and on-site decommissioning activities will promote equitable participation of women in technical teams and will collect sex-disaggregated data to monitor gender participation and occupational exposure levels.

Training delivered under this component will deliberately promote women’s participation in technical operations and introduce gender-responsive worker-safety protocols in line with BEP for hazardous industrial environments.

Component 3 provides the necessary support for the proper interim storage, treatment, and final disposal of excess mercury, mercury recovered during the decontamination as part of Component 2, and seized mercury stockpiles are properly stored, treated and finally disposed of through project-contracted service providers, selected through competitive procurement in line with UN and GEF standards and compliance with Minamata Convention. The casual pathway is that clear specifications and effective oversight guarantee safe and timely treatment routes. The assumption is that qualified providers remain available and resources adequate for the proposed final treatment and disposal option. Gender mainstreaming will be ensured by mapping and promoting the participation of women and men in all mercury stabilization, transport, and disposal activities (mapping the gender distribution of workers involved). Occupational health and safety protocols will include gender-responsive measures, with particular attention to maternal and reproductive health. Sex-disaggregated participation data will be recorded to promote inclusiveness and equal benefit-sharing across the workforce involved.

Risk communication and safety procedures associated with interim storage, transport, and stabilization will include gender-responsive considerations to reduce differentiated exposure risks for workers and surrounding communities.

Component 4 provides results through knowledge management, communication and capacity building. By disseminating lessons, ensuring gender-responsive engagement, capacity building of key stakeholders such as MECC, IBAMA and state environment agencies, and fostering international cooperation with support from Global Mercury Partnership, the project creates conditions for replication. The assumption is that stakeholders engage actively, and institutional support and engagement is ensured. All communication, knowledge, and training activities will integrate gender-responsive design and delivery. Knowledge products and awareness campaigns will reflect women's and men's differentiated experiences and contributions, and targeted gender sessions will be included in workshops, webinars, policy dialogues, and South–South exchanges to promote learning and replication of gender-responsive practices across the mercury management sector.

Knowledge products generated under this component will systematically integrate gender perspectives, highlight women as agents of change in chemicals and waste management, and disseminate lessons on gender-responsive decommissioning and mercury-waste practices. Collaboration with the UNEP Global Mercury Partnership will facilitate South–South exchange on gender-inclusive approaches aligned with the Minamata Convention Gender Action Plan.

Component 1: Strengthening national capacity for managing hazardous chemicals facilities and mercury-contaminated materials.

Outcome 1: Institutional and technical capacity to oversee chlor-alkali mercury-cell decommissioning and ensure environmentally sound management of mercury and associated contaminated materials is strengthened.

This outcome addresses the lack of consistent technical guidance and institutional tools for the decommissioning of mercury-based chlor-alkali plants and mercury waste management in Brazil. While the three companies are responsible for carrying out the decommissioning, federal authorities (MECC, IBAMA) and the state environmental agencies (Pernambuco, Rio de Janeiro and Sao Paulo) require harmonized procedures, monitoring systems and normative technical frameworks to ensure compliance with Minamata and BAT/BEP. Technical experts and academic institutions will provide technical expertise and quality assurance. Outcome indicator & targets: 4 institutions applying harmonized protocols and monitoring systems (target: 4 by project end). Key stakeholders: MECC, IBAMA, state environmental agencies (PE, RJ, SP), companies, academic institutions. Assumptions: institutional ownership and endorsement of protocols. Risk: delays in regulatory uptake or fragmented enforcement.

Output 1.1: A good practice guide including policy recommendations for monitoring and managing the decommissioning of chlor-alkali mercury cells, mercury waste management and related potentially contaminated sites is available.

Activity 1.1.1: Organize an inception workshop.

During this event, global experiences will be shared with Brazilian key stakeholders on BAT/BEP for management and disposal of excess mercury and mercury waste from the phasing out of mercury cells from other chlor-alkali industry experiences. The Chlor-alkali and Mercury Waste Partnership Areas of the Global Mercury Partnership will be engaged and invited to this event and engaged throughout project implementation. This workshop will bring together MECC, IBAMA, state environmental agencies, the three companies, academia, and technical experts, drawing particularly on the experiences from Mexico (see synergies with GEF-funded project 10526). It will establish a shared baseline on best practices and technologies and introduce lessons learned that can inform the project's approach. This workshop will also incorporate a brief presentation of the Gender Action Plan (appendix 5a) to align stakeholders on gender-responsive engagement.

Activity 1.1.2: Elaborate and agree upon a guidance technical protocol for mercury collection logistics, interim storage, transport, stabilization and final disposal of mercury/mercury waste from industrial facilities.

Building on the inception phase, a technical protocol will be prepared and continuously updated throughout the project. It will combine international BAT/BEP with national experiences, providing a reference for regulators and operators. While non-binding, it will guide BAT/BEP aligned procedures for the decommissioning process including storage, transport, stabilization, and disposal of mercury wastes. Gender mainstreaming will be explicitly addressed by recognizing differentiated health and occupational risks for women and men and recommending measures for equal protection and participation. The protocol will also embed GAP recommendations on gender-responsive safety measures and inclusive participation

Output 1.2: A monitoring programme for emissions and releases from all sites is developed and implemented in agreement with key stakeholders and throughout the decommissioning process.

Activity 1.2.1: Develop a BAT/BEP-aligned programme to monitor mercury emissions and releases from the decommissioning of mercury cells, the management of excess mercury/mercury waste, interim storage, and equipment decontamination.

This programme will be developed jointly with key stakeholders such as MECC, IBAMA, state environmental agencies and the three companies. Drawing on international experiences (Mexico), it will cover mercury emissions and releases as well as occupational safety. Risk assessments will explicitly address women's vulnerability both in workplace and community contexts. This assessment will draw directly from GA findings to ensure gender-differentiated risk considerations.

Activity 1.2.2: Implement the programme to monitor mercury emissions and releases from the decommissioning of mercury cells, the management of excess mercury/mercury waste, interim storage, and equipment decontamination.

The monitoring plan (Appendix 15) will be implemented by project consultants during the decommissioning phase and include regular measurement campaigns, data analysis and semi-annual reports on progress and challenges to all stakeholders. Results will be used to identify risks, adjust practices, and ensure compliance with environmental and occupational safety standards. Academic partners will provide technical support while IBAMA and state agencies will integrate the results into regulatory oversight. Monitoring templates will integrate GAP sex-disaggregated indicators and gender-responsive reporting elements.

Component 2: Introducing BAT/BEP during environmentally sound decommissioning of mercury-cell chlor-alkali plants and decontamination of waste materials.

Outcome 2: Decommissioning of mercury-cell chlor-alkali facilities is carried out in accordance with BAT/BEP, ESM principles and Minamata requirements.

This outcome ensures that the decommissioning of mercury-cell facilities, executed under the legal and financial responsibility of the three companies, is aligned with BAT/BEP. Within this framework, specialized contractors will be engaged to carry out decontamination services, while federal and state authorities (MECC, IBAMA and the state environmental agencies) will maintain overall regulatory supervision. Outcome indicator & targets: 3 facilities completing mercury removal from contaminated equipment and initiating site remediation (target: 3). Key stakeholders: Companies, specialized contractors, IBAMA, MECC, and state environmental agencies. Assumption: companies apply BAT/BEP consistently. Risk: limited supervision capacity leading to non-compliance.

Output 2.1: BAT/BEP requirements integrated into companies site-specific decommissioning plans and regulatory oversight.

Activity 2.1.1: Assess the decommissioning plans elaborated by the companies, including soil, groundwater, and rubble remediation proposals, and propose the introduction of BAT/BEP measures to provide technical support for adjustments.

The three companies have already prepared their decommissioning plans which have been submitted to the related environmental authority. Under this activity, project consultants will review these plans, identify gaps, and recommend adjustments in line with BAT/BEP. The main findings will be communicated to the competent regulatory agencies to ensure that plans are consistent with environmental quality standards and Minamata obligations. Reviews will briefly check alignment with GAP gender-responsive workplace provisions.

Activity 2.1.2: Provide technical support and oversight to partner companies for the effective application of BAT/BEP during the implementation of the decommissioning plans, including recommendations of corrective measures.

During project implementation, technical consultants will accompany the companies to ensure that BAT/BEP recommendations are effectively applied. Oversight will include continuous monitoring, documentation of progress, and the proposal of corrective measures as needed. State agencies will also supervise compliance on-site, while MECC and IBAMA will retain overall regulatory oversight. Oversight will also verify that GAP measures related to inclusive participation and safety are considered.

An environmental licensing specialist will monitor these processes and support partner companies and licensing bodies, which include a prior Environmental Impact Assessment (EIA) containing the diagnosis and prior planning of solutions to avoid and minimize impacts on the biotic and social environment, as well as effective measures (which will be evaluated and approved by the competent bodies) for the safety of workers and the community. Public consultation is part of this process, and social demands, as defined by law, will be taken into account by the licensing body for the possible requirement of improvements in the projects.

In addition, the gender specialist will support the observance of gender equity also in the aspect of social participation in the environmental licensing process and will identify female leaders and specific demands.

Output 2.2: Contract for recovered mercury from contaminated equipment issued and overseen ensuring BAT.

Activity 2.2.1: Develop technical requirements (terms of reference) for the selection of a specialized service provider for BAT-aligned mercury recovery from contaminated equipment, including handling, separation, temporary storage, and transport preparation.

The tender will be based on an upstream survey by the companies on the scope and composition of contaminated materials, in line with international guidance (see Table 1)[1][1]. As this survey could not be completed during the project preparatory phase, it will be finalized during project inception phase. The permanence of technology and the related capacity building and knowledge transfer in Brazil beyond the project's duration will be a desirable differentiating asset for the proposals, and the judging criteria will score extra points for this hypothesis. The tender will also require contractors to apply gender-responsive occupational safety standards and to demonstrate compliance with all applicable insurance, permits, and regulatory clearances. Terms of reference will indicate GAP requirements on gender responsive OHS and sex-disaggregated staffing.

Activity 2.2.2: Select and contract a qualified service provider through international competitive procedures in line with GEF and UN procurement standards to implement the recovery of mercury from contaminated equipment and its preparation for transport for interim storage, treatment and final disposal.

Through international procurement procedures, the project will select and contract specialized service providers to carry out decontamination activities by consolidated Minamata compliant technology solutions (see Section A, in Figure 3). These contractors will handle, separate, and decontaminate mercury-contaminated chlor-alkali cell infrastructure and safely recover metallic mercury under controlled conditions, preparing it for transport to an interim storage unit or directly for stabilization treatment and final disposal, according to the project stage. Contractor reporting will include GAP sex-disaggregated participation data.

Activity 2.2.3: Provide technical support and oversight to ensure contractors apply BAT/BEP and that decontaminated residues are disposed of by companies in compliance with ESM standards.

Project consultants, together with IBAMA and state agencies, will monitor contractor performance and verify compliance with BAT/BEP. A particular focus will be the recovery of metallic mercury from decontamination, the volumes of which are estimated in Table 1. Consultants will support the identification of appropriate disposal solutions of this recovered mercury[2][2]. Oversight will also include facilitating communication between service providers and companies to ensure safe and efficient operations. Documentation of compliance will be made available to stakeholders to guarantee transparency. Oversight will track GA indicators related to gender-responsive safe provisions.

Component 3: Environmentally sound management, treatment, and final disposal of excess mercury and mercury waste.

Outcome 3: Up to 175 tons of metallic mercury are safely stored, transported, treated and disposed of through environmentally sound management options in line with the Basel Convention technical guidelines.

This outcome addresses the urgent need to ensure that excess mercury originating from the now-deactivated chlor-alkali electrolytic cells and precariously stored seized mercury stockpiles are transferred as quickly as possible to a suitable temporary storage location and subsequently sent for treatment through stabilization, solidification and environmentally safe final disposal, along with mercury waste recovered from decontamination activities carried out during decommissioning processes, all aligned with the requirements of the Minamata Convention and Basel Convention (should the export for treatment be the selected scenario).

This strategy will accelerate decommissioning processes, allowing for a rapid start to mercury recovery from equipment decontamination activities. This will also provide better security and monitoring conditions for mercury storage and reduce the costs of stabilization/final disposal services for the metal, which will be selected and contracted through international bidding, since the mercury will no longer be dispersed in chlor-alkali facilities and administrative units of public security agencies, but rather concentrated in a more accessible, adequate and secure location for the necessary logistical operations.

Federal authorities (MECC, IBAMA), the three chlor-alkali companies, and state environmental agencies will coordinate to ensure compliance with national and international standards, while the project team will provide oversight. Specialized service providers contracted through international procurement will carry out the technical operations of stabilization, export and/or final disposal. Outcome indicator & targets: 175 tons of metallic mercury stabilized and disposed (target: 175 tons). Key stakeholders: Specialized disposal contractors, MECC, IBAMA, state agencies, the three companies. Assumption: cooperation of partners and timely regulatory approvals. Risk: legal or logistical delays affecting disposal timelines.

Output 3.1: Excess mercury/mercury stockpiles are transferred to secure interim storage.

This output ensures the adoption of a comprehensive national strategy and operational framework for mercury stabilization, in line with the Minamata and Basel Conventions. The output will establish procedures for safe stabilization, packaging, and transport of mercury, define licensing pathways, and ensure full safeguard compliance through HSE planning and gender-responsive measures.

Activity 3.1.1: Develop technical requirements (terms of reference) for the selection of service providers to meet the needs for adequate temporary storage of metallic mercury (excess, waste recovered from decontamination and seized) and associated logistics.

A task force composed of experts and technicians from MECC, IBAMA, partner chlor-alkali companies, and consultants contracted by the project, in close contact with state environmental agencies, will assess the needs and options for the rapid transfer of metallic mercury already available at the start of the project (excess mercury and seized mercury) to a suitable interim storage status. This task will result in the identification of national sites that are already suitable or can be rapidly adapted for interim storage, meeting the requirements of the Minamata Convention and applicable national standards, and the generation of terms of reference for selection through a competitive process if there is more than one option. The assessment will include GAP based checks on gender-responsive safety and facility access.

Activity 3.1.2: Select and contract qualified service providers through competitive procedures in line with GEF and UN procurement standards to implement all needs of interim storage of metallic mercury and associated logistics.

Based on the results of activity 3.1.1., the selection and contracting of providers of goods and services necessary to ensure the safe interim storage of mercury will be carried out through competitive processes whenever feasible. Tender documents will reference GAP gender-responsive requirements where applicable.

Activity 3.1.3: Oversee the safe transfer of metallic mercury (excess, seized and recovered from equipment) to appropriate interim storage.

The transfer of mercury from its current temporary storage locations to a suitable interim storage facility will require support and monitoring to safely overcome logistical and bureaucratic challenges. This task is expected to unfold in at least four phases, beginning with the clearance of the regulatory requirements for each state, then transfer of excess mercury volumes from the chlor-alkali facilities that are already being prepared for this purpose, followed by handling seized mercury, and finally, handling mercury recovered from decontamination activities in the decommissioning processes. Semi-annual reports on storage safety conditions will be submitted. Monitoring will incorporate GAP sex-disaggregated data and gender-responsive HSE observations.

Output 3.2: Contract for the collection, transport, stabilization, solidification and disposal of excess, seized, and recovered mercury is issued and delivered in compliance with best international standards.

This output covers the tendering, contracting, and implementation of environmentally sound stabilization, solidification and disposal operations for mercury and mercury waste. Activities will include the procurement of specialized service providers, execution of stabilization and final disposal operations under validated HSE and safeguard frameworks, and independent monitoring of performance and compliance.

Activity 3.2.1: Conduct laboratory testing to verify the quality of metallic mercury (purity level) and identify potential challenges in complying with specifications for the future treatment and disposal route.

Accredited laboratories will conduct sampling and testing of mercury stocks to verify purity and compliance with specifications required for stabilization as cinnabar. This step is required by the service providers and is essential to avoid delays during implementation. To support these analyses and broader environmental monitoring requirements, the project will procure specialized equipment, including an ICP-MS single quadrupole, XRF analyzer, vapor mercury meter, and sampling equipment. This equipment will enable accurate measurement of mercury concentrations, support monitoring of emissions (ensuring minimal or zero fugitive releases), and facilitate independent verification by environmental authorities, as well as site contamination assessments. The equipment will be hosted and operated by the national reference laboratory (LEA-OM) during project implementation and will be permanently transferred to the institution upon project completion. This will ensure proper custodianship, long-term use, and sustainability of investments by strengthening national technical and analytical capacity in mercury monitoring and management.

