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Project Identification Form (PIF) entry – Full Sized Project – GEF - 7

## Demonstration of production phase-out of mercury-containing medical thermometers and sphygmomanometers and promoting the application of mercury-free alternatives in medical facilities in China

### Part I: Project Information

**GEF ID**

10349

**Project Type**

FSP

**Type of Trust Fund**

GET

**CBIT/NGI** CBIT NGI**Project Title**

Demonstration of production phase-out of mercury-containing medical thermometers and sphygmomanometers and promoting the application of mercury-free alternatives in medical facilities in China

**Countries**

China

**Agency(ies)**

UNDP

**Other Executing Partner(s)****Executing Partner Type**

Foreign Environmental Cooperation Center, Ministry of Ecology and Environment,  
China (formerly the Foreign Economic Cooperation Office, Ministry of Environmental Government  
Protection, China)

**GEF Focal Area**

Chemicals and Waste

**Taxonomy**

Focal Areas, Chemicals and Waste, Mercury, Influencing models, Strengthen institutional capacity and decision-making, Transform policy and regulatory environments, Demonstrate innovative approaches, Stakeholders, Private Sector, Capital providers, Financial intermediaries and market facilitators, SMEs, Large corporations, Individuals/Entrepreneurs, Beneficiaries, Local Communities, Indigenous Peoples, Civil Society, Non-Governmental Organization, Community Based Organization, Academia, Type of Engagement, Information Dissemination, Consultation, Partnership, Participation, Communications, Awareness Raising, Public Campaigns, Behavior change, Education, Gender Equality, Gender results areas, Knowledge Generation and Exchange, Capacity Development, Access to benefits and services, Gender Mainstreaming, Women groups, Capacity, Knowledge and Research, Knowledge Generation, Targeted Research, Learning, Adaptive management, Indicators to measure change, Enabling Activities

**Rio Markers****Climate Change Mitigation**

Climate Change Mitigation 0

**Climate Change Adaptation**

Climate Change Adaptation 0

**Duration**

60 In Months

**Agency Fee(\$)**

1,440,000

**Submission Date**

7/5/2019

## A. Indicative Focal/Non-Focal Area Elements

| Programming Directions | Trust Fund                     | GEF Amount(\$)    | Co-Fin Amount(\$)  |
|------------------------|--------------------------------|-------------------|--------------------|
| CW-1-1                 | GET                            | 16,000,000        | 112,000,000        |
|                        | <b>Total Project Cost (\$)</b> | <b>16,000,000</b> | <b>112,000,000</b> |

## B. Indicative Project description summary

### Project Objective

Establishing the enabling environment to accelerate the transfer to the production of mercury-free medical devices, and to lay the foundation for market acceptance and growth for mercury-free devices in medical facilities, in order to meet associated phase-out deadlines under the Minamata Convention on Mercury.

| Project Component  | Financing Type       | Project Outcomes   | Project Outputs  | Trust Fund | GEF Amount(\$) | Co-Fin Amount(\$) |
|--|----------------------|--|--|------------|----------------|-------------------|
| 1. Integrated policy, regulatory framework, quality standards, fiscal tools, action plans and associated capacities, to support the phase out of mercury medical devices under the Minamata Convention | Technical Assistance | 1. Cross Ministerial cooperation established to jointly develop and implement the necessary policy, regulations, action plans, tools and guidelines, in coordination with appropriate private sector partners, to phase out the production and consumption of mercury-containing medical devices, to reduce the use of primary mercury in medical devices, to manage waste of obsolete devices, and to promote the uptake of mercury-free medical devices. | <p><b>Output 1.1:</b> Inter-ministerial Committee established (e.g., Environment, Health, Industry, etc.) to support the execution of China's National Implement Plan for the Implementation of the Minamata Convention and help identify policy and enforcement capacity gaps between national regulatory policies and the Convention's legal requirements for Parties, and to look at modalities for linking mercury consumption reductions from this sector into the primary mining plans within the National Minamata Implementation Plan, to avoid redirection of phased out consumption to other sectors.</p> <p><b>Output 1.2:</b> Policy and regulatory frameworks, quality control standards, monitoring and management systems, and capacity-building programs developed to support the monitoring, supervision, regulation and enforcement of the</p> | GET        | 600,000        | 3,000,000         |

phase-out of mercury in the production of medical thermometers and sphygmomanometers, as well as to support the carrying out of China's National Implement Plan for the Implementation of the Minamata Convention by collaborating with World Health Organization (WHO) to ensure incorporation of international best practice and experience.

**Output 1.3:** Policy and regulatory frameworks, green procurement standards and action plans developed to promote the application of and grow the market for mercury-free medical thermometers and sphygmomanometers in medical facilities.

**Output 1.4:** Development of a Green Finance Framework, with supporting guidance, to

- Raise the awareness of enterprises on possible green finance instruments, and to facilitate their access to government and/or private banking investments, in order to support quality-controlled conversion of production lines, and to manage obsolete mercury stocks and contaminated areas.
- Create a procurement subsidization scheme to support green procurement, application of mercury-free medical

thermometers and  
sphygmomanometers, sound  
management of obsolete mercury  
containing devices, any related  
capacity building and awareness  
activities in medical facilities.

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|  |            |  |  |     |            |            |
|--|------------|--|--|-----|------------|------------|
| <p>2. Demonstration of technology transfer and investment for (i) Supporting enterprises in phasing out the production of mercury-containing medical devices; (ii) the application of devices in medical facilities, and (iii) enhanced knowledge base for the sound management of obsolete mercury devices, contaminated materials/wastes, and contaminated areas on premises</p> | Investment | <p>2.1 Enterprises are capacitated to change over production lines in line with legally mandated national phase-out planning guidelines, and to soundly manage remaining mercury, stockpiled devices and/or contaminated areas on premises resulting in the phase-out of at least 75 tonnes of mercury.</p> <p>2.2 Medical facilities have the capacity to use and maintain mercury-free devices, and to soundly manage obsolete mercury devices and related wastes.</p> | <p><b>Output 2.1.1</b> A representative sample of key production facilities demonstrate i) Production of mercury-free medical thermometers; the sound management of obsolete mercury and stocks of mercury devices; (ii) remediation pilots at production sites; and, (iii) Cooperation with WHO and associated international agencies to assimilate international experience and promote the compliance with mainstreamed international standards for exported non-mercury devices.</p> <p><b>Output 2.2.1</b> Cooperation with WHO is established to share knowledge about the replacement of mercury thermometers and sphygmomanometers in health care. Use of mercury-free devices and the sound management of obsolete mercury-containing thermometers and sphygmomanometers demonstrated in a representative sample of key medical facilities, with greatest potential to facilitate /influence upscale and replication in the long run (multiple facilities selected across size category of small, medium or large facility)</p> | GET | 12,600,000 | 89,400,000 |
|--|------------|--|--|-----|------------|------------|

|   |                      |  |  |     |           |           |
|---|----------------------|--|--|-----|-----------|-----------|
| 3. Development of long-term guidance and tools for the sound management of obsolete mercury-containing devices, and mercury-contaminated areas. | Technical Assistance | 3. Production entities and medical facilities have the appropriate strategies, tools and guidance to i) Identify, monitor, and remediate mercury contaminated sites; ii) Ensure the safe handling and/or disposal of residual mercury and obsolete devices, and (iii) replicate all actions across relevant sectors. | <p><b>Output 3.1</b> Inventory developed of mercury contaminated sites at enterprises producing mercury-containing thermometers and sphygmomanometers.</p> <p><b>Output 3.2</b> Risk management strategy, technical guidance and training materials developed for the sound management of residual mercury stocks and obsolete mercury containing devices, and the remediation of contaminated sites on production sites, with all incorporated into the long-term operationalization of the National Implement Plan for the Implementation of the Minamata Convention to ensure sector wide replication post project.</p> <p><b>Output 3.3</b> Risk management strategy, technical guidance and training materials developed for the sound management of obsolete mercury-containing thermometers and sphygmomanometers in medical facilities, with all incorporated into the long-term operationalization of the National Implement Plan for the Implementation of the Minamata Convention to ensure sector wide replication post project.</p> | GET | 1,400,000 | 9,800,000 |
| 4. Knowledge Sharing & Management,  | Technical Assistance | 4. Integrated use of knowledge gathering and sharing tools to  | <b>Output 4.1</b> Project Communication Strategy created to support differentiated   | GET | 640,000   | 4,480,000 |

## Monitoring and Evaluation

facilitate sharing of policy, technical knowledge and lessons, as well as gather disaggregated information on stakeholder attitudes, activities and experiences under the project, which in turn can feed into the standard Monitoring and Evaluation process of this GEF project.

stakeholder (including manufacturing enterprises, medical facilities, mercury mining enterprises, government and international agencies, etc.) awareness raising/engagement and data gathering, i.e., UNDP platform for south-south cooperation used to exchange international experience in import and export management . Based on the project's demonstration results, a national replication plan aligned with National Implement Plan is developed and rolled out, including green finance mechanism to support government, enterprises and health facilities to transform and meet China's phase out target by 2026.

**Output 4.2** Awareness materials, knowledge gathering, sharing and learning tools created to be distributed or utilized periodically during the project (e.g., surveying during formal project evaluations; disaggregated surveys designed to measure impact before/during/after training or demonstration activities; compiling or updating relevant materials such as guidelines or textbooks for the use of mercury-free alternatives; awareness events for the general public et al.)

**Output 4.3** Execution of standard PIR, Mid Term and Terminal Evaluations as required in the GEF

Project cycle, with additional oversight exercises should adaptive management reviews require it.

|                                      |                               |                   |                    |
|--------------------------------------|-------------------------------|-------------------|--------------------|
|                                      | <b>Sub Total (\$)</b>         | <b>15,240,000</b> | <b>106,680,000</b> |
| <b>Project Management Cost (PMC)</b> |                               |                   |                    |
|                                      | GET                           | 760,000           | 5,320,000          |
|                                      | <b>Sub Total(\$)</b>          | <b>760,000</b>    | <b>5,320,000</b>   |
|                                      | <b>Total Project Cost(\$)</b> | <b>16,000,000</b> | <b>112,000,000</b> |

**C. Indicative sources of Co-financing for the Project by name and by type**

| Sources of Co-financing | Name of Co-financier                 | Type of Co-financing | Investment Mobilized          | Amount(\$)         |
|-------------------------|--------------------------------------|----------------------|-------------------------------|--------------------|
| GEF Agency              | UNDP                                 | In-kind              | Recurrent expenditures        | 300,000            |
| Government              | National and Local Government        | Grant                | Investment mobilized          | 300,000            |
| Government              | National and Local Government        | In-kind              | Recurrent expenditures        | 700,000            |
| Private Sector          | Medical Device Production Facilities | Equity               | Investment mobilized          | 107,800,000        |
| Others                  | Medical Facilities                   | Grant                | Investment mobilized          | 500,000            |
| Others                  | Medical Facilities                   | In-kind              | Recurrent expenditures        | 2,400,000          |
|                         |                                      |                      | <b>Total Project Cost(\$)</b> | <b>112,000,000</b> |

**Describe how any "Investment Mobilized" was identified**

In response to the GEF Secretariat's review, FECO has done initial scoping of potential co-finance to meet the 1:7 (GEF TF: co-finance) ratio requested, resulting in the current indicative co-financing amount of USD 112 million. This was derived through communication with relevant enterprises and medical institutions, to identify capital and operational investment required to support the alternative scenario indicated in the project, along with the introduction of local funds that support demonstration in medical institutions and exploring related poverty alleviation funding. The categories of activity that co-finance will target independently, and/or leverage the GEF incremental financing, are reflected as seen in the following table. The precise fund allocation amounts across activity categories will be finalized during budget development in the course of the PPG preparation of the CEO endorsement package. (please see the table in the responses to GEF comments sheet in Annex)

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

| Agency                         | Trust Fund | Country | Focal Area          | Programming of Funds | Amount(\$)        | Fee(\$)          | Total(\$)         |
|--------------------------------|------------|---------|---------------------|----------------------|-------------------|------------------|-------------------|
| UNDP                           | GET        | China   | Chemicals and Waste | Mercury              | 16,000,000        | 1,440,000        | 17,440,000        |
| <b>Total GEF Resources(\$)</b> |            |         |                     |                      | <b>16,000,000</b> | <b>1,440,000</b> | <b>17,440,000</b> |

## E. Project Preparation Grant (PPG)

PPG Amount (\$)

300,000

PPG Agency Fee (\$)

27,000

| Agency                         | Trust Fund | Country | Focal Area          | Programming of Funds | Amount(\$)     | Fee(\$)       | Total(\$)      |
|--------------------------------|------------|---------|---------------------|----------------------|----------------|---------------|----------------|
| UNDP                           | GET        | China   | Chemicals and Waste | Mercury              | 300,000        | 27,000        | <b>327,000</b> |
| <b>Total Project Costs(\$)</b> |            |         |                     |                      | <b>300,000</b> | <b>27,000</b> | <b>327,000</b> |

## Core Indicators

Indicator 9 Reduction, disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products (metric tons of toxic chemicals reduced)

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

|       |      |      |      |
|-------|------|------|------|
| 75.00 | 0.00 | 0.00 | 0.00 |
|-------|------|------|------|

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

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

Indicator 9.2 Quantity of mercury reduced (metric tons)

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

|       |  |  |  |
|-------|--|--|--|
| 75.00 |  |  |  |
|-------|--|--|--|

Indicator 9.3 Hydrochlorofluorocarbons (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) |
|-------------------------------|---|-------------------------------|------------------------------|
|-------------------------------|---|-------------------------------|------------------------------|

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**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) |
|--------------------------|--------------------------------------|--------------------------|-------------------------|
|--------------------------|--------------------------------------|--------------------------|-------------------------|

|   |  |  |  |
|---|--|--|--|
| 1 |  |  |  |
|---|--|--|--|

**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) |
|--------------------------|--------------------------------------|--------------------------|-------------------------|
|--------------------------|--------------------------------------|--------------------------|-------------------------|

|   |  |  |  |
|---|--|--|--|
| 1 |  |  |  |
|---|--|--|--|

**Indicator 9.6 Quantity of 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 10 Reduction, avoidance of emissions of POP to air from point and non-point sources (grams of toxic equivalent gTEQ)**

| Grams of toxic equivalent gTEQ<br>(Expected at PIF) | Grams of toxic equivalent gTEQ (Expected<br>at CEO Endorsement) | Grams of toxic equivalent gTEQ<br>(Achieved at MTR) | Grams of toxic equivalent gTEQ<br>(Achieved at TE) |
|---|---|---|--|
|   |   |   |  |

Indicator 10.1 Number of countries with legislation and policy implemented to control emissions of POPs to air (Use this sub-indicator in addition to Core Indicator 10 if applicable)

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

Indicator 10.2 Number of emission control technologies/practices implemented (Use this sub-indicator in addition to Core Indicator 10 if applicable)

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

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

|        | Number (Expected at<br>PIF) | Number (Expected at CEO<br>Endorsement) | Number (Achieved at MTR) | Number (Achieved at TE) |
|--------|-----------------------------|---|--------------------------|-------------------------|
| Female | 700                         |   |                          |                         |

|              |      |   |   |   |   |
|--------------|------|---|---|---|---|
| <b>Male</b>  | 300  |   |   |   |   |
| <b>Total</b> | 1000 | 0 | 0 | 0 | 0 |

## Part II. Project Justification

### 1a. Project Description

#### 1) The global environmental and/or adaption problems, root causes and barriers that need to be addressed (systems description)

Mercury contained in medical devices, specifically thermometers and sphygmomanometers in China.

Mercury can lead to significant adverse neurological and other health effects in humans, especially the unborn child and infants. The global transport of mercury in the environment requires concerted global actions to address the problem of mercury pollution. As one of the global efforts to protect human health and the environment from anthropogenic emissions and releases of mercury as well as mercury compounds, the Minamata Convention on Mercury was agreed on by the intergovernmental negotiating committee and was opened for signature on October 10, 2013.

The Minamata Convention on Mercury came into effect on August 16, 2017 for parties to the Convention (including China), and sets out a range of measures to meet the abovementioned objective, including measures to control the supply and trade of mercury, the control of mercury-added products, etc.

Parties to the Convention agree in Article 4 of the Minamata Convention on Mercury to forbid the manufacture, import or export of mercury-added products (listed in Part I of Annex A) after the 2020 phase-out date. This list of mercury-added products includes mercury-containing medical devices like thermometers and sphygmomanometers.

As per the Minamata Convention on Mercury, the import and/or export and manufacture of mercury-containing medical thermometers and sphygmomanometers will be forbidden from January 1, 2021 onwards. As for China, the manufacture of mercury-containing medical thermometers and sphygmomanometers will be forbidden starting January 1, 2026 on since China registered an exemption pursuant to Article 6 of the Minamata Convention of Mercury ([www.mercuryconvention.org/Countries/Parties/Exemptions/tabid/5967/language/en-US/Default.aspx](http://www.mercuryconvention.org/Countries/Parties/Exemptions/tabid/5967/language/en-US/Default.aspx)).

In line with the Minamata Convention on Mercury, China is making the National Plan for the Implementation of the Minamata Convention, within which interventions to support the phase-out of mercury containing thermometers and sphygmomanometers, such as the introduction of alternative technologies and the promotion and introduction of mercury-free thermometers and sphygmomanometers have been identified within China's Mercury Initial Assessment (MIA) as a high priority.

China is a large manufacturer of mercury-containing medical thermometers and sphygmomanometers. For example, a preliminary survey conducted in 2014 indicated that there were approximately 20 enterprises that produced about 150 million mercury-containing thermometers in China alone, and which used about 150 tonnes of mercury for their manufacturing processes. One third of the produced mercury-containing thermometers were exported to other countries. With respect to mercury-containing sphygmomanometers, approximately 10 enterprises produced and sold about 3 million in China in 2014, and used about 100 tonnes of mercury each year in their production processes.