Activity 3.2.2: Develop technical requirements (terms of reference) for the selection of service providers for collection, transport, stabilization and final disposal of excess mercury, mercury waste and seized mercury.

Project consultants will prepare comprehensive terms of reference specifying technical, environmental, and safety requirements for service providers. The TOR will cover all steps, including collection from temporary interim storage, preparation for transport, transport, and final treatment through stabilization, solidification and final disposal. Contractors must demonstrate compliance with all applicable insurance, permits and regulatory clearances and provide clear physical-financial schedules.

Activity 3.2.3: Select qualified service providers through competitive procedures in line with GEF and UN procurement standards to implement the collection from interim storage, transport, stabilization, and environmentally sound disposal of mercury.

The services necessary for the environmentally sound mercury solution (stabilization, solidification and final disposal, including associated logistical and bureaucratic solutions) will be selected and contracted through international bidding. Both domestic and international solution routes are considered acceptable a priori, and the solution time factor will be decisive in the choice. Selection criteria will also include safety, efficiency, and compliance with Minamata obligations. Services must include accident insurance coverage. The total volume of metallic mercury to be stabilized and disposed of will be known upon completion of the transfer process to the interim storage facility(ies) from where it will be collected.

The allocated budget under this activity (USD 7,500,000) covers the full chain of mercury management services. While detailed stockpile management plans will be finalized during implementation—given the need for coordination among relevant national and state authorities—the project will finance: (i) secure transport of mercury from originating sites to temporary/interim storage facilities; (ii) environmentally sound operation and management of interim storage; (iii) subsequent collection from interim storage, transport, stabilization (including solidification), and final disposal through compliant national or international routes; and (iv) recovery of mercury from contaminated equipment during decommissioning processes to ensure its full integration into the treatment and disposal pathway.

With respect to interim storage, the project allows flexibility regarding the selected storage solution, including the potential development or upgrading of national storage facilities if required. Regardless of the option selected, safe temporary storage within the country is a prerequisite and entails significant costs, including the provision of specialized containers, safety systems, and supporting infrastructure in line with international standards. The project also includes provisions to support in situ stabilization options, should this be selected as part of the overall mercury management strategy.

Gender-responsive provintisions will also be integrated, requiring contractors to adopt inclusive occupational and safety standards that account for the specific needs and vulnerabilities of both women and men workers. Contractors will also be required to provide risk communication materials that are gender-responsive, culturally appropriate and accessible to all workers.

Activity 3.2.4: Oversee the safe transfer of metallic mercury (excess, seized and recovered from equipment) to appropriate interim storage.

Project consultants, together with IBAMA and state environmental agencies, will oversee contractor operations, verify compliance with BAT/BEP, and monitor the integrity of collection, transport, stabilization and disposal processes. Oversight will also address the safe handling and final treatment of metallic mercury recovered from decontamination activities, which represents additional volumes beyond company companies' stocks.

Component 4: Knowledge management, communications and capacity building.

Outcome 4: Knowledge and capacity on the phase-out of mercury-cell chlor-alkali technology and mercury waste management is improved, consolidated and disseminated nationally and internationally in a gender-responsive and inclusive manner.

This outcome will focus on strengthening institutional knowledge and technical capacity for the phase-out of mercury-cell chlor-alkali technology and the management of mercury waste. Through targeted training, knowledge products and exchange initiatives, the project will enable at least eight institutions and entities to report on improved capacity on mercury management (including MECC, IBAMA, state environmental agencies, the three companies and others). Knowledge and lessons will be consolidated and shared through a minimum of five national and international forums or platforms, ensuring that experiences contribute to broader learning and replication. All activities will be implemented in a gender-responsive and inclusive manner to promote equitable participation and benefits.

To support the effective delivery of these outputs, dedicated consultants will be engaged under this component, including a communications and public relations expert, who will be responsible for coordinating and implementing knowledge management activities, developing communication products, and ensuring the timely dissemination of project results at national and international levels. During the project preparation phase, a detailed knowledge management (KM) plan could not be fully developed. To address this, the project will prioritize the preparation of a combined Communication and Knowledge Management Plan during the inception phase. This plan will provide a structured and systematic framework to identify key knowledge needs, target audiences, appropriate knowledge products, dissemination channels, and learning mechanisms. It will ensure that communication, training, and knowledge-sharing activities under this component are evidence-based, context-specific, and aligned with stakeholder needs, as well as UNEP and GEF knowledge management standards.

The UNEP Global Mercury Partnership is a voluntary multi-stakeholder initiative established in 2005 to address mercury emissions and their effects on human health and the environment. It comprises eight priority areas, including the chlor-alkali sector, through which it provides educational, financial, and technical resources to promote the adoption of alternative, mercury-free technologies. Much of the knowledge produced will also be relevant beyond Brazil and the chlor-alkali industry, particularly for entities managing other hazardous chemicals, and will be shared via the GMP through targeted meetings and international forums.

In line with the Gender Action Plan (Appendix 5a), all communication and knowledge activities will incorporate gender-responsive perspectives, ensuring that both women and men benefit equitably from capacity-building opportunities and contribute to the exchange of lessons learned under the Global Mercury Partnership framework. Outcome indicator & targets: At least 8 institutions strengthened (target: 8) and ≥5 national or international platforms where knowledge is shared (target: 5). Key stakeholders: MECC, IBAMA, state environmental agencies, companies, Global Mercury Partnership (GMP), academia, UNEP. Assumption: stakeholders engage actively and participate in trainings. Risk: staff turnover limiting institutional retention of knowledge.

Output 4.1: Communication and knowledge management strategy to support awareness, transparency, and gender-responsive engagement implemented.

<u>Activity 4.1.1</u>: Develop a Communication and Knowledge Management Plan during the inception phase.

This activity will define the project's systematic approach to knowledge generation, capture, dissemination, and use. The plan will identify priority knowledge products, learning objectives, target audiences (national regulators, industry, academia, communities, and international partners), appropriate formats and channels (e.g. guidance documents, online tools, trainings, workshops), and feedback mechanisms to support adaptive learning. It will also establish criteria for selecting the most effective mix of online and in-person capacity-building modalities, ensuring that subsequent activities are evidence-based, inclusive, and responsive to stakeholder needs. Gender-responsive and accessibility considerations will be integrated throughout the plan.

<u>Activity 4.1.2:</u> Implement a communication strategy to inform, raise awareness, and engage stakeholders, using adequate tools and accessible language in a gender-responsive and sensitive manner.

The project will implement an adaptive communication strategy aimed at the harmonious involvement of the various stakeholders with the project, taking into account the assumptions and criteria described in the Stakeholder Engagement Plan (Appendix 5b). The use of language and tools appropriate to diverse target audiences, along with a gender-responsive and sensitive approach, are central aspects of this communication and essential elements for its complete success. The communication tools and approaches will be implemented in accordance with the Communication and Knowledge Management Plan developed during the inception phase.

Developing and maintaining dedicated communication tools in line with UNEP standards is part of this task. A specific website will be developed and maintained to broadly share news, information and specific products, at the same time to provide a response mechanism to any stakeholders.

Output 4.2: Guidance to relevant national stakeholders in Brazil for the development of a safe process for decommissioning chlor-alkali mercury cells aligned with the Minamata Convention provided and internationally shared.

<u>Activity 4.2.1:</u> Contract technical support and capacity building on key elements of the mercury cells decommission and mercury storage & management as needed, including quality check of products and results of project.

The international experience on chlor alkali decommissioning and management of mercury could be decisive to guide Brazil throughout the project. Continuous communication and collaboration, provision of guidelines, and, if needed, referral of experts are key tools to overlap gaps. Furthermore, the quality of the products and the effectiveness of the results obtained could be verified by qualified international experts, if necessary.

Activity 4.2.2: Regularly coordinate with the UNEP Global Partnership for Mercury to disseminate knowledge and exchange information through its websites, tools and partners.

The prompt international sharing of experiences and support for the project's globally-focused activities (such as international selection processes) will be enhanced by the use of the GMP's well-established collaboration network. This will also ensure direct contact and collaboration with similar projects in other countries, such as Mexico, and may inspire nations that do not yet have defined solutions for mercury from their chlor-alkali plants (like Uruguay, Argentina, and Peru).

Output 4.3: Strategy for generating, disseminating, and sharing knowledge and capacity building implemented.

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This output will ensure that the technical knowledge generated across all project components is systematically captured, organized, and shared among national and international stakeholders in line with the Communication and Knowledge Management Plan developed during inception phase. It will consolidate lessons and good practices from the implementation of environmental monitoring systems, the application of BAT/BEP in decommissioning, and the development and execution of mercury disposal mechanisms.

Activity 4.3.1: Develop and disseminate short online training programme on priority topics relevant to mercury waste management.

Short online training courses are an efficient, inexpensive, and long-lasting solution for establishing and maintaining a minimum level of information accessible to a wide audience. The programme will target government institutions, industry representatives, and technical experts, focusing on best practices for environmentally sound storage, treatment, and disposal of mercury waste, in line with the Minamata Convention. This programme accessible free of charge on a public platform (such as IBAMA or FDET) will provide significant benefits for the country in terms of capacity building. The online format will ensure wide accessibility and support the long-term retention of knowledge across institutions and companies. The curriculum and course content will be developed by consultants specifically hired by the project team, based on the joint definition with key stakeholders of the objectives to be achieved and topics to be addressed. The selection of online delivery formats and topics will be guided by the Communication and Knowledge Management Plan, ensuring complementarity with in-person trainings and alignment with stakeholder learning needs.

Activity 4.3.2: Organize in-person training sessions for public agents and academia on various aspects environmentally sound management of mercury and industrial decommissioning.

An essential factor in this project is the development of national capacity to respond to contexts of actual, presumed or potential mercury contamination of sites and to manage control and solution measures efficiently and effectively. Special training sessions for representatives from national universities and state environmental agencies will enable immediate, high-level sharing of the knowledge generated, as well as the establishment of an information dissemination network. Priority topics will be defined in agreement with key stakeholders, and the content will be developed by the project team and specially hired consultants.

The sessions will strengthen practical skills and integrate gender-responsive occupational safety standards, case studies from international experience, and hands-on exercises to ensure participants can directly apply BAT/BEP in the Brazilian context.

Activity 4.3.3: Deliver one regional training focused on best practices for the chlor-alkali decommissioning and hazardous waste management, promoting South-South cooperation and exchange of experiences.

A regional knowledge exchange seminar targeted to Latin America to share experiences and challenges is both a way of directly sharing information and a source of inspiration for innovative solutions that could be applied within the project itself.

Activity 4.3.4: Hold a closure workshop to share project results and experiences with national and international stakeholders.

The workshop will highlight replicable good practices, including gender-responsive approaches to risk communication and occupational safety.

Sustainability, Ownership, and Exit Strategy

The project embeds a clear sustainability strategy to ensure long-term maintenance of results. Regulatory and technical guidance developed under Components 1 and 4 will be formally adopted by MMA, IBAMA, and state authorities, providing lasting frameworks for decommissioning, monitoring, interim storage, and disposal of mercury in line with Minamata and Basel requirements.

National and state institutions will receive targeted training in environmental monitoring, hazardous waste oversight, and contractor supervision, ensuring that technical capacities remain in-country and can be applied to future mercury waste streams, including those from ASGM enforcement actions.

Government ownership is ensured through leadership by MMA and IBAMA, continuous engagement of state agencies, and the participation of private-sector partners, who remain responsible for applying BAT/BEP and financing future waste handling obligations under national law.

The exit strategy relies on establishing a complete, operational workflow for mercury management during the project (interim storage, stabilization, transport, and disposal), while ensuring that post-project responsibilities are fully integrated into national regulatory mandates and industry compliance frameworks. Synergies with the Amazon Fund initiative on mercury chain control further support continuity of monitoring and enforcement after project completion.

Uncertain Futures

The project assumes that service providers can operate within Brazil's normative framework and obtain the necessary permits. Yet regulatory gaps persist, as there are no binding criteria for pre-treatment and stabilization of mercury waste, unclear classification of stabilized forms such as mercury sulphide (HgS), and no precedents for licensing treatment infrastructure. Technical guidance on mercury management, transport, storage, and disposal also remains insufficient. While safe handling is still possible, export for stabilization and disposal abroad may provide a mitigation option with greater certainty.

Another uncertainty concerns the timing gap between the disposal of bulk excess mercury and the mercury recovered during decontamination of plant infrastructure and equipment. This risk will be mitigated through contractual flexibility in the disposal arrangements for excess mercury, complemented by interim secure storage.

Services for the stabilize of excess mercury and the decontamination of contaminated cell infrastructure and equipment are likely to rely on technologies not yet available in Brazil and therefore, to be imported.

Enduring Outcomes

Sustainability will be achieved by institutionalizing technical guidance, embedding BAT/BEP into decommissioning practice, and applying innovative decontamination technologies for production sites with high contamination potential, especially those involving mercury. The project will help close regulatory gaps by integrating monitoring requirements into the decommissioning and waste management activities on the base of the acquired experiences thereby strengthening oversight and enforcement capacities of MMA, IBAMA, and state environmental agencies. By supporting national institutions and private operators in adopting harmonized procedures, the project will contribute to environmentally sound management of mercury waste to become standard practice beyond the project's lifetime.

The safe stabilization and final disposal of up to 175 tons of metallic mercury from the three remaining chlor-alkali installations and law enforcement entities will permanently eliminate a major source of mercury release in Brazil and reduce long-term environmental liability. This provides an enduring outcome with direct global environmental benefits, as one of the last large-scale industrial uses of mercury in Latin America will be phased out.

Replication and uptake will be supported at both national and regional levels. In Brazil, the technical protocols, monitoring programmes, and gender-sensitive communication tools developed under the project will be applicable to other hazardous industrial facilities requiring decommissioning and remediation. The alignment of procedures with international standards will also make the results relevant for other sectors managing mercury waste, including waste treatment facilities, laboratories, and small-scale industries such as lamp recyclers. Regionally, the project will share experiences through UNEP's Global Mercury Partnership, the Minamata Convention process, and structured South-South exchanges with Mexico (GEFID 10526) and other Latin American countries, ensuring that lessons and technologies are transferred.

The project also contributes to long-term institutional learning. By consolidating knowledge products and training programmes, it strengthens the technical base of regulatory authorities, laboratories, and academic institutions. These capacities will remain available to support future decommissioning projects in Brazil and the region. Engagement with private sector actors, including national and international technology providers further enhances the likelihood that proven technologies will be taken up commercially, supporting sustainability through market-based mechanisms.

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[1] Due to the limited time during the Project preparatory phase, this survey could not be completed thoroughly on time.

[2] Depending on the evolution of the project activities and implemented waste disposal solutions (see Component 3), the mercury recovered from decontamination of plant infrastructure could ideally be disposed of together with the excess mercury from the cell decommissioning. However, this situation represents an uncertain future (see section Uncertain Futures).

Institutional Arrangement and Coordination with Ongoing Initiatives and Project.

Please describe the Institutional Arrangements for the execution of this project, including financial management and procurement. If possible, please summarize the flow of funds (diagram), accountabilities for project management and financial reporting (organogram), including audit, and staffing plans. (max. 500 words, approximately 1 page)

The project will be implemented under the institutional framework of the Global Environment Facility (GEF), with the United Nations Environment Programme (UNEP) serving as the Implementing Agency (IA) and Fundação Educacional Ciência e Desenvolvimento (FECD) acting as the Executing Agency (EA). Oversight, coordination, and stakeholder engagement will be ensured through the Project Steering Committee (PSC) and a Technical Advisory Board (TAB), with the Ministry of Environment and Climate Change (MECC) serving as the lead government counterpart (see Figure 6).