Mercury-containing thermometers and sphygmomanometers are widely used in China. There are nearly 1 million medical facilities at different levels. Data on the current use of mercury-containing thermometers and sphygmomanometers in medical facilities is still unclear. In light of the phase-out of the manufacture of mercury-containing thermometers and sphygmomanometers in the near future, it is necessary to gain better understanding of consumption patterns, of representative samples of the overall landscape of the various types of medical facilities to be targeted in demonstration ahead of upscaling, of sound management of obsolete mercury-containing thermometers and sphygmomanometers and proper application of non-mercury devices, and ways to incentivize rapid uptake of non-mercury devices, so that the medical facilities in China are well prepared for the application of mercury-free medical thermometers and sphygmomanometers.

**Barriers that need to be addressed for the phase-out of the production of mercury-containing medical thermometers and sphygmomanometers in enterprises and the application of mercury-free medical thermometers and sphygmomanometers in medical facilities in China.**

There are several challenges in terms of policy and regulatory framework, technical and financial supports as well as educational and awareness raising that could hamper the phase-out the production of mercury-containing medical thermometers and sphygmomanometers in enterprises and the application of mercury-free medical thermometers and sphygmomanometers in medical facilities in China.

**Policy and regulatory barriers:**

Since the phase-out date for the import and/or export and manufacture of mercury-containing medical thermometers and sphygmomanometers in China has been set according to the Minamata Convention on Mercury, corresponding national policies, regulations and action plans are needed to reach this goal. Existing gaps between the current policies, regulatory framework and action plans and what is needed to support the phase-out of mercury-containing medical thermometers and sphygmomanometers and meet the requirements of the Minamata Convention on Mercury need to be identified.

In light of the future phase-out of the production of mercury-containing medical thermometers and sphygmomanometers, policies, regulations and action plans to ensure the introduction and appropriate application of mercury-free medical thermometers and sphygmomanometers in medical facilities, and by the general public, are necessary.

Furthermore, standards for the manufacture of mercury-free thermometers and sphygmomanometers require to be updated to ensure the manufacturing of products that meet the necessary requirements.

Component 1 will help in addressing the above listed challenges.

**Technical barriers:**

The basic idea for the replacement of mercury-containing thermometers and sphygmomanometers is that mercury-free alternatives should meet the demand of the consumers and the market, both in terms of quantities and quality, without causing much inconvenience to the users.

As for the manufacture of mercury-free medical thermometers, non-electronic thermometers with liquid Galinstan, and electronic thermometers, are both considered promising alternatives to mercury-containing medical thermometers.

In the case of the manufacture of Galinstan-in-glass thermometers, there are several technical issues to be addressed, including the high price of liquid Galinstan, the requirement for technical improvement in such thermometers because of their slow reset time, and suboptimal efficacy at low temperatures, as compared to mercury-added thermometers. Furthermore, only a few companies hold related-patents to produce Galinstan-in-glass thermometers in China, such that the production capacity of Galinstan-in-glass thermometers is currently very limited. The lack of trained personnel for the manufacture of Galinstan-in-glass thermometers is another obstacle. Therefore, the demonstrative technical transfer from production of mercury-containing thermometers to Galinstan-in-glass thermometers is necessary.

As for the manufacture of electronic thermometers, the lack of chips with self-owned intellectual property rights, core to the very function of electronic thermometers, is a major technical issue. The lack of trained personnel is another obstacle. In addition, the quality of the electronic thermometers is variable, and there is a need for universal quality control in production. Therefore, the demonstrative technical transfer from production of mercury-containing thermometers to electronic thermometers is necessary.

As for the manufacture of mercury-free sphygmomanometers, there are two main alternatives: mercury free aneroid sphygmomanometers and electronic sphygmomanometers.

Similar to the manufacture of electronic thermometers, the manufacture of electronic sphygmomanometers also lacks chips with independent/self-owned intellectual property rights, and trained personnel, and the same issue of variability of quality exists. Therefore, the demonstrative technical transfer from production of mercury-containing sphygmomanometers to electronic ones is necessary.

China's National Implement Plan for the Implementation of the Minamata Convention will seek to work with enterprises to phase out mercury from their operations and enhance safe handling of mercury on site. However, in fine-tuning the sectoral plan for this, there needs to be prioritization of enterprises, and improved understanding of not only where the largest mercury consumption lies in production of devices, but also of the greatest risks of contamination and threats to human and environmental health. The development of a long-term risk management strategy for enterprises could be supported through pilot assessment of contaminated sites associated with the operations of enterprises, and development of guidance and tools for the sound management of mercury-contaminated sites and obsolete mercury and mercury-containing thermometers and sphygmomanometers at enterprises is necessary in order to reduce risks to workers on site.

The introduction and application of mercury-free thermometers and sphygmomanometers in medical facilities requires accurate and reliable measurements similar to the mercury-containing thermometers and sphygmomanometers. The lack of the confidence on the quality of measurements taken with mercury-free devices, and the lack of trained medical workers to accurately use and maintain mercury-free medical devices in many medical facilities are significant barriers. These need to be overcome with demonstration interventions in medical facilities (at various health-care level) to instill in medical personnel the confidence in the quality and usability of mercury-free alternatives.

Finally, the development of long-term guidance and tools for the sound management of obsolete mercury and mercury-containing thermometers and sphygmomanometers at medical facilities is necessary. Currently, risk assessment and management plans for the management and storage of mercury-

containing thermometers and sphygmomanometers are lacking.

Project components 2 and 3 will help in addressing these obstacles.

#### **Financial barriers:**

Most of the enterprises manufacturing mercury-containing thermometers and sphygmomanometers are private companies with low profitability. As such they face financial constraints for the conversion from mercury-containing thermometers and sphygmomanometers to mercury-free alternatives. The transfer to mercury-free alternatives generally requires construction of new production lines, and training of employees in new technologies. Financial support to demonstrate the technical transfer from mercury-containing thermometers and sphygmomanometers will support manufacturing companies in accessing incremental investments for the conversion to mercury-free technologies and train their employees in new technologies. In those instances where site contamination and disposal of obsolete mercury-containing materials is an issue, they can also see assistance in putting risk assessment and management procedures and approaches in place to protect their workers as well as surrounding communities.

Considering the relatively high price and high cost for the maintenance of mercury-free alternatives combined with medical staff that is not trained in their use, medical facilities are reluctant to introduce mercury-free alternatives. Financial support and a green financing framework in participating medical facilities will facilitate the adoption of mercury-free alternatives, and help put in place risk assessment and management plans to ensure the sound management of broken and/or obsolete mercury-containing thermometers and sphygmomanometers to safeguard medical staff, patients, visitors and surrounding communities. Medical facilities could also help to provide critical feedback to manufacturers and the Chinese government alike, in testing performance of new technologies, and helping to confirm the best products for upscale and wider use in the long term. Besides, the general public is supposed to follow the choice of medical facilities on mercury-free alternatives.

Project components 2 and 3 will help in addressing these challenges.

#### **Educational and awareness raising barriers:**

Some countries have successfully phased-out mercury-containing thermometers and sphygmomanometers, while they are still widely used in China. Therefore, the gathering of international experiences, lessons-learned and the exchange of best and worst practices with countries and medical facilities which have been successful in this endeavor will be critical for a successful phase out in China.

As relates to the adoption of mercury-free alternatives, the lack of trained medical workers to use such devices requires thorough, systematic education, including appropriate use and gaining critical capacity as relates to calibration and accuracy of measurements.

For the general public, the knowledge on the accuracy and reliability of mercury-free alternatives is also necessary.

Awareness raising among government entities, private sector entities, civil society stakeholder groups and the general public and medical personnel most importantly, on the necessity to replace mercury-containing thermometers and sphygmomanometers is highly required, as is R&D on mercury-free alternatives (such as the refinement of Galistan devices).

Component 4 will help address these barriers.

## 2) The baseline scenario and any associated baseline projects

In China, the manufacture of mercury-free thermometers and sphygmomanometers has been encouraged by the National Development and Reform Commission of China since 2011. In 2014, mercury-containing thermometers and sphygmomanometers were listed as high-pollution and high-environmental-risk products by the then Ministry of Environmental Protection of China. The Ministry of Ecology and Environment is currently initiating the development of a National Implement Plan for implementation of the Minamata Convention on Mercury, including the phase-out of mercury containing medical thermometers and sphygmomanometers. Some regulations on the calibration of electronic thermometers have also been issued from 2009. However, gaps still exist between the current regulatory system and the requirements of the Minamata Convention on Mercury on the phase-out of the production of mercury-containing thermometers and sphygmomanometers and the application of mercury-free medical devices. Therefore, cross ministerial cooperation (e.g., Environment, Health, and Industry, etc.) to jointly develop the necessary action plans and guidelines, and identify appropriate private sector partners is required to phase out the production of mercury-containing medical thermometers and sphygmomanometers in enterprises and introduce mercury-free medical devices in medical facilities.