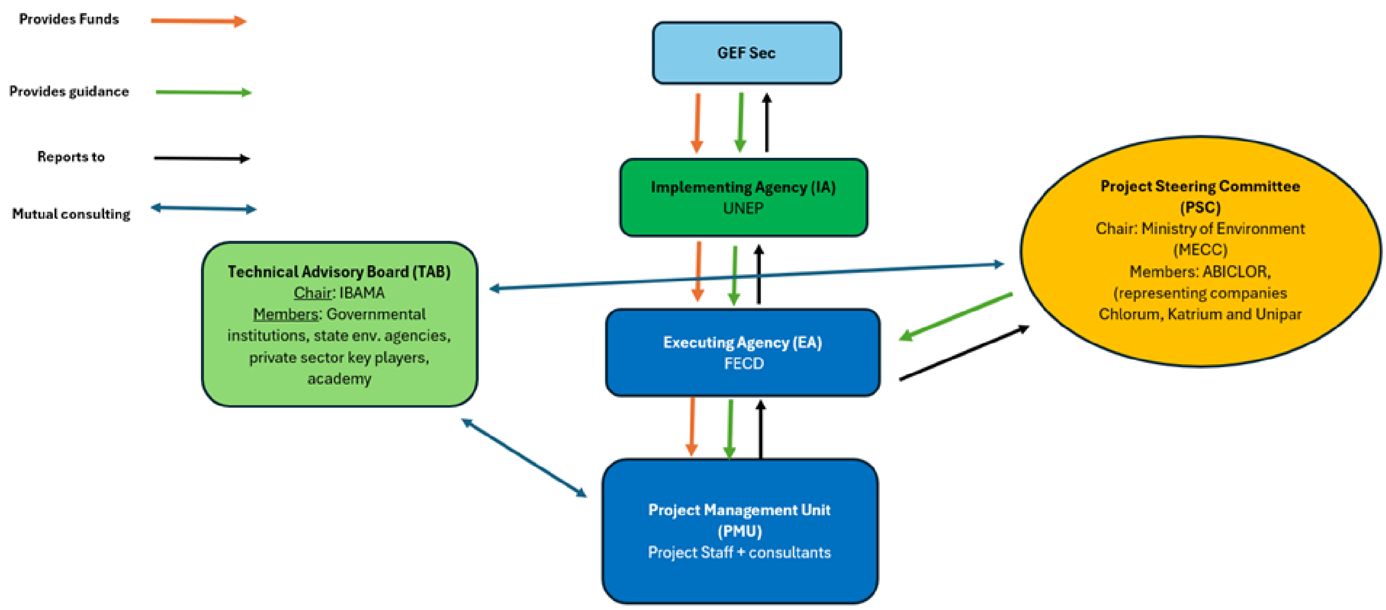

Figure 6: institutional arrangements

As the **Implementing Agency**, UNEP's GEF Chemicals and Waste Unit will provide overall project supervision. This encompasses technical and financial monitoring, quality assurance, and evaluation through quarterly and annual progress reports. UNEP will establish a Project Cooperation Agreement (PCA) with FECD, ensuring that disbursements align with approved annual expenditure forecasts, procurement plans, and work plans. UNEP will review and approve financial and progress reports, guarantee adherence to audit requirements, and report back to the GEF on project progress through PIRs, the MTR, and the TE. UNEP will also maintain regular communication with the Government of Brazil, the UNEP Brazil Office, and the UNEP Regional Office for Latin America and the Caribbean (ROLAC). Furthermore, UNEP will participate in the PSC, ensuring close coordination between international oversight and national execution.

The Global Mercury Partnership (GMP), a voluntary multi-stakeholder initiative led by UNEP, will be engaged and support knowledge dissemination. Its experience in the chlor-alkali and mercury waste partnership areas will reinforce synergies with the project and strengthen global outreach.

The **Executing Agency**, Fundação Educacional Ciência e Desenvolvimento (FECD), a Brazilian non-profit organization established in 1998 from the Federal University of Rio de Janeiro (UFRJ), serves as a mediator between the university and civil society, facilitating a range of initiatives that provide innovative solutions derived from the extensive knowledge and expertise of Brazil's academic and research institutions. Working closely with UFRJ's professors — who are among the leading experts in mercury contamination analysis in Brazil — FECD has the capacity to bring additional experts from other institutions when needed. It will manage day-to-day implementation of activities, financial administration, and human resources. Embedded within FECD, the Project Management Unit (PMU) will coordinate technical experts, consultants, and project staff under the leadership of a National Project Coordinator (NPC). The PMU will oversee activity execution, stakeholder engagement, knowledge management, and communication strategies, while also serving as PSC secretariat. FECD will be accountable to UNEP for ensuring timely delivery of outputs, outcomes, and sound financial management. It will hire project staff and consultants in line with the approved budget and submit progress and financial reports to UNEP, alongside annual work plans and procurement forecasts. In accordance with UNEP's partnership procedures, a Harmonized Approach to Cash Transfers (HACT) micro assessment will be undertaken to assess the financial management capacity of FECD — including accounting, procurement, reporting, and internal control systems — and determine its overall risk rating and assurance requirements. The assessment process, which includes a site visit and final report issuance, is currently ongoing and is expected to be completed before the start of project implementation. Where necessary, a capacity development plan will be implemented to strengthen specific areas identified through the assessment.

UNEP has extensive experience working with national research foundations, academic institutions, and technical agencies to deliver chemicals and waste projects in Latin America and globally. In Brazil, UNEP has collaborated with FECD and other similar entities through Minamata Initial Assessment activities, mercury inventories, analytical capacity assessments, and other GEF-supported initiatives, confirming FECD's capacity to manage complex scientific and regulatory tasks. UNEP's past engagement with these partners demonstrated their reliability in meeting fiduciary standards, coordinating multi-stakeholder processes, and ensuring compliance with UNEP's safeguards and procurement requirements.

This experience is complemented by UNEP's long-standing work with comparable executing partners where universities, research foundations, and public institutions successfully carried out environmental monitoring, and regulatory strengthening. These implementation models closely resemble the FECD-led approach envisioned for Brazil, providing a proven foundation for effective delivery.

UNEP will provide continuous quality assurance, fiduciary oversight, and technical supervision throughout implementation, ensuring that FECD and subcontracted service providers maintain compliance with GEF policies and Minamata Convention-related technical and environmental standards. Capacity development for FECD and government partners is embedded where needed—particularly for monitoring, laboratory procedures, regulatory enforcement, and hazardous waste oversight—ensuring that institutional capacities remain strengthened beyond the project's lifetime.

The Ministry of Environment and Climate Change (MECC) will act as the **primary government counterpart**, ensuring policy alignment and compliance with Brazil's obligations under the Minamata Convention. Leadership and regulatory oversight will rest with MECC and IBAMA – the latter being particularly responsible for managing stocks of seized mercury stored in regional superintendencies. MECC and IBAMA will be responsible for securing an interim storage facility including its construction (if needed), operation and liabilities. MECC which also hosts the national Minamata Convention focal point, will ensure policy coordination and alignment with Brazil's international commitments, while IBAMA will oversee national licensing and enforcement. At the subnational level, state environmental agencies (e.g., CETESTB in Sao Paulo, INEA in Rio de Janeiro, and CPRH in Pernambuco) will issue permits, monitor implementation, and ensure compliance locally. The Ministry of Finance, as GEF Operational Focal Point, will play a complementary role in facilitating government coordination.

The **Project Steering Committee (PSC)** will provide overall strategic direction, chaired by MECC and composed of key stakeholders, including UNEP, FECD, ABICLOR which include representatives from chlor-alkali companies (Chlorum, Katrium, Unipar Carbocloro). The PSC will endorse annual work plans and budgets, review progress, and provide guidance to ensure project objectives are met. Gender balance and inclusivity will be actively pursued, with a designated focal point overseeing the Gender Action Plan.

The **Technical Advisory Board (TAB)** will provide strategic guidance and technical oversight to ensure the project's success, drawing on expertise from key stakeholders and aligning activities with best practices and standards. Its members—confirmed during the inception phase and expanded as needed—will include IBAMA, the Global Mercury Partnership, MECC, state environmental agencies (CETESB, INEA, CPRH), municipal environmental secretariats, and selected NGOs and associations.

Finally, the private sector partners—Chlorum, Katrium, and Unipar Carbocloro—who also serve as the project's main co-financiers, will play a critical role in its implementation. They will undertake site evaluations, Provide access to site infrastructure, support mercury recovery and stabilization operations, finance technology conversion and decommissioning, and ensure safe mercury waste management. ABICLOR (Associação Brasileira da Indústria de Álcalis, Cloro e Derivados) will serve as a strategic facilitator for dialogues between private sector partners and regulators, supporting the harmonization of technical standards, disseminating best practices, and promoting sector-wide compliance with the Minamata Convention.

Through this multi-layered institutional arrangement, the project will combine global oversight, national ownership, and technical expertise, ensuring effective delivery of results and sustainability of outcomes.

Will the GEF Agency play an execution role on this project?

If so, please describe that role here and the justification.

Not applicable

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 (max. 500 words, approximately 1 page)

The chlor-alkali project in Brazil aims to collaborate closely with national partners, including federal and local governments, technical agencies, and the private sector, to plan joint activities at both national and local levels. The Ministry of Environment and Climate Change (MECC), IBAMA, state environmental agencies and private sector entities such as Chlorum, Katrium, Unipar Carbocloro will provide in-kind and investment support during project implementation. The project team will provide technical guidance to federal and state government bodies, including the National Chemical Safety Commission (CONASQ), focusing on addressing mercury pollution issues. The FSP project will closely coordinate with the Amazon Funded project implemented by IBAMA which is developing a computerized system and related logistics for tracking and managing mercury across the Legal Amazon. This coordination will ensure complementarity, particularly by using the FSP to address gaps in the safe disposal of mercury.

UNEP brings significant comparative advantage to the project. UNEP's extensive knowledge base on mercury management, derived from its leadership in global efforts such as the Global Mercury Partnership (GMP), positions it well to provide technical and strategic guidance for this project and contribute to and benefit from global knowledge sharing and alignment with the Minamata Convention. UNEP's involvement in previous mercury projects, such as the Minamata Initial Assessment (GEFID 5861), has built a robust information base, technical knowledge and strong global networks, enhancing coordination, knowledge sharing, and capacity building for mercury management. UNEP's deep expertise in guiding governments and private sector entities through complex environmental challenges ensures that this project will benefit from best practices and lessons learned globally.

The project will also integrate experiences from UNEP projects like 'Eliminate mercury use and manage mercury wastes in the chlor-alkali sector in Mexico' (GEFID 10526). Structured cooperation will involve exchange of lessons of BAT/BEP integration, monitoring and stakeholder engagement; joint South-South webinars under the coordination of the GMP; and the potential sharing of consultants and service providers. Both projects will contribute to a common repository of best practices and gender-responsive communication tools for replication across Latin America. Furthermore, the Brazilian project aims to strengthen regional information exchange and knowledge generation to support countries facing similar challenges from the chlor-alkali industry such as Argentina, Peru and Uruguay, building on previous GEF projects in Argentina (GEF ID 10094) and Colombia (GEF ID 6928).

Coordination during the project preparatory phase took place with established stakeholders in mercury waste management in the chlor-alkali sector, such as BATREC, Econ industries and TAUW. These will remain engaged during implementation to ensure alignment with BAT/BEP standards and access to specialized expertise. Consultations during the preparatory phase will continue with UNEP's Brazil Focal Point and Regional Office to identify additional collaboration opportunities for project implementation.

Core Indicators

Indicate expected results in each relevant indicator using methodologies indicated in the GEF-8 Results Measurement Framework Guidelines. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

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)	0	0	0	0
Expected metric tons of CO_2e (indirect)	53670	53670	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)	53,670	53,670		
Anticipated start year of accounting	2026	2026		
Duration of accounting	5	5		

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)				
Expected metric tons of CO_2e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

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)
340.00	275.00	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)
340.00	275.00		

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	3,400,000	3,400,000		
Male	3,000,000	3,000,000		
Total	**6,400,000**	**6,400,000**	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)

GEF Core Indicator 6: The calculation factor for CO2 was estimated by the Industry Association on energy efficiency of membrane technology compared to mercury cells over 1 year for a 100,000-chlorine production unit plant (0.283 MtonCO2-Eq/MWh). All companies involved will convert their mercury electrolytic cells to membrane technology. The reduction in energy consumption was calculated considering the average energy efficiency of the installed capacity of the mercury cells (3,700 kWh/ton) compared to the projected energy efficiency of the membrane technology (2,500 kWh per ton of chlorine produced), as reported by companies.

GEF Core Indicator 9: based on the amount of 175 tons of estimated excess mercury/mercury waste informed by involved companies (including approximately 2 tons of mercury held by law enforcement institutions) – all this mercury will be permanently disposed by the project. Additionally, the partner chlor-alkali plants jointly consumed an average of 20 tons of mercury per year before their electrolytic cells were shut down. Since this project’s co-financing supports the ongoing technological transition process and allows for the elimination of mercury use, an additional GEB of 100 tons of reduction of Hg consumption that will no longer be required over the project's duration was considered (5 years x 20 tons).

GEF Core Indicator 11: The number of direct beneficiaries corresponds to the number of inhabitants of the municipalities in which the mercury using facilities are located, according to estimates for 2022 from Brazil's official statistical body (IBGE – Brazilian Institute of Geography and Statistics). Therefore, a total of 6,438,895 individuals (2,991,866 men and 3,447,029 women) was estimated based on the aggregation of the population of Cubatão, Igarassú, and Rio de Janeiro. Within this population, 891 workers are included from the three facilities (160 women and 731 men).

Key Risks

	Rating	Explanation of risk and mitigation measures
CONTEXT		
Climate	Low	Extreme weather conditions affect project activities and related infrastructure. Likelihood: Low; Impact: Moderate Climate-related events may damage roads and bridges, delaying the transport of mercury to hubs and treatment facilities. Ports and maritime transport used in case of export are especially vulnerable to floods, storms and extreme heat. Mitigation measures: Logistics will be designed with resilient routes and alternatives. Coordination with local authorities will ensure contingency measures are in place for emergency response.
Environmental and Social	Moderate	Environmental and social impacts may arise as a result of project activities. Likelihood: Low; Impact: Moderate Accidents during handling, storage and/or expert of mercury could occur. Risk of theft and diversion remain present. Communities may be exposed to health impacts. Women may be excluded from decision-making. Mitigation measures: An environmental and social management framework (ESMF) will guide safeguards monitoring. Service contracts will include chain-of-custody protocols, security arrangements and gender-responsive activities. A gender action plan has been developed to ensure gender mainstreaming across project activities.
Political and Governance	Moderate	Changes in government priorities or institutions may delay approvals and weaken enforcement, affecting permits for contractors and service providers. Likelihood: Moderate; Impact: Moderate Shifts in government priorities and/or competent institutions on state level could negatively influence approvals, or weaken enforcement, affecting permits for contractors and service providers. Mitigation measures: Continuous dialogue with MECC, IBAMA and state authorities will secure political alignment over the election period at the end of 2026. An independent executing team (EA) will reduce sensitivity to political turnover. Periodic reporting and high-level engagement will maintain commitment.
INNOVATION		
Institutional and Policy	Moderate	Regulatory gaps in mercury storage, disposal and decontamination services may discourage providers. Likelihood: Moderate; Impact: Moderate Gaps in the regulatory framework for mercury disposal (especially for stabilization and national disposal) and for contracted decontamination services may discourage providers or delay licensing. Mitigation measures: Early engagement with authorities will clarify rules and streamline procedures. National practices and guidance will be aligned with Basel and Minamata requirements. Regulatory

		facilitation will be included in project arrangements to give service providers legal certainty.
Technological	Moderate	Limited contractor engagement and potential loss of technical know-how after contract completion. Likelihood: Moderate; Impact: Moderate Contractors may hesitate to bring BAT to Brazil Mitigation measures: Tendering conditions will include obligations for best technology and will require a business plan to support long-term availability of services in Brazil. Coordination with relevant ministries will be pursued to support the potential creation of such a facility.
Financial and Business Model	Moderate	Uncertainty over mercury interim storage, disposal and decontamination costs combined with regulatory gaps may deter service providers and delay implementation. Likelihood: Moderate; Impact: Moderate The costs of mercury interim storage, disposal and decontamination are uncertain. A feasibility study has provided initial estimates, but costs require updating during inception before tendering. Brazil may be perceived as high-risk environment for service providers due to regulatory gaps. Mitigation measures: Early engagement with competent federal and state authorities will address regulatory uncertainties. Tendering documents will specify clear pricing structures, indexed adjustments, and performance-based payments to reduce financial exposure for providers.
EXECUTION		
Capacity	Moderate	Delays or limited capacity among companies and national institutions in implementing interim storage and, releasing mercury from industrial custody to storage and waste disposal and, approving decommissioning plans, and managing contracts could affect timely implementation. Likelihood: Moderate; Impact: Moderate Implementation depends on timely management and release of mercury from chlor-alkali facilities and on companies' compliance with approval of decommissioning plans. Delays or insufficient cooperation from industries could affect the work plan. National institutions have limited experience with technical oversight, though UNOPS or a similar institution will manage large-procurement contracts. Mitigation measures: A HACT assessment to identify capacity gaps and related recommendations of FECD is underway. Close coordination with chlor-alkali companies will ensure alignment with decommissioning schedules and work plan milestones. Clear obligations for timely provision of mercury and cooperation will be formalized in agreements with the industry. UNOPS will manage large procurement and contracting to ensure compliance with international standards. FECD may contract specialized experts for contract management if necessary.
Fiduciary	Low	Mismanagement of funds and delays in co-financing materialization. Likelihood: Low; Impact: Moderate Mitigation measures: GEF and UNEP fiduciary procedures will be strictly applied and monitored at all times. Independent audits will be conducted annually. Co-financing commitments will be monitored and reported annually.

Stakeholder	Moderate	Lack of engagement and commitment of specific stakeholders affect project outcomes Likelihood: Moderate; Impact; Moderate Chlor-alkali companies may regard decommissioning and decontamination costs as unpredictable. State environmental agencies could delay approval of decommissioning plans due to uncertainties of mercury disposal solutions. Interim storage sites are not identified and made available in a timely manner. Local communities may distrust mercury management activities. Mitigation measures: A stakeholder engagement plan will promote inclusive dialogue and transparency. MECC, IBAMA and State agencies will be involved at the outset to provide regulatory clarity on interim storage and final disposal. Private sector engagement will be supported through incentives such as liability reduction and energy efficiency gains. Early and continuous communication with communities will build trust and ensure participation.
Other	Moderate	Uncertain futures may impact project outcomes. Likelihood: Low; Impact: High International market or transport disruptions could delay delivery of services. Mitigation measures: Secure interim storage will cover potential gaps. Security protocols will prevent diversions.
Overall Risk Rating	Moderate	The overall risk of achieving outcomes is considered moderate. Most risks related to regulatory clarity, financial feasibility, and cooperation of industries, but these can be effectively managed through strong engagement with authorities, transparent contracting and stakeholder participation. With these measures in place, residual risks remain manageable and do not threaten project delivery.

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

Explain 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.

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.

Confirm if any country policies that might contradict with intended outcomes of the project have been identified, and how the project will address this. (max. 500 words, approximately 1 page)

The project aligns with the **GEF-8 Chemicals and Waste Programming Directions**[1][3] by tackling mercury pollution and advancing the sound management of chemicals and waste. It contributes directly to its three strategic objectives: a) strengthening enabling environments for sound chemical management; b) preventing future build-up of hazardous chemicals and waste; and c) eliminating hazardous chemicals and waste.

The project has the potential to contribute to multiple **Sustainable Development Goal (SDG)** targets including 3.9 (reducing illnesses from hazardous chemicals and pollution), 9.4 (upgrading industries for sustainability) and 17.6 and 17.7 (promoting partnerships for environmentally sound technologies).

Furthermore, the project will support Brazil's **UN Sustainable Development Cooperation Framework 2023-2027**[2][4], notably: Axis 3 (Environment and Climate Change): Strengthening Brazil's actions on climate change mitigation, disaster risk reduction and protection of vulnerable communities, and Axis 4 (Governance and Institutional Capacities): Enhancing governance and institutional coordination, promoting human rights and increasing transparency, participation and innovation.

The project is aligned with **UNEP's Medium-Term Strategy (MTS) 2022–2025** and its Programme of Work (PoW) 2022–2023. It directly contributes to Outcome 3A, which seeks to optimize human health and environmental benefits through stronger capacity and leadership in the sound management of chemicals and waste, and Outcome 3C, which focuses on reducing pollutant releases to air, water, soil, and the ocean. Specific contributions will be made to outcomes 3.1, 3.2, 3.5, 3.9, 3.10, and 3.13[3][5]. In addition, the project supports the broader 'Pollution and Health' Programme Coordination Project (PCP).

Importantly, the project supports the implementation of the **Minamata Convention on Mercury**, particularly Articles 3 (mercury supply and trade), Article 5 (Manufacturing processes in which mercury or mercury compounds are used), 8 (emissions), 9 (releases), 10 (interim storage) and 11 (waste). Since Brazil ratified the Convention in 2017, the project will support its compliance by addressing mercury from the chlor-alkali sector, mitigating long-term pollution and related risks.

At the national level, the project is consistent with several strategies and frameworks including the **National Solid Waste Policy (PNRS**[4][6]**)**, and the **National Environmental Policy (PNMA**[5][7]**)**. It also aligns with the **Ministry of Environment Strategic Planning (2024–2027**[6][8]**)**, which emphasizes responsible chemical management and hazardous waste disposal.

The project will contribute to policy coherence by aligning with existing national, state, and municipal regulations, including Brazil's broader environmental laws and policies. This ensures that the project's interventions are aligned with both national and local legislative frameworks, which is critical for its smooth implementation. Additionally, it will support Brazil's industrial growth by promoting sustainable practices, contributing to the country's long-term development goals, and reinforcing Brazil's leadership in environmental governance on the international stage.

Finally, the project complements regional efforts to address mercury use in the chlor-alkali sector. The project not only strengthens Brazil's response but also generates knowledge and practices that can benefit regional neighbors such as Argentina, Peru and Uruguay, while reinforcing cooperation through initiatives like the **UNEP Global Mercury Partnership**.

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[1] GEF (2022). GEF-8 Programming Directions. Available here: https://www.thegef.org/sites/default/files/documents/2022-04/GEF_R.08_29_Rev.01_GEF8_Programming_Directions.pdf

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[2] UN (2024). United Nations Sustainable Development Cooperation Framework (2023-2027). Available at: https://brasil.un.org/

[3] 3.1: Enhanced capacity of countries to implement environmental policies and management practices.3.2: Strengthened institutional frameworks and governance structures for environmental sustainability. 3.5: Improved management of chemicals and waste to minimize adverse impacts on human health and the environment.3.9: Increased integration of environmental considerations into national development planning and decision-making processes.3.10: Enhanced public awareness and participation in environmental governance.3.13: Strengthened partnerships and collaborations among stakeholders for effective environmental management.

[4] https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm

[5] https://www.planalto.gov.br/ccivil_03/leis/l6938.htm

[6] https://www.in.gov.br/en/web/dou/-/portaria-gm/mma-n-1.012-de-11-de-marco-de-2024-547759659

D. POLICY REQUIREMENTS

Gender Equality and Women's Empowerment

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

Yes

1) Does the project expect to include any gender-responsive-measures to address gender gaps or promote gender equality and women's empowerment?

Yes

If the project expects to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment, please indicate in which results area(s) the project is expected to contribute to gender equality:

Closing gender gaps in access to and control over natural resources;

Improving women's participation and decision-making; and/or

Yes

Generating socio-economic benefits or services for women.

Yes

2) Does the project's results framework or logical framework include gender-sensitive indicators?

Yes

Stakeholder Engagement

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

Yes

Select what role civil society will play in the Project

Consulted only;

Member of Advisory Body; Contractor;

Co-financier; Yes

Member of project steering committee or equivalent decision-making body ; Yes

Executor or co-executor; Yes

Other (Please explain)

Private Sector

Will there be private sector engagement in the project?

Yes

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

Yes

Environmental and Social Safeguards

We confirm that we have provided information regarding Environmental and Social risks associated with the proposed project or program, including risk screenings/ assessments and, if applicable, management plans or other measures to address identified risks and impacts (this information should be presented in Annex E).

Yes

Please provide overall Project/Program Risk Classification

Overall Project/Program Risk Classification

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate	Medium/Moderate		

E. OTHER REQUIREMENTS

Knowledge management

We confirm that an approach to Knowledge Management and Learning has been clearly described during Project Preparation in the Project Description and that these activities have been budgeted and an anticipated timeline for delivery of relevant outputs has been provided.

Yes

Socio-economic Benefits

We confirm that the project design has considered socio-economic benefits to be delivered by the project and these have been clearly described in the Project Description and will be monitored and reported on during project implementation (at MTR and TER).

The project will generate significant socioeconomic gains by addressing mercury risks in the chlor-alkali sector. Safe management and final disposal of mercury will reduce liabilities for companies and government, while lowering health risks for surrounding communities and workers.

Job opportunities will be created in decommissioning, decontamination, waste management, and environmental monitoring, while capacity-building activities will enhance technical skills, strengthening long-term employability in green industries. Local service providers and contractors will benefit from demand for specialized technologies and infrastructure, stimulating innovation and investment in safer industrial practices.

In addition, improved regulatory compliance and alignment with the Minamata Convention will help enhance Brazil's environmental governance. By preventing mercury emissions and releases from chlor-alkali facilities, the project safeguards local communities, ensuring sustainable economic and social development.

ANNEX A: FINANCING TABLES

GEF Financing Table

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 ($)
UNEP	GET	Brazil	Chemicals and Waste	Mercury	Grant	12,000,000.00	1,080,000.00	13,080,000.00
Total GEF Resources ($)						**12,000,000.00**	**1,080,000.00**	**13,080,000.00**

Project Preparation Grant (PPG)

Was a Project Preparation Grant requested?

true

PPG Amount ($)

200000

PPG Agency Fee ($)

18000

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	PPG($)	Agency Fee($)	Total PPG Funding($)
UNEP	GET	Brazil	Chemicals and Waste	Mercury	200,000.00	18,000.00	218,000.00
Total PPG Amount ($)					**200,000.00**	**18,000.00**	**218,000.00**

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**

Focal Area Elements

Programming Directions	Trust Fund	GEF Project Financing($)	Co-financing($)
CW-2	GET	12,000,000.00	274106856
Total Project Cost		**12,000,000.00**	**274,106,856.00**

Confirmed Co-financing for the project, by name and type

Please include evidence for each co-financing source for this project in the tab of the portal

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Private Sector	Chlorum Solutions	In-kind	Recurrent expenditures	77720000
Civil Society Organization	Fundação Educacional Ciência e Desenvolvimento (FECD)	In-kind	Recurrent expenditures	25185

Private Sector	Unipar	In-kind	Recurrent expenditures	105550000
Private Sector	Katrium	In-kind	Recurrent expenditures	66254875
Recipient Country Government	Ministry of Environment and Climate Change (MECC)	In-kind	Recurrent expenditures	1907561
Recipient Country Government	Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA)	In-kind	Recurrent expenditures	346585
Others	Laboratório de Estudos Ambientais Olaf Malm (LEA-OM)	In-kind	Recurrent expenditures	8150200
Private Sector	Katrium	Grant	Recurrent expenditures	14152450
Total Co-financing				**274,106,856.00**

Please describe the investment mobilized portion of the co-financing

Investment mobilized under the project is primarily driven by private-sector capital investments and in-kind contributions from the three chlor-alkali companies (Chlorum Solutions, Katrium Indústrias Químicas S.A., and Unipar Carbocloro S.A.) directly affected by the Minamata Convention phase-out requirements. Collectively, these companies are mobilizing over USD 240 million in cash investments to convert mercury-cell technology to membrane technology, financed independently and implemented in parallel with the GEF project. In addition, they provide substantial in-kind co-financing through workforce allocation, equipment, facilities, internal waste management services, and the delivery of excess metallic mercury for environmentally sound management and disposal. Complementary in-kind contributions from FECD and UFRJ/LEA-OM support project implementation through specialized technical expertise, laboratory capacity, monitoring, and institutional infrastructure. Together, these investments represent concrete, measurable expenditures that enable Minamata compliance, while the GEF grant strategically addresses remaining technical, regulatory, and environmental sound management gaps.

ANNEX B: ENDORSEMENTS

GEF Agency(ies) Certification

GEF Agency Type	Date	Project Contact Person	Phone	Email
GEF Agency Coordinator	12/18/2025	Ms Kelly West		kelly.west@un.org
Project Coordinator	12/16/2025	Mrs Eloise Touni		eloise.touni@un.org

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

Please attach the Operational Focal Point endorsement letter(s) with this template.

Name of GEF OFP	Position	Ministry	Date (MM/DD/YYYY)
Ms. Livia Farias Ferreira de Oliveira	General Coordinator for Sustainable Finance	Ministry of Finance	9/2/2024

ANNEX C: PROJECT RESULTS FRAMEWORK

Please indicate the page number in the Project Document where the project results and M&E frameworks can be found. Please also paste below the Project Results Framework from the Agency document.

Document can be located as Annex C - Project Results Framework

Project 11697: Environmentally sound management and disposal of excess mercury and mercury waste from removing mercury electrolytic cells in Brazil's chlor-alkali sector (Chlor-Alkali Brazil)							
Project Objective	**Objective level indicators**	**Baseline**	**Targets and Monitoring Milestones**	**Means of verification**	**Assumptions & Risks**	**UNEP MTS Relevant PoW) Outcoes**	**Relevant SDG target(s) and indicators****
To reduce negative environmental and social impacts caused by mercury and mercury wastes from the chlor-alkali sector and other stocks of obsolete metallic mercury in Brazil	Amount of mercury disposed of or avoided from release into the environment through environmentally sound management measures (GEF Core Indicator 9.2)	0 tonnes	Mid-Point: 100 tonnes End-Point: 275 tonnes	Certified disposal reports, contractor documentation, IBAMA validation	A: The recovered and excess mercury is suitable for treatment and disposal within project timeframe. R: Delays in procurement or legal clearance may affect disposal rates.	3.9	SDG 3 (T 3.9/ I 3.9.3) SDG 5 (T 5.1/I 5.1.1 & T 5.5 / I 5.5.2) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4/I 12.4.
	Number of decommissioned mercury-cell chlor-alkali sites for which project-supported measures have eliminated the risk of mercury releases and residual liability (as verified by competent authorities) (GEF Core Indicator 9.5)	0 sites	Mid-Point: 1 site End-Point: 3 sites	Environmental monitoring reports, site audit documentation, regulatory sign-off	A: Companies comply with decommissioning timelines, legal requirements and BAT/BEP standards. R: Delays in approval, licensing, or verification by authorities; unforeseen contamination requiring extended remediation.	3.9 3.11	

	Number of individuals benefited by risk elimination provided by project	0 individuals	Mid-Point: 3.2 million (1.7 F/1.5 M) End-Point: 6.4 million (3.4 F/ 3.0 M)	Environmental monitoring reports, site audit documentation, contractor's stabilization / disposal reports/certificates	A: Disposal operations effectively interrupt emissions & releases pathways: environmental monitoring confirms reduction in exposure risk; companies comply with decommissioning timelines; regulatory approvals for mercury transport and disposal are granted on schedule. R: Delays in contracting the disposal provider (delayed elimination exposure); accidental release during transport or stabilization	3.9 3.11	1 & 12.4.2.b – T 12.6/I 12.6.1) SDG 17 (T 17.16 /I 17.16.1)