Projecting to the present day based on preliminary estimation as aforementioned, current annual consumption of mercury in China used for the manufacture of medical thermometers and sphygmomanometers is estimated to be between 200 and 250 tonnes each year.

There are basically 3 types of enterprises that produce medical thermometers and sphygmomanometers in China. Some of these companies produce only mercury-free devices, some produces both mercury-free and mercury-containing devices and some produce only mercury-containing devices. Among the 20 enterprises that produce mercury-containing thermometers, about 3-4 enterprises could produce mercury-free Galinstan-in-glass thermometers, but these companies were hampered by limited production capacity, uneven performance and lack of standardization of performance of alternative technology, the high cost of Galinstan and a relatively small market share due to low confidence and acceptance of non-mercury technology.

It has been estimated through MIA that there are more than 100 enterprises that produce electronic thermometers with varying quality. The production capacity for this type of electronic thermometers is not known.

Through the preliminary survey conducted in 2014 it was observed that among the 10 enterprises that produce mercury-containing sphygmomanometers, at present, there is only one enterprise that can produce both mercury-containing, mercury free aneroid and electronic sphygmomanometers.

Overall, though there is understanding of the largest consumption of mercury by producers, there is lack of understanding of where greatest contamination risks lie, to help prioritize focus for assistance in the transition away from mercury and to remove and dispose of mercury-containing materials. Similar capacity to deal with mercury containing materials is lacking in the medical sector.

In terms of baseline projects, this project builds on:

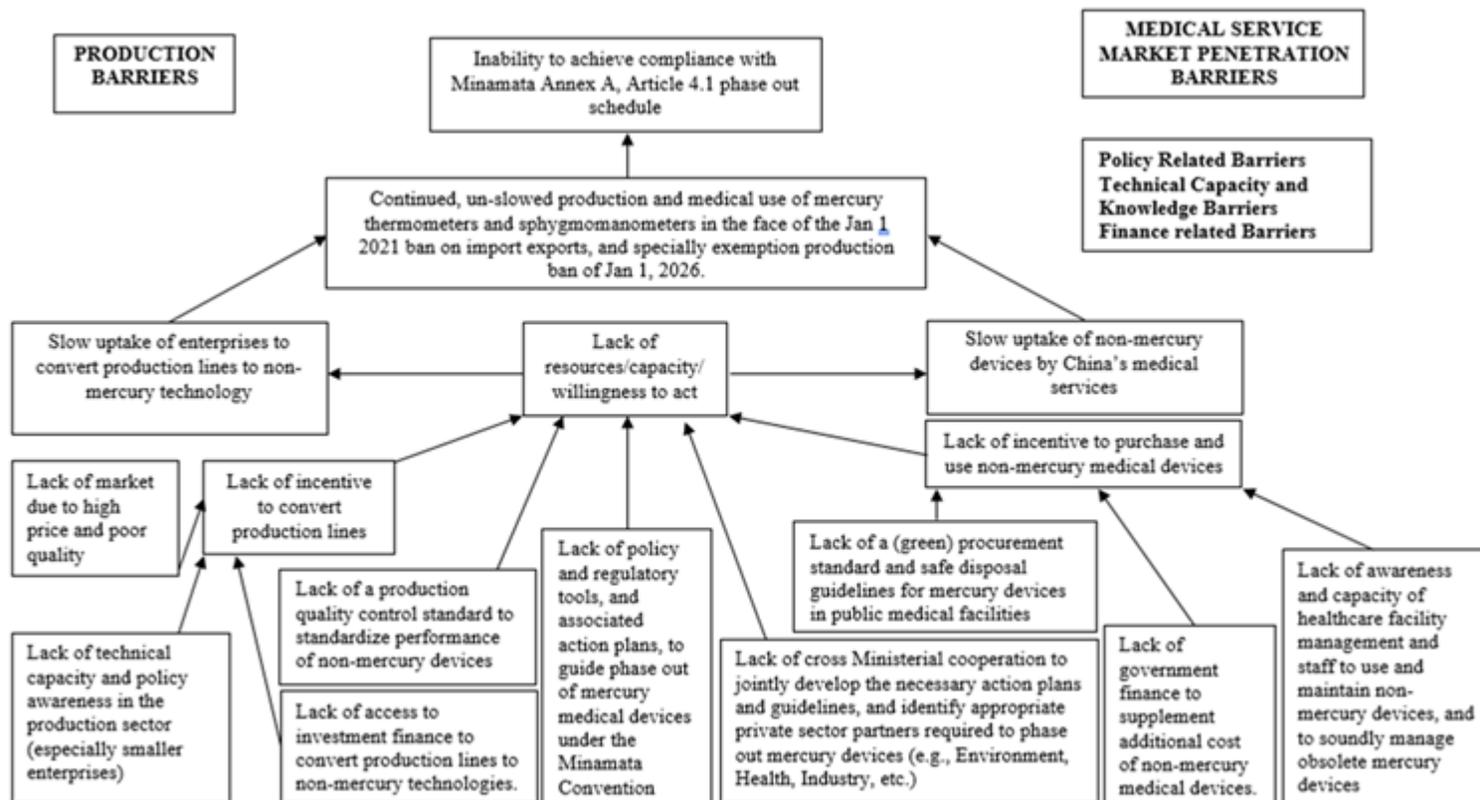
a) The GEF Funded "China Minamata Convention Initial Assessment (MIA) project (2015-2018)" (USD \$ 1,000,000). Based on the situation in 2014, this project collected the available data of production and use of mercury-containing thermometers and sphygmomanometers, estimated the whole national production in China. Initially provided data reference for China's implementation work. Indeed, the proposed project was identified as a priority during the MIA project, as the production of thermometers and sphygmomanometers is one of the major industries using mercury and the production and utilization of these medical instrument will bring mercury pollution and health risk; and

b) The GEF-funded "Capacity Strengthening for the Implementation of the Minamata Convention (2018-2022)" USD 8,000,000 from GEFTF, USD 16,000,000 with co-financing. The on-going capacity strengthening project is to (a) develop a National Implement Plan, and (b) improve China's mercury management capacity and readiness to implement this strategy in the project provinces. China's National Implement Plan is a compiling framework covering an overarching plan and 10 sub-plans by industries, which includes strategy and action plan for reducing the use of mercury in mercury-added products and polyvinyl chloride (PVC) production sector, the environmentally sound management of wastes and contaminated sites containing mercury and strengthening mercury supply sources and trade management in China. The current project being requested is seeking to carry out detailed implementation according with National Implement Plan and its sub-plans at sectoral level for phase out of mercury in the medical devices sector.

FECO/MEE is the execution agency for both these projects. The two ongoing GEF projects focus on establishing a comprehensive overview of the mercury issues in China. On the other hand, this project will specifically address the mercury issues in mercury-added products, i.e. mercury-containing thermometers and sphygmomanometers.

Taking into account the myriad of barriers, and the interconnectedness of production phase out with market uptake, a cause-effect "problem tree" can be constructed to help categorize barriers, see where they lie, who can help alleviate them, and how addressing barriers in component activities can feed into achieving the ultimate project objective. Figure 1 below gives a graphic representation of this analysis of the barriers at baseline.

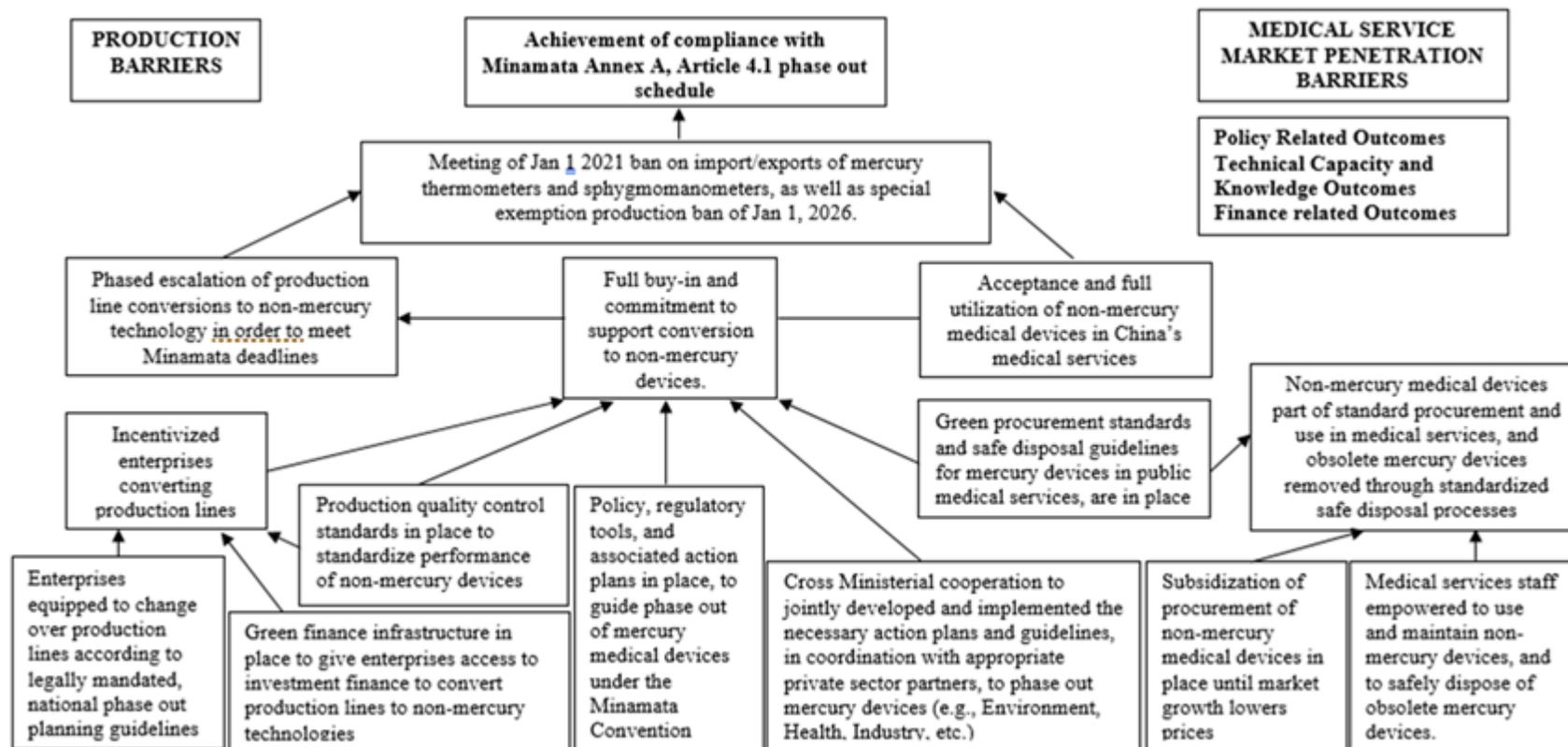
FIGURE 1: Problem Analysis to explore the Cause-Effect for Challenges Faced in the phase out of mercury-based medical devices in China