Outcome/ Output	**Indicator**	**Baseline**	**Targets and Monitoring Milestones**	**Means of Verification**	**Assumptions & Risks**	**Relevant PoW Outcome(s) and indicator(s)**	**Relevant SDG target(s) and indicators**
Component 1: Strengthening national capacity for managing hazardous chemical facilities and mercury-contaminated materials							
Outcome 1: Institutional and technical capacity to oversee chlor-alkali mercury-cells decommissioning and ensure environmentally sound management of mercury and associated contaminated materials is strengthened[1]9	1. Number of national and state institutions strengthened by applying harmonized protocols and monitoring systems for mercury-cell decommissioning and ESM of mercury (UNEP CW Unit Outcome Indicator 10)	0 institutions	Mid-Point: 2 institutions End-Point: 4 institutions	Directives, norms and instructions proving institutionalized use of guidance and recommendations MoV will include sex-disaggregated	A: Institutional ownership and legal endorsement of protocols is achieved; companies are sufficiently qualifying to implement them; A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities.	3.5	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/ I

				participation records for all project activities (trainings, consultations, monitoring missions, stakeholder dialogues).	R: Lack of enforcement mandate or delays in regulatory action hinder uptake. R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.		8.8.1) SDG 12 (T 12.4 / I 12.4.1
	2. Number of institutions formally referencing or using technical protocol procedures (UNEP CW Unit Outcome Indicator 8)	0 institutions	Mid-Point: 2 institutions End-Point: 4 institutions	Official version of the technical protocol document; stakeholder validation records (e.g. meeting minutes, approvals); dissemination reports. MoV will include sex-disaggregated participation records for all project activities (trainings, consultations, monitoring missions, stakeholder dialogues).	A: IBAMA, MECC, State Agencies actively engage in the drafting and validation process. International BAT/BEP guidance can be adapted to Brazilian context. A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities. R: Divergencies among key stakeholders may delay consensus. Lack of legal clarity on non-binding guidance may limit institutional uptake. R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.	3.1	SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1)
Output 1.1. A good practice guide, including policy recommendations, for monitoring and managing the decommissioning of chlor-alkali mercury cells, mercury waste management, and related potentially contaminated sites is developed and made available.	Indicator 1.1.1. Technical protocol published and disseminated (UNEP CW Unit Indicator 3.2)	0 protocols	Mid-Point: 1 draft developed End-Point: 1 document developed and disseminated	Final technical protocol, publication records, meeting minutes, citations in institutional procedures	A: Stakeholders are engaged, cooperative and validate the guidance. R: Institutional resistance or legal fragmentation may hinder guide dissemination	3.1	SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1)

Output 1.2. A monitoring programme for emissions and releases from all sites is developed and implemented in agreement with key stakeholders and throughout the decommissioning process.	Indicator 1.2.1. Number of site-specific monitoring protocols and reporting templates developed and formally approved by competent authorities (UNEP CW Unit Indicator 9.1)	0 site specific monitoring protocols	Mid-Point: 1 monitoring protocol End-Point: 3 monitoring protocols	Protocols and approval documents issued by environmental authorities (IBAMA and state environmental agencies) and companies	A: Monitoring methodologies from BAT/BEP and GMP can be adapted to site-specific conditions. State environmental agencies approve protocols R: Technical disagreements may delay finalization.	3.5	SDG 3 (T 3.9/I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4/I 12.4 – T 12.6/I 12.6.1)
	Indicator 1.2.2. Number of monitoring measurement campaigns conducted (UNEP CW Unit Indicator 2.1)	0 monitoring campaigns	Mid-Point: 2 monitoring campaigns End-Point: 4 monitoring campaigns	Protocols and monitoring reports (internal documents) submitted by IBAMA, ECC, and state agencies, campaign logs.	A: Institutions allocate staff and equipment. R: Logistical or safety constraints at decommissioning sites may disrupt monitoring timeline.	3.5	SDG 3 (T 3.9/I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4/I 12.4 – T 12.6/I 12.6.1)
Component 2: Introducing BAT/BEP during environmentally sound decommissioning of mercury-cell chlor-alkali plants and decontamination of waste materials							

Outcome 2: Decommissioning of mercury-cell chlor-alkali facilities is carried out in accordance with BAT/BEP, ESM principles and Minamata requirements[2]10.	1. Number of facilities that complete their processes of mercury removal from contaminated equipment and initiate site remediation (UNEP CW Unit Outcome Indicator 2)	0 facilities	Mid-Point: 2 facilities End-Point: 3 facilities	Technical reports, field inspections, MoV will include sex-disaggregated participation records for all project activities (trainings, consultations, monitoring missions, stakeholder dialogues).	A: Partners apply BAT/BEP standards consistently. A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities. R: Limited supervision may allow non-compliance. R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4 – T 12.6 /I 12.6.1)
	2. Total volume of mercury (tons) avoided through decommissioning process (UNEP CW Outcome Indicator 1)	0 tonnes	Mid-Point: 50 tonnes End-Point: 100 tonnes	Technical reports; Decommission reports MoV will include sex-disaggregated participation records for all project activities (trainings, consultations, monitoring missions, stakeholder dialogues).	A: Decommissioning process is conducted in a timely manner and mercury is no longer used by the industry. A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities. R: Limited supervision may allow non-compliance; R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4 – T 12.6 /I 12.6.1)

Output 2.1: BAT/BEP requirements integrated into companies site-specific decommissioning plans and regulatory oversight.	Indicator 2.1.1. Number of decommissioning plans reviewed and adjusted to include BAT/BEP (UNEP CW Unit Indicator 3.2)	0 plans	Mid-Point: 1 decom-missioning plan End-Point: 3 decom-missioning plans	Technical review documentation; meeting minutes; feedback to companies	A: Plans are available and timely. R: Lack of transparency and access to plans or cooperation by companies and control agencies	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1 T 12.6 /I 12.6.1)
	Indicator 2.1.2. Percentage of site-specific BAT/BEP including operational safety recommendations implemented during execution	0% of site-specific BAT/BEP	Mid-Point: 50% of site-specific BAT/BEP End-Point: 100% of site-specific BAT/BEP	Implementation tracking and field observation reports	A: Implementation windows after submission of official decommissioning plans allow adjustments. R: Timeline pressure may lead to omissions.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1 T 12.6 /I 12.6.1)
Output 2.2: Contract for recovered mercury from contaminated equipment	Indicator 2.2.1. Percentage of mercury-contaminated equipment	0% of mercury contaminated equipme	Mid-Point: 30% of mercury contami	Decontamination and recovery records; contractor	A: Contractors meet technical and regulatory requirements and approvals from authorities	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I

issued and overseen ensuring BAT.	decontaminated using BAT-compliant technology	nt decontaminated.	nated equipment decontaminated End-Point: 100% of mercury contaminated equipment decontaminated	performance reports	R: Shortage of certified treatment capacity delays processing and recovery.		3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1 T 12.6 /I 12.6.1)
	Indicator 2.2.2. Number of tons of mercury recovered from contaminated equipment, managed under ESM and forwarded to interim storage/treatment (UNEP CW Unit Indicator 1.3)	0 tonnes	Mid-Point: 10 tonnes recovered End-Point: ≥20 tonnes recovered	Contractor reports; transport logs; interim storage/treatment acceptance reports	A: Contractors meet technical requirements and regulatory approvals. R: Shortage of certified disposal solution resp. capacity delays processing and recovery.	3.1; 3.9; 3.11	SDG 3 (T 3.9/I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1 T 12.6 /I 12.6.1)
Component 3: Environmentally sound management, treatment, and final disposal of excess mercury waste							

Outcome 3: Up to 175 tons of metallic mercury are safely stored, transported, treated and disposed of through environmentally sound management options in line with the Basel Convention technical guidelines[3]11.	1. Total volume of mercury (tons) safely stabilized and disposed under project-supported operations (UNEP CW Unit Outcome Indicator 1)	0 tonnes	Mid-Point: 100 tonnes of mercury End-Point: 175 tonnes of mercury	Contractors' reports; disposal confirmation reports MoV will include sex-disaggregated participation records for all project activities (trainings, consultations, monitoring missions, stakeholder dialogues).	A: Partners cooperate in full management and final destination of mercury. A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities. R: Legal or procedural disputes delay the liability resolution. R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1 & 12.4.2.b – T 12.6 /I 12.6.1)
Output 3.1. Excess mercury/mercury stockpiles are transferred to secure interim storage.	Indicator 3.1.1 Number of public and private partners that have had their mercury stockpiles completely moved to secure interim storage facilities.	0 partners	Mid-Point: 2 partners End-Point: 4 partners	Transport logs; facility acceptance certificates; contractors reports	A: Transfer of mercury to a safe interim storage proceed quick and safely. R: Delays in regulatory approval or contractor non-compliance could delay or impede the interim storage in a feasible time.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4.1 & 12.4.

							2.b – T 12.6 /I 12.6. 1)
	Indicator 3.1.2 Total volume of mercury (tons) safely interim stored under project-supported operations	0 tonnes	Mid-Point: 100 tonnes of mercury End-Point: 175 tonnes of mercury	Transport logs; facility acceptance certificates; contractors reports	A: Transfer of mercury to a safe interim storage proceed quick and safely. R: Delays in regulatory approval or contractor non-compliance could delay or impede the interim storage in a feasible time.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I 12.4. 1 & 12.4. 2.b – T 12.6 /I 12.6. 1)
Output 3.2. Contract for the collection, transport, stabilization, solidification and disposal of excess, seized, and recovered mercury is issued and delivered in compliance with best international standards.	Indicator 3.2.1 Percentage of mercury collected by project, properly stabilized and sent for appropriate final disposal.	0% of mercury collecte d	Mid-Point: 50% of mercury collecte d End-Point: 100% of mercury collecte d	Stabilization/ disposal logs; facility acceptance certificates; disposal licensing by authorities; contractor reports	A: Transport and treatment/disposal proceed as contracted. R: Delays in regulatory approval or contractor non-compliance could impede final disposal.	3.1; 3.9; 3.11	SDG 3 (T 3.9/ I 3.9.3) SDG 8 (T 8.8/I 8.8.1) SDG 12 (T 12.4 /I

							12.4.1 & 12.4.2.b – T 12.6 /I 12.6.1)
Component 4: Knowledge management, communication and capacity building							
Outcome 4: Knowledge and capacity on the phase-out of mercury-cell chlor-alkali technology is improved, consolidated and disseminated nationally and internationally in a gender-responsive and inclusive manner[4]12.	1. Number of institutions and entities strengthened as a result of the project (UNEP CW Unit Outcome Indicator 10)	0 institutions	Mid-Point: 4 institutions End-Point: 8 institutions	Surveys, feedback forms, workshop evaluations MoV will include sex-disaggregated participation records for all project activities (trainings, consultations, monitoring missions, stakeholder dialogues).	A: Stakeholders engage actively in trainings and platforms. A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities. R: Staff turnover or limited engagement reduce impact of capacity building. R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.	3.5	SDG 5 (T 5.1/I 5.1.1) SDG 12 (T 12.4 /I 12.4.1) SDG 17 (T 17.16/I 17.16.1)
	2. Number of national or international forums/platforms where project knowledge is presented or shared (UNEP CW Unit Outcome Indicator 11)	0 forums	Mid-Point: 2 forums End-Point: ≥5 forums	Event reports, presentations, media coverage MoV will include sex-disaggregated participation records for all project activities (trainings, consultations, monitoring missions,	A: UNEP and partners coordinate outreach effectively. A: Stakeholder institutions allocate personnel in a manner that enables women and men to participate equally in capacity-building and technical activities. R: Lack of international events or restrictions limit knowledge sharing opportunities. R: Persistent gender inequalities in technical sectors may limit women's ability to participate unless mitigated through targeted GAP actions.	3.5	SDG 5 (T 5.1/I 5.1.1) SDG 12 (T 12.4 /I 12.4.1) SDG 17

				stakeholder dialogues).			(T 17.16/I 17.16.1)
Output 4.1: Communication strategy to support awareness, transparency, and gender-responsive engagement implemented.	Indicator 4.1.1. Project' website developed and launched	0 websites	Mid-Point: 1 draft version End-Point: 1 final version	Website operational	A: Project team prioritizes communication and allocates adequate resources. R: Messaging may not reach target audiences or fail to address gender-specific concerns.	3.5	SDG 5 (T 5.1/I 5.1.1) SDG 12 (T 12.4 /I 12.4.1) SDG 17 (T 17.16/I 17.16.1)
	Indicator 4.1.2. Number of social media and media products that integrate gender-sensitive content on decommissioning and mercury disposal (UNEP CW Unit Indicator 8.3)	0 media products	Mid-Point: ≥5 media products End-Point: ≥10 media products	Campaign materials, screenshots, social media posts, media publications	A: Gender analysis informs communication products. R: Inconsistent gender integration across communication outputs.	3.5	SDG 5 (T 5.1/I 5.1.1) SDG 17 (T 17.16/I 17.16.1)
Output 4.2. Guidance to relevant national stakeholders in Brazil for the development of a safe process for decommissioning chlor-alkali mercury cells aligned with the Minamata Convention provided and internationally shared.	Indicator 4.2.1 Number of lessons learned and/or knowledge exchange contributions shared with regional/global platforms (e.g., GMP, Minamata COPs)	0 lessons learned	Mid-Point: 2 lessons learned End-Point: ≥ 4 lessons learned	Reports, screenshots	A: Global networks engage with project outputs. R: International visibility limited by lack of coordination or documentation.	3.5	SDG 17 (T 17.16/I 17.16.1)

Output 4.3. Strategy for generating, disseminating, and sharing knowledge and capacity building implemented.	Indicator 4.3.1. Number of training modules developed	0 training modules	Mid-Point: 5 training modules End-Point: ≥ 10 training modules	Training records	A: Consultants deliver quality materials aligned with stakeholder needs. R: Modules are not accessed or updated after the project.	3.5	SDG 8 (T 8.8/I 8.8.1) SDG 17 (T 17.16/I 17.16.1)
	Indicator 4.3.2. Number of professionals trained through online, national and regional activities (sex-disaggregated) (UNEP CW Unit Indicator 10.1)	0 professionals trained	Mid-Point: 250 professionals (125F / 125M) End-Point: 500 professionals (250F / 250 M)	Training attendance sheets, evaluation reports, online learning analytics	A: Target groups are motivated and able to attend trainings. R: Gender balance targets are not met due to participation barriers.	3.5	SDG 5 (T 5.1/I 5.1.1) SDG 8 (T 8.8/I 8.8.1) SDG 17 (T 17.16/I 17.16.1)

[1] Gender-responsive dimension: Capacity-building activities under Outcome 1 will explicitly address gender gaps identified in the gender analysis by ensuring equal access of women and men to institutional training, technical workshops, and regulatory consultations. Regulatory and monitoring protocols developed will include provisions to ensure that occupational exposure risks are assessed and communicated in a gender-responsive manner. Sex-disaggregated data will be collected for all institutions and personnel engaged in capacity-strengthening processes.

[2] Gender-responsive dimension: Implementation of BAT/BEP during decommissioning will incorporate gender-responsive occupational safety considerations, ensuring that differentiated exposure pathways for women and men are reflected in safety procedures, communication materials, and field supervision practices. The project will collect sex-disaggregated data on participation in decommissioning-related trainings and technical oversight missions to ensure equitable inclusion of women technicians, inspectors, and company staff.

[3] Gender-responsive dimension: Outcome 3 will integrate gender-responsive risk communication and safety planning to ensure that women and men in surrounding communities and among operational teams have equal access to information on potential risks and emergency protocols. All stakeholder engagements related to mercury transport, stabilization, final disposal, and community safety briefings will be tracked with sex-disaggregated data and qualitative information on levels of participation.

[4] Gender-responsive dimension (additional clarification): Knowledge and communication products developed under this Outcome will systematically integrate gender considerations identified in the Gender Action Plan, including differentiated vulnerabilities, gaps in participation, and the need to increase women's involvement in technical and decision-making roles in mercury management. All training events, knowledge exchange sessions, and outreach activities will collect and report sex-disaggregated data and assess how women and men benefit from knowledge products

*** Relevant Programme of Work (PoW) Outcomes**		
3.1 Regional and national integrated policy has shifted towards the sound management of chemicals and waste		
3.5 Institutional capacity to adopt and act on national and international commitment is enhanced		
3.9 Use of harmful chemicals in products and processes is reduced in key sectors.		
3.11 Global advocacy catalyses the phase-out of most polluting products and practices.		
**** Relevant SDG target(s) and indicators**		
Goal 3 Good Health and Well-Being.		
Target 3.9 - Reduce illnesses and deaths from hazardous chemicals and pollution.	Indicator 3.9.3:	Mortality rate attributed to unintentional poisoning.
Goal 5 Gender Equality.		
Target 5.1 - End all forms of discrimination against all females everywhere.	Indicator 5.1.1:	Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex.
Target 5.5 - Ensure full participation in leadership and decision-making.	Indicator 5.5.2:	Proportion of women in managerial positions
Goal 8 Decent Work and Economic Growth.		
Target 8.8 - Protect labour rights and promote safe working environments	Indicator 8.8.1:	Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status.
Goal 12 Responsible Consumption and Production.		
Target 12.4 - Responsible management of chemicals and waste	Indicator 12.4.1:	Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement.
	Indicator 12.4.2.b:	Proportion of hazardous waste treated, by type of treatment.
Target 12.6 - Encourage companies to adopt sustainable practices and sustainability reporting.	Indicator 12.6.1:	Number of companies publishing sustainability reports.
Goal 17 Partnerships for the Goals.		
Target 17.16 - Enhance the global partnership for sustainable development.	Indicator 17.16.1:	Number of countries reporting progress in multi-stakeholder development effectiveness monitoring frameworks that support the achievement of the sustainable development goals.

ANNEX D: STATUS OF UTILIZATION OF PROJECT PREPARATION GRANT (PPG)

Provide detailed funding amount of the PPG activities financing status in the table below:

Project Preparation Activities Implemented	GETF/LDCF/SCCF Amount ($)

	Budgeted Amount	Amount Spent To date	Amount Committed
Preparatory phase coordinator	31,425.00	31,425.00	
Stakeholder engagement expert	15,000.00	15,000.00	
Mercury management and monitoring experts	32,000.00	32,000.00	
Gender expert	7,500.00	7,500.00	
Technical consultants (feasibility assessment, monitoring plan expert, project baseline development expert)	65,649.00	65,649.00	
HACT assessment of executing agency	5,860.00	5,860.00	
In-country travel and consultations	25,000.00	25,000.00	
Meeting and conferences (two main stakeholder consultation events: PPG inception and validation workshops)	10,000.00	10,000.00	
Final report	7,566.00	7,566.00	
Total	**200,000.00**	**200,000.00**	**0.00**

ANNEX E: PROJECT MAP AND COORDINATES

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

Location Name	Latitude	Longitude	GeoName ID
Chlorum Facility	-7.20462	-40.11426	

Location Description:

Location of Chlorum's Facility

Activity Description:

All project activities that require on-site presence

Location Name	Latitude	Longitude	GeoName ID
Katrium Facility	-22.84343	-43.354	

Location Description:

Location of Katrium's facility

Activity Description:

all project activities that require on-site presence

Location Name	Latitude	Longitude	GeoName ID
Unipar Carbocloro Facility	-27.19346	-48.58594	

Location Description:

Location of Unipar Carbocloro's Facility

Activity Description:

All project activities that require on-site presence

Location Name	Latitude	Longitude	GeoName ID
Brasilia	-15.77972	-47.92972	

Location Description:

City where government institutions are based

Activity Description:

Activities targeting policy makers and private sector partners

Location Name	Latitude	Longitude	GeoName ID
Recife	-8.05389	-34.88111	

Location Description:

Capital of Pernambuco State

Activity Description:

Activities targeting policy makers and private sector partners

Location Name	Latitude	Longitude	GeoName ID
Rio de Janeiro	-22.90642	-43.18223	

Location Description:

Capital of Rio de Janeiro State

Activity Description:

Activities targeting policy makers and private sector partners

Location Name	Latitude	Longitude	GeoName ID
São Paulo	-23.5475	-46.63611	

Location Description:

Capital of São Paulo State

Activity Description:

Activities targeting policy makers and private sector partners

Please provide any further geo-referenced information and map where project interventions are taking place as appropriate.

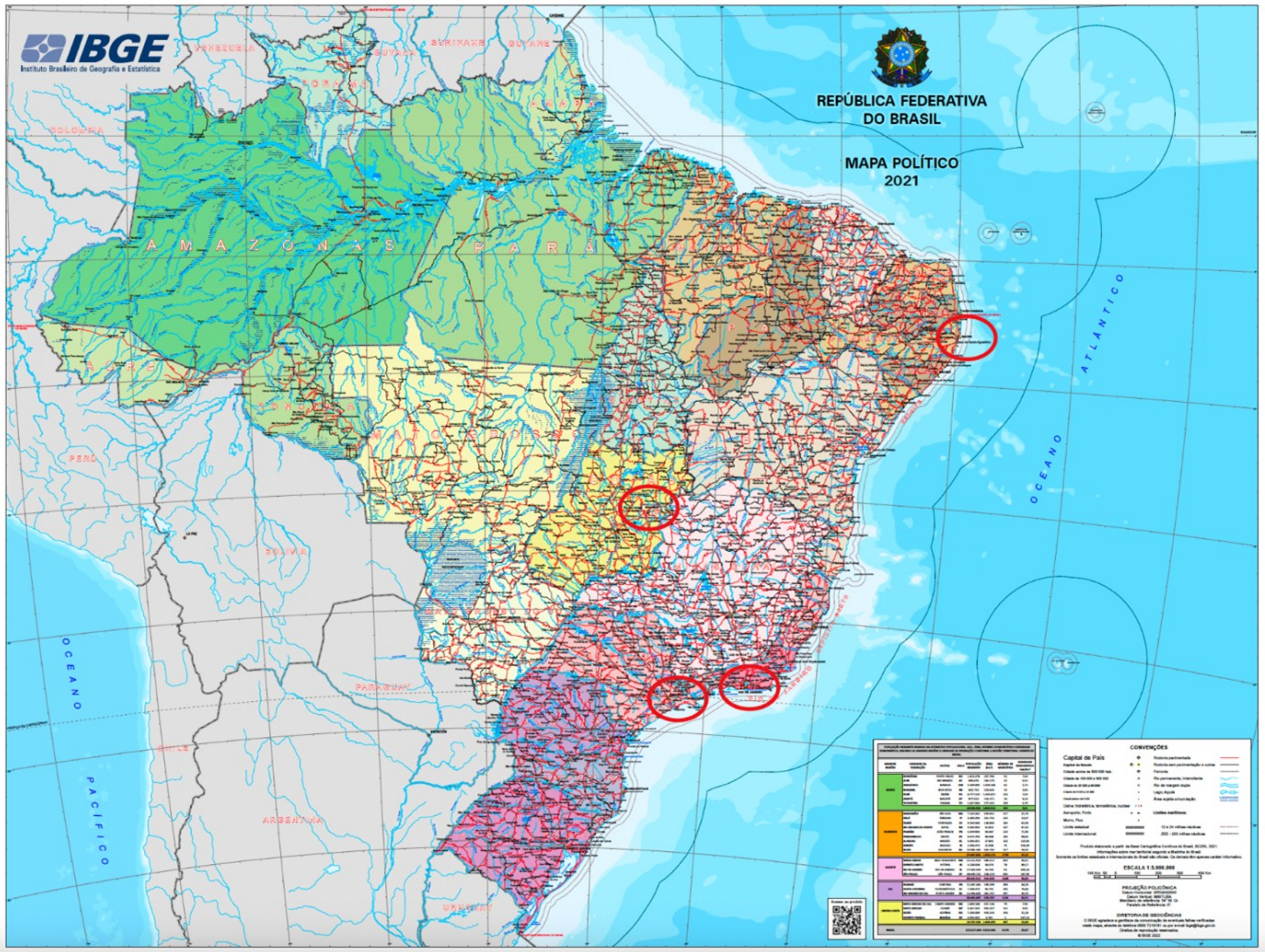

Figure 7: Map of Brazil highlighting location of chlor-alkali industry plants. Source: Government of Brazil

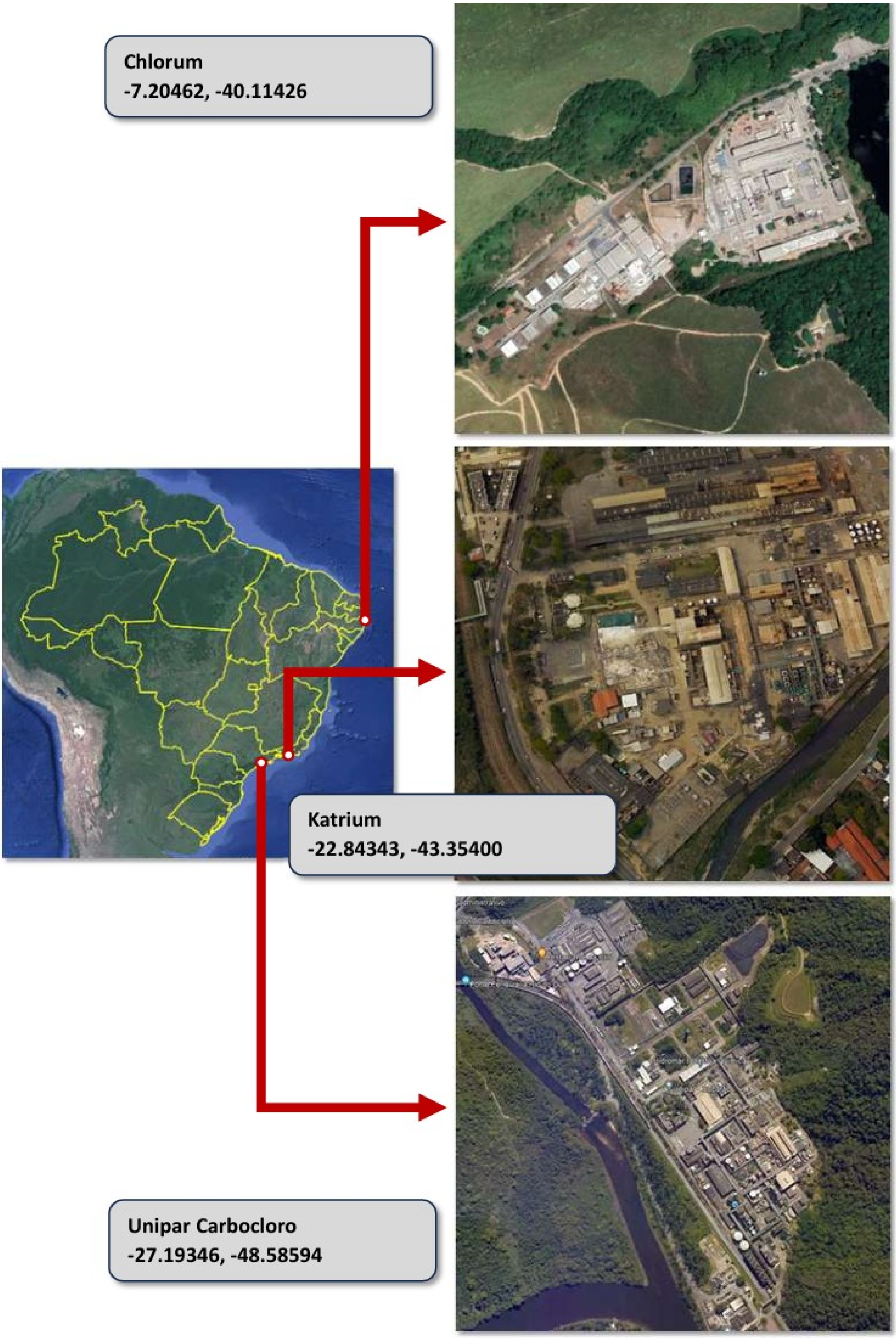
Chlorum
-7.20462, -40.11426
Katrium
-22.84343, -43.35400
Unipar Carbocloro
-27.19346, -48.58594

Figure 8: Geographic location and images of chlor-alkali industry plants in Brazil. Source: Chlor-alkali industry partners

ANNEX F: ENVIRONMENTAL AND SOCIAL SAFEGUARDS SCREEN AND RATING

Attach agency safeguard datasheet/assessment report(s), including ratings of risk types and overall project/program risk classification as well as any management plans or measures to address identified risks and impacts (as applicable).

Title
11697 - Chlor-alkali Brazil - Annex F - SRIF

ANNEX G: BUDGET TABLE

Please upload the budget table here.

Annex G. BUDGET BY PROJECT COMPONENT AND UNEP BUDGET LINES

Project Number/Grant:	GEF 11697
Project Title:	Environmentally sound management and disposal of excess mercury and mercury waste from removing mercury electrolytic cells in Brazil's chlor-alkali sector (Chlor-alkali Brazil)
Implementing Agency:	United Nations Environment Programme (UNEP)
Executing Agency / National Partner:	Fundação Educacional Ciência e Desenvolvimento (FECD) / Ministry of Environment and Climate Change (MMA) of Brazil

Total GEF funding (US$)	**12,000,000**

Project Title: Environmentally	**Component 1**	**Component 2**	**Component 3**	**Component 4**	**M&E**	**PMC**	**Total**	**Responsible Entity**

sound management and disposal of excess mercury and mercury waste from removing mercury electrolytic cells in Brazil's chlor-alkali sector (Chlor-alkali Brazil) Timeline: 2026 - 2030	Strengthening national capacity for managing hazardous chemical facilities and mercury-contaminated materials	Introducing BAT/BEP during environmentally sound decommissioning of mercury-cell chlor-alkali plants and decontamination of waste materials	Environmentally sound management, treatment, and final disposal of excess mercury and mercury waste from the three decommissioned and converted chlor-alkali plants	Knowledge Management, Communication and Capacity Building	**Monitoring and Evaluation**	**Project Management Cost**	**Total**	
Expenditure Category Detailed Description	US$	US$	US$	US$	US$	US$	US$	
Salary and benefits/ staff costs								
Operational Project Manager	-	-	-	-	-	120,000	120,000	FECD
Project Assistant	-	-	-	-	-	90,000	90,000	FECD
Financial and Accounting Support Officer	-	-	-	-	-	100,000	100,000	FECD
Contracts and Procurement Manager						100,000	100,000	FECD
National consultants								
Stakeholder Engagement Expert	120,000	20,000	20,000	30,000	50,000	-	240,000	FECD
Technical Director (Monitoring of Mercury)	100,000	20,000	20,000	40,000	-	-	180,000	FECD
Technical Director (Laboratory and Analisys)	100,000	20,000	20,000	40,000	-	-	180,000	FECD
Legal Expert	100,000	20,000	20,000	10,000	30,000	-	180,000	FECD
Environmental Management Expert	60,000	60,000	60,000	-	-	-	180,000	FECD

Social Integration and Gender Equity Expert	80,000	10,000	10,000	40,000	10,000	-	150,000	FECD
Communications and Public Relations Expert	10,000	10,000	10,000	120,000	-	-	150,000	FECD
Lead Researcher (Field Activities)	96,000	-	-	-	-	-	96,000	FECD
Lead Researcher (Chemical Analisys)	96,000	-	-	-	-	-	96,000	FECD
Researchers (6)	288,000	-	-	-	-	-	288,000	FECD
Scientific Reviewer	30,000	-	-	-	-	-	30,000	FECD
Data Analyst	30,000	-	-	-	-	-	30,000	FECD
Pedagogical Expert	-	-	-	96,000	-	-	96,000	FECD
International consultants								
Chlor-Alkali Decommissioning Specialist	50,000	-	-	-	-	-	50,000	FECD
Sub-Total	1,160,000	160,000	160,000	376,000	90,000	300,000	2,246,000	
Travel							-	
Domestic travel: Project coord. & superv. (PMU staff)	12,000	-	-	-	-	-	12,000	FECD
Domestic travel: Technical missions (Consultants)	140,000	-	-	-	-	-	140,000	FECD
Domestic travel: PSC and stakeholder meetings	24,000	-	-	-	-	-	24,000	FECD
International travel: Knowledge exchange & learn.	64,000	-	-	-	-	-	64,000	FECD
Sub-Total	**240,000**	**-**	**-**	**-**	**-**	**-**	**240,000**	