### 3) Proposed alternative scenario, with a brief description of expected outcomes and components of the project

In carrying out an analysis of the project objectives, the negative aspects or “problems” identified in the problem analysis (see Figure 1) are reformulated into positive ones to reflect what is envisioned for the future. This can be drawn up in an “objectives tree” (see Figure 2) such that the various levels of objectives and the ‘means-end’ relationships between them are clear, as are the different levels of objectives for the overall project strategy. The objective of this proposal therefore becomes to **“set the enabling environment to accelerate uptake of mercury-free technology in production of medical thermometers and sphygmomanometers, and to lay the foundation for market acceptance and growth for mercury-free devices in the medical services sector, to meet the associated phase out deadlines under the Minamata”**

FIGURE 2: Outcome/Objectives Analysis for the phase out of mercury-based medical devices in China



China has developed a National Plan for the Implementation of the Minamata Convention. In targeting sectoral phase out, it will be necessary to develop deeper understanding of issues, barriers, resource and capacity needs, formation of critical partnerships and overall raising of awareness amongst partners and the public.

With GEF TF support, China would be able to enhance the institutional capacity and technical capability of public and private stakeholders for phase-out of the production of mercury-containing thermometers and sphygmomanometers in enterprises and the application of mercury-free medical devices in medical facilities, by reviewing and updating the current regulation and policies, with due consideration of the requirements of Minamata Conventions on Mercury, as well as carrying out pilot demonstrative activities that will provide the evidence base for the scope of capacity building and technical assistance needs, areas of prioritization, and all the associated costs of upscaling phase-out through China's National Plan for the Implementation of the Minamata Convention (hereafter referred to as "the National Plan").

As was indicated in the financing section of this PIF, FECO has done initial scoping of potential co-finance to meet the 1 (GEF TF): 7 (co-finance) ratio requested, resulting in the current indicative co-financing amount of USD 112 million. Working with the relevant enterprises and medical institutions, they have identified capital and operational investment required to support the alternative scenario indicated in the project, as well as identified local fund sources associated with poverty alleviation and demonstration activity medical institutions. Co-finance will be focused heavily on the enterprise investment associated

with: (i) the elimination and technology transformation of the production of mercury containing medical equipment; (ii) on promotion and application of non-mercury technologies in medical facilities; (iii) on environmental and human risk assessment and control measures (within pilot enterprises and medical institutions); (iv) on public awareness, and (v) capacity building activities. The PPG will afford detailed assignment of co-finance in the project budget developed.

China may also be requesting UNDP support in the area of procurement of expert services across components, and organizing of any study tours, and if deemed necessary at end of PPG, will provide a letter to accompany the CEO Endorsement submission with the specific request and rationale for requesting these services from UNDP.

**Component 1.** Integrated policy, regulatory framework, quality standards, fiscal tools, action plans and associated capacities, to support the phase out of mercury medical devices under the Minamata Convention

This component will systematically assess measures (including administrative, legal, financial and economic instruments, etc.) to phase-out the production of mercury-containing thermometers and sphygmomanometers in enterprises and promote the introduction and use of mercury-free medical devices in medical facilities. The component will develop and implement integrated approach consisting of policy and regulatory measures, quality standards, fiscal tools, and associated capacities to meet the requirements of the Minamata Convention. Activities under this component will help strengthen baseline levels of effort under the National Plan in expanding beyond a more siloed policy review and amendment exercise, and providing opportunity for a broader consultation amongst private and public partners. It also affords opportunity to look at creative fiscal or revenue generating tools to support the long-term phase out of mercury from the medical device production sector, and to cover any initial cost increases related to procurement of non-mercury devices by key medical facilities.

**Expected outcome:**

Cross Ministerial cooperation established to jointly develop and implement the necessary policy, regulations, tools, action plans and guidelines, in coordination with appropriate private sector partners, to phase out the production and consumption of mercury-containing medical devices, to reduce the use of primary mercury in medical devices, to manage waste of obsolete devices, and to promote the uptake of mercury-free medical devices.

**Expected outputs:**

**Output 1.1:** Inter-ministerial Committee established (e.g., Environment, Health, Industry, etc.) to support the execution of China's National Implement Plan for the Implementation of the Minamata Convention and help identify policy and enforcement capacity gaps between national regulatory policies and the Convention's legal requirements for Parties, and to look at modalities for linking mercury consumption reductions from this sector into the primary mining plans within the National Minamata Implementation Plan to avoid redirection of phased out consumption to other sectors.

**Output 1.2:** Policy and regulatory frameworks, quality control standards, monitoring and management systems, and capacity-building programs developed to support the monitoring, supervision, regulation and enforcement of the phase-out of mercury in the production of medical thermometers and sphygmomanometers, as well as to support the implementation of National Implement Plan for the Implementation of the Minamata Convention by collaborating with World Health Organization (WHO) and referring to international best practice and experience.

**Output 1.3:** Policy and regulatory frameworks, green procurement standards and action plans developed to promote the application of and grow the market for mercury-free medical thermometers and sphygmomanometers in medical facilities.

**Output 1.4:** Development of a Green Finance Framework, with supporting guidance, to:

a) Raise the awareness of enterprises on possible green finance instruments, and to facilitate their access to government and/or private banking investments, in order to support quality-controlled conversion of production lines, and to manage obsolete mercury stocks and contaminated areas.

b) Create a procurement subsidization scheme to support green procurement, application of mercury-free medical thermometers and sphygmomanometers, sound management of obsolete mercury containing devices, any related capacity building and awareness activities in medical facilities.

It should be recognized that there will also be exploration of revenue through application of punitive fiscal measures for non-compliance with regulations governing the production sector.

**Component 2.** Demonstration of technology transfer and investment for (i) Supporting enterprises in phasing out the production of mercury-containing medical devices; (ii) the application of devices in medical facilities, and (iii) enhanced knowledge base for the sound management of obsolete mercury devices, contaminated materials/wastes, and contaminated areas on premises

This component will focus on generating the evidence base for long term provision of the necessary technology transfer and investment support to enable the conversion of the manufacturing from mercury-containing thermometers and sphygmomanometers to mercury-free alternatives. This will be achieved through pilot activities in selected demonstration production facilities, the final number of which will be determined during the PPG (perhaps 3 to 4 out of the top 10 producers). Through project supported demonstration interventions, an incentive mechanism will be established and an assessment to determine the cost and various mercury-free technology options will be completed for each demonstration production facility. In addition, if there are issues of on-premises contamination and significant stores of mercury (containing) waste to be disposed of, there can be piloting of mitigative and safe handling activities (perhaps at 2-3 facilities depending on the findings for prioritization). Ultimately, this will provide critical information for upscale through China's National Plan.

This project component will also promote the uptake of mercury-free alternatives in a number of different size categories and types of demonstration medical facilities, paying particular attention to those located in remote and/or poor areas. Due to the need for better characterization of such facilities, the projected number to be targeted for pilot activities will be determined during PPG. However, the intention is to ensure that there is appropriate representation to mirror China's overall landscape of medical facilities, so that the evidence gathered from piloting is relevant, and can be captured and upscaled post project in the overarching National Plan. The correct use of mercury-free alternatives, including their routine internal and external calibration including required capacity building for the official calibration of mercury-free alternatives, will be supported by the project. The demonstration interventions also aim to train medical staff to correctly use mercury-free thermometers and sphygmomanometers and soundly manage obsolete mercury-containing medical thermometers and sphygmomanometers. Demonstration outcomes will be captured in awareness and training materials and guidance for long term, post-project, broader implementation.