Sub-Contracts to executing partner/entity								
Transport mercury to interim storage	-	-	200,000	-	-	-	200,000	FECD
Mercury interim storage	-	-	900,000	-	-	-	900,000	FECD
Mercury collection/ transport/ stabilization /destination	-	-	3,500,000	-	-	-	3,500,000	FECD
Mercury recovery from equipment	-	2,900,000	-	-	-	-	2,900,000	FECD
Sub-Total	**-**	**2,900,000**	**4,600,000**	**-**	**-**	**-**	**7,500,000**	
Training, workshops, meetings								
Development of distance learning	-	-	-	250,000	-	-	250,000	FECD
In-person technical trainings	-	-	-	300,000	-	-	300,000	FECD
International Knowledge Sharing	-	-	-	150,000	-	-	150,000	FECD
Inception workshop	20,000	-	-	-	-	-	20,000	FECD
Final workshop	-	-	-	20,000	-	-	20,000	FECD
Project Steering Committee (PSC) meetings	-	-	-	-	25,000	-	25,000	FECD
Regional knowledge exchange seminar	-	-	-	120,000	-	-	120,000	FECD
Sub-Total	**20,000**	**-**	**-**	**840,000**	**25,000**	**-**	**885,000**	
Contractual services - company								
Operational costs	38,800	10,000	10,000	10,000	-	-	68,800	FECD
Passive mercury emission samplers (30)	3,900	-	-	-	-	-	3,900	FECD
Teflon tubes (40)	31,600	-	-	-	-	-	31,600	FECD

Technical Sotware license	5,000	-	-	-	-	-	5,000	FECD
ICP-MS single quadrupolo	220,500	-	-	-	-	-	220,500	FECD
Acid distillation system	13,200	-	-	-	-	-	13,200	FECD
Acid vapor cleaning system	21,000	-	-	-	-	-	21,000	FECD
Portable XRF analyser (3)	195,000	-	-	-	-	-	195,000	FECD
Portable mercury vapor meter (3)	92,400	-	-	-	-	-	92,400	FECD
Advanced kit for portable mercury vapor meter (3)	22,400	-	-	-	-	-	22,400	FECD
Computers (2)	2,600	-	-	-	-	-	2,600	FECD
Equipment for sample preservation (2)	1,600	-	-	-	-	-	1,600	FECD
Mid-term Review	-	-	-	-	30,000		30,000	UNEP
Independent Terminal Evaluation	-	-	-	-	50,000		50,000	UNEP
Independent Financial Audit	-	-	-	-	-	25,000	25,000	FECD
Sub-total	**648,000**	**10,000**	**10,000**	**10,000**	**80,000**	**25,000**	**783,000**	
Other Operating Costs								
Website & reports for diffusion of results	-	-	-	50,000	-	-	50,000	FECD
Preparation of Project M&E Reports	-	-	-	-	24,000	-	24,000	FECD
Preparation of final report	-	-	-	-	10,000	-	10,000	FECD
Translations	30,000	5,000	5,000	5,000	5,000	-	50,000	FECD
Shared ICT Infrastructure & IT Managed Services						45.000	45.000	FECD
Corporative Software						15.000	15.000	FECD

Licensing & Digital Tools								
Shared integrated facilities & workspace consum. (IFC)						30.000	30.000	FECD
Bank charges and transaction fees	-	-	-	-	-	12,000	12,000	FECD
Sub-total	**30,000**	**5,000**	**5,000**	**55,000**	**39,000**	**212,000**	**346,000**	
TOTAL	**2,098,000**	**3,075,000**	**4,775,000**	**1,281,000**	**234,000**	**537,000**	**12,000,000**	

Please explain any aspects of the budget as needed here

ANNEX I: RESPONSES TO PROJECT REVIEWS

From GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF.

STAP Comments	Agency Response
The proposal does not indicate the ''lessons learned'' from the Mexico project have been considered and incorporated so that the success of the project is maximized.	At the time of submission, no specific learnings where shared since implementation of the Mexico project faced some delays. Since implementation of both projects will coincide and UNEP is the Implementing Agency for both projects, a knowledge exchange meeting will be organized at the beginning of the implementation phase to exchange views and potential ways forward to collaborate and exchange.
(...) the project description and possibly design require improvements to justify the overall strategy of the project, that appropriate consideration has been given to the soundness of assumptions, and that sufficient consideration has been given to barriers and enabling elements, the financial viability of the project, and long-term outcomes. The need to build institutional capacity and develop coherent policies for the 3 site-specific plans requires justification.	The design of the project has been improved during the PPG phase and, consequently, the project description was reviewed with special attention on clarifying the application of ToC.
Also, the project theory of change diagram and narrative is incomplete. It does not adequately present the casual pathways to the expected project output, outcome and ultimate impact. Furthermore, the assumptions are not well grounded, and sometimes, the drivers and assumptions are mixed up.	During the preparatory phase, the Theory of Change diagram was reformulated to clearly map the casual pathways linking outputs, outcomes, and impacts, with new layers for drivers, enablers, and assumptions. Enabling elements now include a) regulatory mandates under the MC, b) private sector investment in conversion as co-financing, and c) availability of proven BAT/BEP

	technologies. Assumptions were reformulated with measurable indicators.
While the proposal indicates that mercury will be treated by stabilization, it does not provide useful information about how this will be done or the specific technological/treatment options to be considered. Furthermore, a key element that was not discussed is that of risks and costs associated with long-term storage of mercury and how treated mercury will ultimately be disposed of.	The technical methodology for mercury stabilization is well-known and mastered. Globally there are several service providers capable of performing this task and certain Brazilian providers could acquire this capability by purchasing the appropriate equipment and training (there is at least one supplier with readily available, extensively tested product). So, the options to be considered for Brazilian needs are therefore limited to defining the location where the stabilization process and the subsequent final storage of the stabilized mercury will take place. The most conventional solution would be to export the metallic mercury for treatment and disposal abroad; an option with a greater positive local impact would be to enable the country to perform this task locally to allow for long-term sustainable management and disposal of mercury and mercury waste. During the PPG phase, a feasibility study was conducted and is available as Appendix 14. While the two options (stabilization and export) are considered, the Ministry of the Environment stated that the priority criteria is the speed with which the mercury can be removed from its current precarious storage state and taken to a suitable interim storage/stabilization site. Since the answer to this question is strongly linked to the capabilities and work plan of the service provider to be contracted and is less influenced by the location of the stabilization and final destination, both stabilization route options (export/domestic) remain open in the project and will be resolved naturally during the evaluation of the proposals submitted in the international tender for the selection of the service provider.
1. *Systems thinking*. The proposal would benefit from adopting a systems thinking approach that links together, for example, the environmental need to reduce mercury use and release from these 3 chlor-alkali plants with gains in energy efficiency that presumably translate into greater profitability for these plants. Systems thinking also needs to include the elements to ensure the project's financial viability and justify the need to build regulatory capacity for these three site-specific and time-limited projects. Such thinking would foster the development of clear logic for each causal pathway that would promote project success.	The three partner companies are aware that fulfilling their legal obligation to eliminate the use of mercury in their production process will bring the collateral benefit of greater energy (and production) efficiency, which over time will offset the investment through savings in energy and raw material costs. This saving is already considered in the financial planning of these companies and ensures the financial viability of the technological transition process. Therefore, additional awareness-raising efforts in this regard are not needed. Systemic logic was also applied to the project's financial planning (whose viability is ensured by the sufficient resources provided by the GEF grant and co-financing sources). The inclusion of regulatory strengthening has been consider and will generate a clearer regulatory framework applicable to other sources of mercury that still

	need to be managed by Brazil. Thus, investing in clear rules for the handling, transport, and interim and final storage of mercury will save time and resources for tasks outside the project, and this approach was well established during the PPG phase. The causal pathways of the PIF were significantly improved during the PPG phase, benefiting, among other things, from a more logical organization of the ToC.
2. *Barriers*. Several barriers require greater explanation and justification. The listed barriers are not sufficiently justified, including the current regulatory and policy framework that hampers enforcement and compliance and barriers to implementing legislation mandating BAT/BEP practices for handling and disposing of mercury due to a lack of governmental capacity for administration and coordination. Why are knowledge gaps on environmentally sound management (ESM) of mercury a barrier when numerous other projects in numerous countries have undertaken this? Financial constraints for mercury disposal are listed as a barrier which then requires some explanation as to how this barrier will be overcome. As noted below, the barrier of the lack of established service providers that can safely handle mercury and mercury-contaminated materials is mentioned inconsistently.	During the project's preparatory phase, all barriers were further expanded with evidence and clear mitigation measures. <u>Legal, Regulatory, and Policy Barriers</u> The main challenge in complying with the Minamata Convention for mercury cell decommissioning is the absence of clear legal and operational standards. Without this, companies and environmental agencies in the three states involved may implement solutions considered acceptable locally and among themselves, but which do not necessarily represent a nationally harmonized understanding and may not be fully aligned with each other and with global BAT/BEP. This could lead to avoidable environmental risks and impacts or legal disputes led by the Public Prosecutor's Office. These disputes could delay mercury management for years, risking environmental contamination and financial instability for companies. Even adherence to global BAT/BEP standards cannot prevent conflicts without prior formal agreements among all parties. <u>Technical Knowledge Gaps</u> While other countries have addressed mercury cell decommissioning, these technologies are not available in Brazil due to a lack of demand. National technical expertise exists, but requires capacity building through the acquisition of appropriate equipment and corresponding operational training. During the PPG phase, several foreign service providers were identified that could meet the country's needs, either by importing equipment or by exporting metallic mercury. The gap in the sense of the lack of immediately available equipment for an environmentally sound mercury solution can, therefore, be overcome relatively quickly by the project through either of these options (importing equipment or exporting metallic mercury). <u>Administrative Capacity Deficits</u>

	Governmental agencies lack the administrative capacity needed to manage and coordinate effective mercury decommissioning and disposal efforts.
3. *Uncertain futures.* This was not discussed but should be. For example, an uncertain future could consider time lags between decommissioning and having secured storage and handling facilities available, as well as the time lag between storage and final treatment and disposal.	The project document was improved, and uncertain futures are now described more deeply.
4. *Theory of Change (ToC)* The ToC includes major elements, except enabling elements. However, the logic behind the causal pathways is incomplete. Some drivers are noted elsewhere as assumptions, while other drivers are not mentioned. Assumptions. - A major assumption is that remediation and monitoring plants will be adopted (paid for?) by plant owners (ToC listing "financing is available" needs to be clarified – financing for what?) - The proposal assumes "predictability and adequacy of costs." The proposal needs to clarify what is meant here and why these are reasonable assumptions. An "uncertain futures" analysis should consider the implications of this assumption not holding true. - The proposal assumes that "vendors present a consistent and reliable service"; however, this assumption should be backed up by government oversight. - Numerous other assumptions are listed in the ToC that require explanation, e.g., that the 3 chlor-alkali plants can finance the transition away from mercury cells. Causal pathways are short and incomplete by connecting single levels of outputs with outcomes. For example, it is assumed, but the project itself doesn't include activities related to providing or coordinating financing for either mercury cell conversion or decommissioning. A driver is predictable and reasonable costs, which is listed as, and does seem to be, a critical assumption but, again, does not include an activity to enable this. Barriers and enablers. Major barriers identified are limited administrative capacity, unclear regulatory and policy framework, and technical knowledge gaps regarding the ESM of mercury. The ToC is missing a discussion of	ToC was significantly updated based on the suggestions provided by STAP, with a special emphasis on improving assumptions, pathways, barriers and drivers.

enabling elements which could be learning from other Minamata-focused GEF projects on mercury ESM. <u>Drivers</u>. As noted above, some are assumptions rather than drivers. Not discussed is a driver, such as the benefit to the chloralkali plant owners of more cost-effective or efficient upgrading of the chloralkali process (is this a benefit?) or reduced liability due to mercury contamination.	
5. Project Components <u>Component 1</u> of strengthening national capacity requires better justification. The proposal needs to justify the investment and activities related to policy development and capacity building for decommissioning three chlor-alkali plants, whereby other chlor-alkali plants in Brazil operate with technologies that do not rely on mercury cells. Did these other plants undergo a transition or were they opened with alternative technologies? Is the development of a "good practice guide for decommissioning mercury chlor-alkali plants" needed when the GEF is funding a similar project in Mexico and the project in Brazil aims to develop site-specific plans for each site (Output 1.2)? <u>Component 2</u>. It is unclear if the conversion from mercury cells to alternative technologies (which are already in use in the three plants) is within the scope of the project. (the proposal includes the information that the 3 plants have secured co-financing for new membrane technologies). The proposal needs to resolve whether the barrier exists of not having established service providers that can safely handle mercury and mercury-contaminated materials vs Output 2.1, which relies on engaging "specialized contractors with technical expertise to manage mercury and mercury-contaminated wastes safely" (page 17). <u>Component 3</u> needs to include consideration of existing technologies for managing mercury-containing wastes and some explanation of ultimate mercury disposal, not just containment. The explanation needs to include what measures will be taken to create, for example, financial conditions necessary for ESM of 250 tons of mercury. The proposal should be explicit about who will be responsible for mercury monitoring, both technically and financially. <u>Component 4</u>, regarding knowledge management and communication, should include existing repositories of information and what new information can be usefully communicated from this project. Who is the audience for the communication strategy if this project is tackling the last 3 mercury cell technologies in Brazil?	The project components and their respective justifications were altered and improved to address the comments from the review process. A detailed description of the activities helped to better understand what is being proposed. Component 1 (strengthening national capacity) was enhanced to provide a broader perspective. The best practice guide for the decommissioning of chlor-alkali plants incorporated the guidance sources described in the project, and national discussions were broadened to encompass not only this economic sector but also other activities involving mercury management needs. Furthermore, a more detailed description of strengthening public capacity for monitoring mercury emissions and releases is presented. It was clarified that all other plants have already been built using diaphragm or membrane technologies; The only case of conversion in country history did not generate a best practice guide.. The original Component 2 has been improved and now clearly encompasses the introduction of BAT BEP into the decommissioning process. Conversion of electrolytic cells to alternative technologies was never part of the project scope, but is considered as a counterpart. Component 3 has been improved to better describe the environmentally sound management strategy for the now 175 tons of mercury (a better assessment during the PPG phase identified the revised volume to be managed through the project). The financial mechanism for financing the stabilization and final disposal of excess mercury/mercury waste is clear: the cost of this activity will be financed mainly through GEF resources (and co-financing provided by the selected private sector supplier). Responsibility for managing the execution of this activity (in the form of a service contract awarded through a tender) has been clarified at its various levels, including the description of

	specific activities (also in the other components) that reveal the technical monitoring as well as the monitoring of mercury releases and emissions. Component 4: The knowledge management strategy was improved to describe how identify relevant audiences (national stakeholders), leverage existing repositories, and focus on communication relevant to mercury phase-out in Brazil and identifying the potential synergies linked to the ongoing project in Mexico. More on this item is described in detail in the appended Stakeholder Engagement Plan.
6. Sectors and stakeholders. Women are mentioned throughout the proposal, including that less than 20% of workers in these plants are women. The discussion of gender does not include a reason to include gender consideration and thus seems superfluous to this project. The role played by the academic sector needs to be clarified. On the one hand, the proposal notes that research institutes and labs will be tentatively engaged to develop and implement monitoring and remediation plans. Yet, elsewhere (p19), the proposal notes that academics from the Federal University of Rio de Janeiro (UFRJ) "are among the leading experts in mercury contamination analysis" – perhaps the latter refers to mercury measurement but not treatment and containment technologies? It is puzzling that UFRJ experts in "mercury contamination analysis" are not mentioned in the activities related to mercury monitoring. The proposal needs more clearly explain how the executing agency Fundação Educacional Ciência e Desenvolvimento (FECD) will have or assemble the requisite expertise to execute this project since "FECD does not have direct experience in the chlor-alkali sector".	Gender considerations: Preliminary gender considerations have been considered with the information available at this stage, considering women as active stakeholders of the project as direct beneficiaries (20% of women work in the plants) and part of the communities where the plants are located (approximately 50% of inhabitants). Despite not having a strong gender component, gender mainstreaming is a core principle in GEF and UNEP projects and a comprehensive Gender Analysis and Action Plan tailored to the specific realities of the project was developed during PPG phase. Academics from UFRJ/FECD, renowned for their expertise in mercury contamination, will lead monitoring of mercury emissions, releases, and decontamination efficiency in the project. They will also support harmonizing best practices for mercury storage, stabilization, transportation, and disposal. While UFRJ lacks direct chlor-alkali sector experience, their technical capacity remains strong, with potential to hire additional specialists as needed. In the PPG phase, a specific study assessing national and global alternatives for mercury stabilization was developed by FECD, supporting the improvement of project strategy to deal with mercury. The rationale for choosing FECD as the executing agency was better described in the project document, and the lack of specific knowledge in the chlor-alkali sector is considered a minimal deficiency since the entity has recognized expertise in managing large-scale projects and has access to a body of professionals who are leading authorities in environmental monitoring, contamination assessment, and mercury waste management.
7. Contribution to GEBs. These contributions (reduced GHG emissions, energy saved (in calculations but not transferred to PIF), and reducing mercury, are reasonable. The assumptions underpinning the people benefiting from this project are unclear. However, this can be mute since all people and ecosystems globally benefit from mercury use and release reductions, given its ability for global transport and bioaccumulation.	GEB provided at PIF stage were estimated with the available information. Adjustments were made in the PPG phase based on data refinement, and a review of the explanation of the criteria was carried out.
8. Policy coherence. The lack of coherent legal regulatory and policy framework was cited as a barrier, but the proposal needs to explain why, in fact, this lack of	The project was improved to show that a lack of clarity and a nationally unified standard or criterion could create impediments to mercury management. For example, a safe