**Expected outcome:**

2.1 Enterprises are capacitated to change over production lines in line with legally mandated national phase-out planning guidelines, and to soundly manage remaining mercury, stockpiled devices and/or contaminated areas on premises resulting in the phase-out of at least 75 tonnes of mercury.

2.2 Staffs in medical facilities have the capacity to use and maintain mercury-free devices, and to soundly manage obsolete mercury devices and related wastes.

**Expected outputs:**

Output 2.1.1 A representative sample of key production facilities demonstrate i) Production of mercury-free medical thermometers; the sound management of obsolete mercury and stocks of mercury devices; ii) remediation pilots at production sites; and, iii) Cooperation with WHO and associated international agencies to assimilate international experience and promote the compliance with mainstreamed international standards for exported non-mercury devices, referring to the technical guidance of WHO on replacement of mercury thermometers and sphygmomanometers in health care.

**Output 2.2.1** Cooperation with WHO is established to share knowledge about the replacement of mercury thermometers and sphygmomanometers in health care. Use of mercury-free devices and the sound management of obsolete mercury-containing thermometers and sphygmomanometers demonstrated in a representative sample of key medical facilities (with greatest potential to facilitate/influence upscale and replication the long run (multiple facilities selected across the various size categories of small, medium or large facility)).

**Component 3.** Development of long-term guidance and tools for the sound management of obsolete mercury-containing devices, and mercury-contaminated areas.

This component will focus on the identification and prioritization process for long-term sound management of mercury-contaminated sites and obsolete mercury-containing thermometers and sphygmomanometers. An assessment regarding the status of mercury contaminated sites (where the production of mercury-containing thermometers and sphygmomanometers has taken place) will be undertaken. The risks posed due to mercury contamination in these sites will be assessed and a strategy for their risk management will be developed. As part of this project component, an assessment of risk to employees and surrounding communities working on or living close to these sites will also be conducted; and ultimately, an overall risk management strategy and associated guidance will be produced for replication in the National Plan. Finally, this component will also undertake a similar risk assessment in the course of development of a risk management plan related to the safe handling and disposal of mercury-containing thermometers and sphygmomanometers in medical facilities.

**Expected outcome:**

Production entities and medical facilities have the appropriate strategies, tools and guidance to i) Identify, monitor, and remediate mercury contaminated sites; ii) Ensure the safe handling and/or disposal of residual mercury and obsolete devices; and (iii) replicate all actions across relevant sectors..

**Expected outputs:**

**Output 3.1** Inventory developed of mercury contaminated sites at enterprises producing mercury-containing thermometers and sphygmomanometers.

**Output 3.2** Risk management strategy, technical guidance and training materials developed for the sound management of residual mercury stocks and obsolete mercury containing devices, and the remediation of contaminated sites on production sites; with all incorporated into the long-term

operationalization of the National Implement Plan for the Implementation of the Minamata Convention to ensure sector wide replication post project.

**Output 3.3** Risk management strategy, technical guidance and training materials developed for the sound management of obsolete mercury-containing thermometers and sphygmomanometers in medical facilities, with all incorporated into the long-term operationalization of the National Implement Plan for the Implementation of the Minamata Convention to ensure sector wide replication post project.

#### **Component 4.** Knowledge Sharing & Management, Monitoring and Evaluation

This component will promote experience gathering, sharing, technical exchanges, information dissemination and awareness raising among different stakeholders including the government, public and private sectors, medical personnel, civil society groups and the general public. This project component will also ensure the smooth implementation of project activities through standard, internal periodical communication, evaluation and external review.

##### **Expected outcome:**

Integrated use of knowledge gathering and sharing tools to facilitate sharing of policy, technical knowledge and lessons, as well as gather disaggregated information on stakeholder attitudes, activities and experiences under the project, which in turn can feed into the standard Monitoring and Evaluation process of this GEF project.

##### **Expected outputs:**

**Output 4.1** Project Communication Strategy created to support differentiated stakeholder (including manufacturing enterprises, medical facilities, mercury mining enterprises, government and international agencies, etc.) awareness raising/engagement and data gathering, i.g., UNDP platform for South-South cooperation used to exchange international experience in import and export management, awareness raising education sessions carried out in related enterprises and health care, dissemination and knowledge exchange plan made and carried out, etc.. Based on the project's demonstration results, a national replication plan aligned with National Implement Plan is developed and rolled out, including green finance mechanism to support government, enterprises and health facilities to transform and meet China's phase out target by 2026.

**Output 4.2** Awareness materials, knowledge gathering, sharing and learning tools created to be distributed or utilized periodically during the project (e.g., surveying during formal project evaluations; disaggregated surveys designed to measure impact before/during/after training or demonstration activities; compiling or updating relevant materials such as guidelines or textbooks for the use of mercury-free alternatives; awareness events for the general public et al.)

**Output 4.3** Execution of standard PIR, Mid Term and Terminal Evaluations as required in the GEF Project cycle, with additional oversight exercises should adaptive management reviews require it.

#### **4) Alignment with GEF focal area and/or Impact Program strategies**

This project is in alignment with the GEF Chemicals and Waste focal area, Program 1: Industrial Chemicals Program, with a focus on reducing the use and releases of mercury, as mandated under the Minamata Convention on Mercury, through activities that will reduce the use of mercury for the production of

medical devices and enhance the management of related contaminated wastes and sites.

This project will demonstrate technical transfer to support the phase-out of the production of mercury-containing medical thermometers and sphygmomanometers and support the introduction and use of mercury-free medical thermometers and sphygmomanometers in medical facilities. The project is expected to reduce the use of mercury by at least 75 tonnes of Hg throughout its duration.

##### **5) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing**

The project is designed to respond to the requirements of the Minamata Convention on Mercury and reduce the risks of mercury on human health and the environment by demonstrating the phase-out of mercury in the manufacturing of medical thermometers and sphygmomanometers. The project also aims to ensure the uptake of mercury-free alternatives in demonstration medical facilities. The project will complement and enhance implementation of China's National Plan to implement the Minamata Convention. Specifically, its incrementality lies in its purpose to

- (i) create the enabling environment (i.e. policy, legal, capacity, financial);
- (ii) technical guidance (including the risk mitigation strategies for safe handling/disposal);
- (iii) the evidence base (i.e. characterizing the production and medical sectors in terms of priorities for action; demonstrating the investment and capacity building activities); and critically,
- (iv) the costs associated with this for representative enterprises and facilities

in order to halt production of mercury producing devices and uptake of non-mercury technology. In turn, these outputs can be used to inform national sectoral planning, and upscale action nationwide in support of China's National Plan for the Implementation of the Minamata Convention.

Therefore, this project represents a critical incremental investment for China to this end.

As mentioned earlier in this document, most of the enterprises currently manufacturing mercury-containing thermometers and sphygmomanometers are private sector companies with low profitability. Furthermore, there are also technical, regulatory, and knowledge-related constraints to be tackled. Thus, the GEF funding will provide critical assistance in providing for: (i) the establishment and implementation of policies, regulations, standards and tools to promote the removal of barriers preventing the transfer to mercury-free production processes and medical devices (outputs 1.1, 1.2); (ii) the building of organizational and institutional capacity at the level of municipalities, public administration and the private sector (outputs 1.1, 1.2, 1.3); (iii) the mobilization of all relevant resources (e.g. capital, land, labor and technology) to phase out mercury with mercury-free alternatives (outputs 2.1.1, 2.2.1); (iv) the introduction of innovative practices and development of tools and technologies for the manufacture of mercury-free alternatives (outputs 2.1.1, 2.2.1); (v) the development of risk assessment and management strategies for both enterprises and medical facilities to deal with mercury waste. (outputs 3.1, 3.2).

Similarly, due to the much higher price of the mercury-free alternatives, lack of medical staff trained in the proper use and calibration of such devices, and overall lack of confidence in accuracy and reliability, medical facilities are reluctant to adopt mercury-free alternatives. In addition, understanding the parameters and related risks associated with the safe management of the obsolete mercury-containing medical devices in medical facilities is lacking. The GEF funding will therefore be critical for:

- (i) the establishment and implementation of policies, regulations, standards and tools to promote the appropriate application of mercury-free alternatives in medical services (outputs 1.1, 1.2);
- (ii) the adaption to mercury-free alternatives through choosing the most appropriate mercury-free alternatives in demonstrative medical facilities (outputs 2.2.1);
- (iii) the risk assessment and building of capacity in sound management of mercury in obsolete mercury-containing medical devices at pilot demonstration medical facilities (outputs 3.1, 3.2, 3.3).

GEF funding will also support the development and operation of a Communications Strategy to enable cooperation on technology exchange between international and Chinese experts and institutions, as well as information sharing and awareness raising system among stakeholders (outputs 4.1, 4.2).

Finally, GEF funding is a must to leverage domestic co-finance. It will also play a significant role as catalyst in promoting the mobilization of social and private sector resources. As mentioned previously, it has already begun to catalyze commitment from project partners, such that so far, indicative co-finance of USD 112 million has been identified from enterprises and medical institutions that will focus heavily on (i) the elimination and technology transformation of the production of mercury containing medical equipment; (ii) on promotion and application of non-mercury technologies in medical facilities; (iii) on environmental and human risk assessment and control measures (within pilot enterprises and medical institutions); (iv) on public awareness, and (v) capacity building activities. The PPG will afford detailed assignment of co-finance in the project budget developed.

This project builds on past projects and initiatives such as:

The GEF Funded "China Minamata Convention Initial Assessment (MIA) project (2015-2018)". Based on the situation in 2014, this project collected the available data of production and use of mercury-containing thermometers and sphygmomanometers, estimated the whole national production in China. Initially provided data reference for China's implementation work. Indeed, the proposed project was identified as a priority during the MIA project, as the production of thermometers and sphygmomanometers is one of the major industries using mercury and the production and utilization of these medical instrument will bring mercury pollution and health risk;

The GEF-funded "Capacity Strengthening for the Implementation of the Minamata Convention (2018-2022)". The on-going capacity strengthening project will partly help in supporting the identification of technologies for producing mercury-free alternatives, which will facilitate the demonstration activities contained in this project. The gaps including policies, technologies and finance for the successful replacement of mercury-added products and convention implement will be further identified.

FECO/MEE is the execution agency for both these projects. The two ongoing GEF projects focus on establishing a comprehensive overview of the mercury issues in China. On the other hand, this project will specifically address the mercury issues in mercury-added products, i.e. mercury-containing thermometers and sphygmomanometers.

Co-financing that will be provided by UNDP, the recipient government, private sector entities, medical facilities and others will focus on: (i) the establishment of infrastructure for manufacturing mercury-free alternatives in demonstration plants (outcome 2); (ii) support capacity strengthening to enable the introduction and correct use and calibration of mercury-free alternatives in demonstration medical facilities (outcome 2); and (iii) support technology exchange, information gathering, sharing and awareness raising among stakeholders (outcome 4).

## **6) Global environmental benefits (GEFTF) and/or adaption benefits (LDCF/SCCF):**

As a large consumer of mercury, the current annual consumption of mercury in China for the manufacture of medical thermometers and sphygmomanometers is estimated to be 200-250 tonnes annually. China is also an exporter of medical thermometers and sphygmomanometers – approximately a third of its production is exported. Therefore, this project will contribute significantly to the global efforts to reduce the production, use and release of mercury into the global environment.

This project aims to phase-out mercury in medical thermometers and sphygmomanometers in demonstration production facilities and promote the uptake and proper use and calibration of mercury-free alternatives in demonstration medical facilities. Through these demonstration interventions, at least 75 tonnes of mercury is expected to be phased-out in the production of thermometers and sphygmomanometers. Besides the reduction of mercury use, this project also assist National Implement Plan for the regulation and supervision on the production of mercury thermometers and sphygmomanometers and the mining of primary mercury, encourages and guides the enterprises to manufacture mercury-free alternatives with low-chemicals and sound management of the chemicals, and develop a national replication plan based on the demonstration.

This project is therefore key in addressing one of the key articles of the Minamata Convention on Mercury, which stipulates that "each party shall not allow, by taking appropriate measures, the manufacture, import or export of mercury-added products listed in part I of annex A after the phase-out date specified for those products".

Under its component 1, the project will develop strategic, legal, technical, financial, tools etc. to promote the phase-out of the manufacture of mercury-containing thermometers and sphygmomanometers and support the uptake of mercury-free medical devices in medical facilities. The project's component 2 will focus on demonstrating the transfer of technologies that allow for the manufacturing of mercury-free alternatives in enterprises and promote the appropriate application of mercury-free alternatives in medical facilities; Component 3 will focus on the development of long term guidance and tools for the sound management of mercury-contaminated sites and obsolete mercury and mercury-containing thermometers and sphygmomanometers at enterprises and medical facilities, to minimize future exposure to mercury and mercury containing wastes and soils. Component 4 will promote technical exchange, information gathering, sharing and awareness raising. This project will be the first initiative to demonstrate the phase-out of mercury in the production of medical thermometers and sphygmomanometers and the uptake of mercury-free medical devices in medical facilities in China and will provide the basis for the replication of these environmentally sound techniques nationwide. Project experiences, knowledge and lessons learned will be shared nationwide and through UNDP's global networks.

## **7) Innovation, sustainability and potential for scaling up:**

This project is clearly innovative, stemming from its approach to demonstrate technology transfer to support conversion from technologies manufacturing mercury-containing thermometers and sphygmomanometers to mercury-free ones. Specifically, areas of innovation anticipated lie in the development of potential long-term green finance mechanisms to support upscale of conversion of facilities, safe handling of mercury waste and green procurement by medical facilities. The R&D work into streamlining performance of Galistan devices and overall standardization of production and performance of the non-mercury technologies in China could also yield innovations. The technologies, knowledge and experiences obtained through this project can be used as basis for nationwide replication. In addition, coming up with solutions to optimize performance of alternatives (e.g., those associated with Galinstan-in-glass

thermometers, and quality/performance standard setting for devices) is something that can be of global benefit to the manufacturing sector. At the operational level, the promotion of R&D and technology transfer to mercury-free alternatives will assist privately owned production facilities to phase out mercury. At the managerial and economic development level, removal of market barriers to the adoption of new technologies will be encouraged through a novel incentive programs. At the strategic level, national policy reform will promote green industrial development in China, including through use of specific regulations and legal frameworks to impose increasing financial costs for those non-compliance companies.

Improving the regulatory framework and strengthening China's capacity through relevant policy adjustments and increased stakeholder awareness, will ensure the phase-out of the production of mercury-containing thermometers and sphygmomanometers, and support China's national implementation of the Minamata Convention on Mercury. This will ensure the sustainability of the project. The sustainability of technology interventions will be ensured through the demonstrative adaption to mercury-free technologies in enterprises, which can be easily replicated to other plants. Cost effective technologies will be promoted throughout this project to ensure engagement and awareness of the private sector stakeholders. Social sustainability will be ensured by strengthening information dissemination of project outcomes and awareness raising of the general public, private sectors and other stakeholders to minimize exposure to mercury.

This project attaches high importance to technology innovation. The novel and updated technologies for mercury-free thermometers and sphygmomanometers can be scaled up and replicated in China and other countries and regions through replication activities. The experiences obtained through the demonstration of appropriate application of mercury-free thermometers and sphygmomanometers can also be replicated in China and other countries and regions.

**1b. Project Map and Coordinates**

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

This project will be implemented solely in the jurisdiction of China. The geo-referenced information and map of the demonstration enterprises and medical facilities will be discussed and determined in the preparation stage of this project.

## 2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities Yes

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

**In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.**

Three enterprises that produce over 2/3 of thermometers, and two enterprises that produce over 1/2 of sphygmomanometers in China, were consulted during the project identification phase. Some Beijing-based large medical facilities were consulted on the application of mercury-containing thermometers and sphygmomanometers;

Several Associations and research institutions that are well connected with the industries and the medical services were also consulted; Local communities that are potentially affected by or could potentially be involved in generating mercury-exposure events were also consulted.

Effective Stakeholder engagement is the basis for achieving sustainable project implementation. In this regard, a wide range of relevant stakeholders will be consulted during the PPG phase to ensure active project participation and commitment. A series of meetings will be organized to discuss the project objectives, potential outcomes and outputs, to ensure active participation and support. Specific discussions with key stakeholders such as the Ministries of Health, Industry, Environment, State Administration for Market regulation, et. al., health facilities, production facilities, health related NGOs, and relevant community level groups, will be held to shape project design and activities, and to ensure goal alignment in support of the project. Such consultations will also help in ensuring that the outputs can be taken up, replicated and scaled through the execution of China's National Implement Plan for the Implementation of the Minamata Convention. In addition, relevant stakeholders with a focus on gender and job training and safety will be sought out for engagement wherever possible.

Note that even at PIF stage, though not mandatory in the GEF project cycle, UNDP does a pre-SESP exercise to take a preliminary look at Environment and Social Safeguards, and identify possible risks, and groups that may be at risk, from the project's unintended consequences. This exercise further informs the PPG on the stakeholders that should be contacted in the course of developing the CEO endorsement package, and which should be engaged in any risk mitigation plans or actions that may be deemed necessary when the SESP is properly analyzed for prioritization of those risks with greatest chance of actually becoming a reality in the course of the project.