coherence is a hindrance to achieving the goal of safe transitioning of mercury cells and handling and ultimately containment of mercury.	packaging standard from one federal state could conflict with that of another, making cross-border transport unfeasible; similarly, a lack of standards for the requirements for the interim or final storage of mercury, for example, could potentially lead to non-compliance with the Minamata Convention Criteria.
9. Alignment with current GEF investments. The proposal aligns with past and current GEF projects in Brazil (source identification and emissions apportionment, 2nd project on ESM of seized mercury) and Mexico (similar goals of managing mercury from chlor-alkali plants). However, an important point requiring attention is the demonstration that the proposal is learning from and thus maximizing these GEF investments.	During the PPG phase, the proposal was strengthen its alignment with related GEF projects, demonstrating how lessons learned and best practices from these initiatives are being integrated. As UNEP is the Implementing Agency for these projects, knowledge exchange sessions will be convened early in the preparatory phase. These sessions will facilitate sharing insights, experiences, and strategies, ensuring complementarity and preventing duplication of efforts. This collaborative approach will maximize the impact of GEF investments by fostering coherence and leveraging synergies among interventions in Brazil and Mexico.
11. Knowledge management (KM). This component requires better explanation and justification of the audience, the intention, and how knowledge management is a "two-way street." What has been learned from other GEF projects, and how will this be reflected in the current project?	During the project preparatory phase, the project conducted a series of meetings with active projects and stakeholders with existing experience and knowledge on mercury management. Furthermore, its Knowledge Management (KM) activities were refined to define the target audience (IBAMA, MECC, private sector, academia), objectives, and mechanisms for knowledge repository exchange (Global Mercury Partnership portal) during project design and implementation. All oh that was built on lessons learned from other GEF projects (Mexico, Argentina and Colombia), ensuring these insights inform activities while fostering a two-way dialogue to enhance learning and impact.
12. Innovation. It is unclear what innovations are planned for this project as few details are presented on actual handling, storage, and final destruction technologies. What technologies will be considered, and are they adequate? Is technology transfer necessary, or are the relevant Brazilian companies at the technological forefront?	The safe handling techniques for excess mercury/mercury waste from the chlor-alkali industry that will be adopted in the project, including transportation, packaging, stabilization, and recovery of contaminated equipment, correspond to global BAT/BET standards; there will be no innovation in this regard (because established and existing technologies are sufficient). Technology transfer may be a product of the project if the national route for stabilization and disposal of mercury is adopted by the winning bid in the international tender that will select the service provider for the management and disposal of the metal. Similarly, the guidelines produced and the standards inspired by the project may be innovative in the sense of filling a national gap, but they will be in line with internationally recommended BEPs. The real project's contribution to innovation is focused on two other aspects: techniques for monitoring mercury emissions/releases and human occupational exposure to the metal; and the production and provision of training and capacity-building materials in mercury management, which are original and adapted to national needs (including availability in Portuguese).
13. Risks. The discussion of financial risks needs to be expanded to consider financial mechanisms for hazardous	The project's approach to mercury waste management was reinforced and clarified during the PPG phase. The original

waste handling and ultimate disposal since these activities do not ultimately deliver financial value under the current financial system. It is unclear how "monitoring, knowledge generation and dissemination efforts within the project will ensure sustainability and longevity of outcomes" – these efforts can assess but not ensure the longevity and effectiveness of the project. Risks of hazardous waste mismanagement, including theft, have not been considered.	component 2 was expanded to ensure an adequate management of mercury, and the budget allocated to support the costs of recovering mercury from contaminated equipment was separated from the overall amount for 'mercury management,' providing greater clarity regarding the scale of the investment in this area. Other waste (including decontaminated equipment) and the environmental remediation of industrial sites that may be contaminated by mercury are not covered by this project due to an express limiting rule from the funder (GEF). Despite this, the project will monitor actions related to this issue, which will be fully funded by the partner companies as a form of co-financing. There are no risks to the longevity of the project's effects due to economic factors, since after the proper disposal of the stabilized mercury there will be no future costs. This is a scenario of permanent effects.
1. The proposal should address all the issues in Section 2 above.	Issues presented by STAP have been taken into account and will be carefully considered during the preparatory phase.
2. The proposal should draw on the considerable experience in other jurisdictions of the environmentally sound management (ESM) of mercury and mercury-containing wastes from chlor-alkali plants. This includes components and learning from a current GEF project regarding the decommissioning of mercury cell chlor-alkali plants underway in Mexico (GEFID 10526). What efficiencies and complementarity can be achieved by the proposal being developed by the Brazilian Ministry of Environment and Climate Change and UNEP, which will have the common element of developing "management procedures, logistics and infrastructure necessary to safely seize, handle, transport, store and eliminate current and future element mercury…"? Will both projects seek to develop the same or different locations for safe storage and ultimate disposal?	The Brazil project was built upon lessons learned so far from the GEF project in Mexico (GEFID 10526), ensuring efficiency and complementarity. On the other hand, while both projects focus on mercury management addressing country-specific needs and locations, and different challenges area expected, the execution of both will be largely simultaneous, allowing for a more immediate exchange of experiences. To take advantage of this circumstance and avoids duplication and fosters regional knowledge sharing Brazilian project has a new activities specific to ensure knowledge sharing. Global experience, particularly in decommissioning techniques for chlor-alkali plants and waste management, remains a fundamental source of guidance for the project, and information exchange with the Global Mercury Partnership is planned to occur regularly, several times a year.
3. The proposal's Theory of Change (ToC) is incomplete. The causal pathways do not sufficiently connect barriers, enablers, and drivers with those pathways. Indeed, enablers are missing from the ToC. Some drivers have been identified as assumptions. An example of the incomplete ToC and development of project logic is that GHG emissions will be reduced by 53,670 CO2e and 13,320 Mj of energy saved (listed in calculations but not PIF). The explanation of the GHG calculation indicates that these three plants will gain	ToC was revised based on STAP's suggestions, particularly to improve assumptions, pathways, barriers, and drivers. The reduction in energy costs will not affect project financing, as the necessary investments will only be amortized over several decades post-conversion, and is therefore not considered a key driver.

energy efficiency by converting old mercury cells to newer membrane technologies. These energy savings, and presumably cost savings to the industries, should be listed as an enabling element, if not a driver, for mercury cell decommissioning and technology upgrading. Further, these cost savings should be discussed in terms of the project's finance.	Although future energy cost reductions are a benefit, they were not a determining factor for the technology switch. The sole determining factor was the ban on mercury use starting in 2025.
4. More consideration is required for financing this project. Financial risks are briefly discussed, but the strategy for securing adequate financing for hazardous waste handling and ultimate disposal is missing from the proposal.	The responsibility for financing the proper final disposal of hazardous waste, excluding mercury, and environmental recovery of impacted areas lies with the partner industries.
GEF Council Comments	**Agency Response**
(Germany) Chapter 2.1 reviews several barriers, including a "shortage of financial and economic support for final mercury disposal". However, this barrier is not elaborated upon as thoroughly as others, nor is it mentioned in the Theory of Change. Germany requests additional details on how to address this barrier and an explanation for its omission from the Theory of Change.	The barrier refers to the high costs associated with stabilization, transport and environmentally sound disposal of mercury and mercury-contaminated materials, which also could require specialized international service providers and compliance with Basel Convention requirements. This circumstance makes the adoption of global BAT/BEP uneconomical, making the adoption of less secure, cheaper, but still acceptable means within the current Brazilian legal framework, a tempting option for private entrepreneurs. The project addresses this barrier by using GEF grant resources to finance the incremental costs of stabilization (which results in solidification, for example) and final disposal of mercury, while private sector partners finance technology conversion and cells decommissioning. The Theory of Change has been updated to explicitly reflect this financial barrier and the role of the GEF grant in addressing it.
(Germany) The investment required for the technology conversion of chlor-alkali mercury cells is estimated at USD 344 million (see page 30) to be co-financed by the private sector. The availability of major investment is identified as a moderate risk, stating that "project partners and national counterparts may not sustain activities including co-financing commitments". As a mitigation measure, the proposer explains that the executing agency (EA) has "extensive experiences in handling such initiatives". Germany requests an elaboration on the EA's experiences. Additionally, Germany requests the incorporation of mitigation strategies in the project concept, including criteria for a project exit, if private sector parties fail to perform. Germany is concerned that low commitment by the private sector poses a major risk to the overall objective and may lead to greenwashing.	FECD as the Executing Agency has extensive experience managing multi-stakeholder environmental projects in Brazil in collaboration with international organizations and academic institutions (for example, it previously worked on large projects in partnership with leading organizations such as WHO, UNEP, the National Service for Industrial Training - SENAI, Brazil's Biodiversity Fund - FUNBIO, and prestigious universities of Durham, Oxford Brookes, York, and Birmingham). To mitigate co-financing risks, the project includes formal co-financing commitments from participating companies, regulatory obligations under the Minamata Convention, and oversight by national authorities. GEF resources will only be deployed once companies complete the steps of technology conversion and mercury cells decommissioning activities; These commitments will be enforced by the relevant State environmental agencies, which are responsible for licensing and monitoring the industrial activities of the participating entities. As such, these obligations constitute a core component of the authorization processes that enable facilities to undertake technological conversion and continue operating. In the event of non-compliance, facilities may face regulatory consequences, including the suspension of operations. At the same time, even under such circumstances, the project would still provide a pathway to ensure the environmentally sound removal and disposal of mercury, with the support of public authorities, thereby

	addressing what could otherwise become an "orphan liability."
(Germany) One of the key objectives of component 2 is stated as "…will focus on supporting the decommissioning of the mercury cells and converting the plants" (see page 17). However, this objective is not supported by any output – the only output under component 2 refers to collection of excess mercury and mercury-contaminated materials. The overall objective relies on the decommissioning of mercury cells, as this addresses a beginning of pipe problem. Germany requests the definition of an additional output to ensure the decommissioning of mercury cells and the monitoring of the conversion process.	The physical conversion of chlor-alkali plants is financed by the private sector and required under national regulations and the Minamata Convention. The project supports this process by ensuring that decommissioning is conducted in accordance with BAT/BEP and that mercury removal and site monitoring are properly implemented. Component 2 has been clarified to include technical oversight, monitoring protocols and environmental monitoring to ensure safe decommissioning and mercury management.
(Germany) Project component 2 refers to "introducing BAT/BEP during decommissioning of mercury cells and following technology conversion of three plants". Germany highly appreciates the utilization of the BAT/BEP process. However, Germany requests clarification on the specific BAT/BEP reference document for chlor-alkali production cited in the proposal. Furthermore, Germany seeks clarification on wether the BAT/BEP process for chlor-alkali production has already been introduced in Brazil.	The project applies BAT/BEP guidance developed under the Minamata Convention, the UNEP Global Mercury Partnership for the chlor-alkali sector, and Basel Convention technical guidelines for mercury waste management. While Brazil has initiated the transition to mercury-free membrane technology, standardized procedures for decommissioning mercury cells and managing mercury-contaminated materials remain limited. The project strengthens national capacity to apply these international BAT/BEP standards.
(Germany) The introduction of mercury-free technologies is classified as a moderate risk (see page 25) as it "entails several technological risks, including feasibility, maintenance reliability, availability of technology and service providers for mercury waste and contaminated and remediation, mercury stabilization and disposal and cost implications for the chlor-alkali sector". The proposed mitigation measures are very generic and lack a clear strategy for technology transfer. Moreover, for drivers of inaction and barriers under chapter 2.1.3 the proposal only mentions remediation, stabilization, transport and storage services for mercury but does not refer to barriers for mercury-free technologies. Germany requests to evaluate if there is an additional technical barrier to the introduction of mercury-free technologies.	Mercury-free membrane technology is already commercially available and is being introduced by the private sector partners. The main technical risks relate to the safe dismantling of mercury-cell equipment, management of mercury-contaminated materials, and access to specialized services for stabilization and disposal. The project addresses these challenges through technical guidance, monitoring systems and support for environmentally sound mercury waste management during the transition.
(Japan) We are concerned that the project with a large (almost 1:10) co-financing proposed by one country, may have been inflated. We hope that the risk is taken into account in project designs, and recommend careful review to backcheck the proposed figures for co-financing as well as the value of the grants proposed.	The co-financing reflects confirmed investments from private sector partners and research institutions associated with technology conversion, plant decommissioning and environmental monitoring. These contributions are supported by formal commitment letters and represent baseline investments required for compliance with the Minamata Convention. The GEF grant finances only the incremental costs related to mercury stabilization, transport and final disposal
(Japan) Furthermore, since the industry-related project can be easily financed by risk-tolerant private capital, we need to consider additionality issues much more carefully. Considering the demarcation with the Non-Grant Instrument, those projects should be reviewed in order to ensure transparency and the regional balance.	The project demonstrates clear additionality. While private companies finance the conversion to mercury-free technologies, they do not typically finance the incremental costs associated with environmentally sound stabilization and final disposal of mercury. These activities generate global environmental benefits but do not produce direct financial returns, making them suitable for GEF grant support rather than commercial financing. Furthermore, for Brazil, the project will provide enhanced traceability and knowledge regarding the final destination

	of excess mercury from chlor-alkali plants, which would otherwise remain uncertain. It will also support the development and harmonization of technical criteria, procedures, and potentially legal frameworks to guide the management of metallic mercury and mercury-contaminated materials from other sources. This is particularly relevant for addressing the challenges associated with so-called "public mercury," referring to mercury stocks under the custody and responsibility of Federal and State public administrations. A third key added value is the strengthening of the national reference laboratory for environmental monitoring and mercury contamination analysis. This will be achieved through both the upgrading of equipment and, more importantly, the generation and dissemination of new and improved knowledge. In turn, this will enhance Brazil's scientific and technical capacity and contribute to the establishment of a national network for information-sharing on mercury contamination, a critical issue in regions such as the Amazon. Finally, the project will enable Brazil to establish a clear and replicable pathway for the environmentally sound disposal of mercury, which can be applied to future needs, including the management of ASGM-related stockpiles. This approach may also serve as a model for neighboring countries.
(United Kingdom) Important to ensure the project will not impact indigenous people and local communities' land. Areas with mercury are known by its poverty and low level of development.	Project activities take place within existing industrial facilities and licensed waste management sites and do not involve land acquisition or activities affecting Indigenous Peoples' territories. The project will reduce environmental and health risks associated with mercury contamination in surrounding communities. All activities will be implemented in accordance with UNEP environmental and social safeguards.
(United States) See the commitment to follow international best practices for disposal of mercury.	The project design is fully aligned with the Minamata Convention and Basel Convention technical guidelines, and integrates Best Available Techniques and Best Environmental Practices (BAT/BEP) throughout all components, particularly in relation to decommissioning, interim storage, and final disposal of mercury. UNEP remains committed to ensuring that these standards are effectively applied during project implementation