### 3. Gender Equality and Women's Empowerment

**Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).**

Gender dimensions will also be a critical component of this project. In the manufacturing of mercury-containing thermometers and sphygmomanometers, there are more female workers than male workers employed. For the use of mercury-containing thermometers and sphygmomanometers in medical services, nurses, who are predominantly female, use mercury-containing thermometers and sphygmomanometers on a daily basis at triage. Therefore, these females are exposed more often to mercury when these mercury containing medical devices break during use. Recognizing that the level of exposure to mercury and its related impacts on human health are determined by social and biological factors, women, children and men might be exposed to different kinds, levels and frequency of mercury. therefore, gender mainstreaming will be an integral part of this project. Particularly component 1 and national strategies developed under that component will consider related gender and gender disaggregated health risks and other issues, with appropriate stakeholder associations and expertise. The awareness raising in component 4 will also pay more attention to women to help them be well prepared for the protection from mercury-exposure.

The concepts of gender mainstreaming, originate in a globally agreed strategy for achieving gender equality and women empowerment, as defined by the United Nations Economic and Social Council in 1997 as "a strategy for making women's as well men's concerns and experiences an integral dimensions of policies and programmers in all political, economic and societal spheres' so that women and men benefit equally and inequality is not perpetuated..". This will be the basis for practical gender activities, especially by identifying gaps in gender equality, throughout the project. Outcomes of the gender problem areas such as allocation of sufficient funds, gender equality, gender 'soft' areas such as gender health and education, or "gender-neutral" areas such as infrastructure and political commitment identified in the UN Secretary-General's Review and Appraisal of the implementation of the Beijing Platform for Action" will provide a basis for the gender assessment during this project. A specific gender analysis for this project will be conducted during the PPG stage of the proposed project in close consultation with the UNDP gender advisor.

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes**

**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**

**Will the project's results framework or logical framework include gender-sensitive indicators?**

Yes

#### 4. Private sector engagement

**Will there be private sector engagement in the project?**

Yes

**Please briefly explain the rationale behind your answer.**

Most of the enterprises manufacturing mercury-containing thermometers and sphygmomanometers are privately owned; therefore, this project will directly target working closely with enterprises from the private sector. All the enterprises that manufacture mercury-containing thermometers and sphygmomanometers will be invited to participate in this project if they are willing to convert their operations to mercury-free thermometers and sphygmomanometers. The rationale for enterprise selection will depend on their willingness to provide co-financing for their conversion.

There are also many private sector medical facilities that will be invited to join in the demonstration of the uptake of mercury-free thermometers and sphygmomanometers if they are willing to participate and co-finance this project.

## 5. Risks

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

| Risks   | Level  | Mitigation measures  |
|---|--------|--|
| Low participation of stakeholders   | Low    | Awareness raising through workshops, posters, press releases, TVs, radios and internet. Stakeholders will be widely informed on the issue of mercury contained in medical thermometers and sphygmomanometers.  |
| Mercury-containing thermometers and sphygmomanometers producers might not willing to transfer to mercury-free technologies                        | Low    | Awareness raising on the requirements of the Convention and national strategies, technical assistance and technologies replication through demonstration, enhancement of monitoring and appropriate incentive mechanism.   |
| Medical facilities might not willing to use mercury-free alternatives   | Medium | Awareness raising on the requirements of the Convention and national strategies; awareness raising of the management and health workers in the medical facilities on the accuracy and reliability of mercury-free alternatives; sufficient training on the appropriate application of mercury-free alternatives; and risk assessment and management on the application of mercury-containing thermometers and sphygmomanometers in medical facilities. |
| Delayed demonstration of transfer from production of mercury-containing thermometers and sphygmomanometers to mercury-free alternatives in plants | Low    | Information exchange on the mercury-free technologies, step-by-step strategy for the transfer, and R&D efforts on the innovation of mercury-free technologies.   |

## 6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

The overall project institutional structure is envisioned as seen in Figure 3 below:

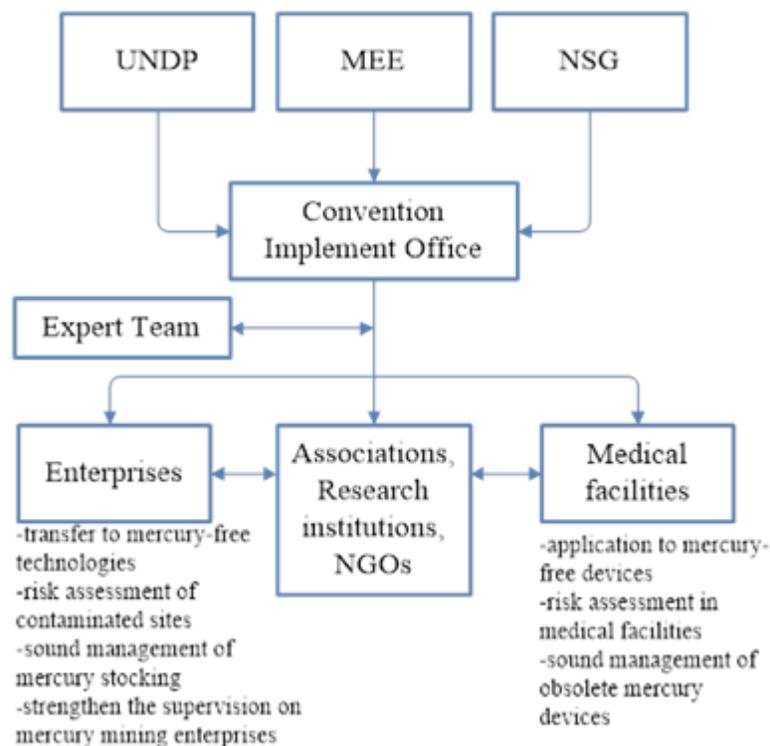


Figure 3: Project Stockholder Arrangement

The project will engage stakeholders from both the public and private sector. Many parties will be involved in the preparation and implementation of the project. The roles and responsibilities of various stakeholders directly involved in project implementation are described in Figure 3. These include:

- UNDP, which will be the GEF implementing agency (IA) for the project;
- Ministry of Ecology and Environment (MEE), as the administrative authority on ecological and environmental protection, is designated by the State Council as the core agency for coordination of all mercury related activities in China. As the focal point for the implementation of the Minamata Convention in China, MEE is national implementing agency for this project;

- The National Steering Group (NSG) is an Inter-ministerial Steering Group and will comprise of MEE and other ministries like the Ministry of Industry and Information Technology (MIIT), the National Health Commission (NHC) etc. It will provide overall guidance and coordination for the implementation of the relevant project activities and ensure that inputs and contributions are available as required; The NSG will secure the cooperation, as necessary, with key Ministries and other public/private decision-making bodies, to ensure that execution of activities occurs smoothly and in an integrated way with overall national policies and planning;
- The National Project Team comprising of staff from MEE, MIIT, and NHC etc will be established and based in Foreign Environmental Cooperation Center (FECO, formerly the Foreign Economic Cooperation Office) of MEE.
- Participating production facilities and medical facilities will be the major role-players in the demonstration of technology transfer to and application of mercury-free alternatives;
- Associations and research institutions that are well connected with industries and the healthcare sector will provide information and coordination in implementing relevant activities and provide technical/policy consultation as well as awareness raising and environmental risk assessment of contaminated sites;
- Research institutions and laboratories will be engaged in the gap identification of the regulatory framework, R&D for mercury-free thermometers and sphygmomanometers, risk assessment and management of mercury-contaminated sites to minimize exposure risks to population groups. The project also seeks public participation by consulting those potentially affected by the production, use and management of mercury-containing thermometers and sphygmomanometers, e.g. residents living close to mercury-using industries and employees of such industries.
- Mercury mining enterprises. Strengthening the supervision on upstream mercury mining enterprises involved in this project is one of the measures to fulfill the convention and reduce the use of mercury.

During the project's preparation, a series of consultations and/or interviews will be undertaken with all types of different stakeholders. Assessments will be carried out in order to collect information on the opportunities and constraints the various stakeholders are facing. The project will mobilize stakeholders from both the public and private sector through knowledge sharing.

This project also builds on and complements other projects in China.

Two relevant GEF projects were approved: "Minamata Convention Initial Assessment (MIA) in the People's Republic of China (2014-2016)" and "Capacity Strengthening for the Implementation of the Minamata Convention (2018-2022)". FECO/MEE (FECO/MEP) is the execution agency for both these projects.

The proposed project was identified as a priority during the MIA project. Based on the results of the MIA, technical and financial needs for the successful replacement of mercury-added products were identified as a priority.

The on-going capacity strengthening project will partly help in supporting the identification of technologies for producing mercury-free alternatives, which will facilitate the demonstration activities contained in this project.

The two ongoing GEF projects focus on establishing a comprehensive overview of the mercury issues in China. On the other hand, this project will specifically address the mercury issues in mercury-added products, i.e. mercury-containing thermometers and sphygmomanometers.

## 7. Consistency with National Priorities

### Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

- - National Action Plan for Adaptation (NAPA) under LDCF/UNFCCC
- National Action Program (NAP) under UNCCD
- ASGM NAP (Artisanal and Small-scale Gold Mining) under Mercury
- Minamata Initial Assessment (MIA) under Minamata Convention
- National Biodiversity Strategies and Action Plan (NBSAP) under UNCBD
- National Communications (NC) under UNFCCC
- Technology Needs Assessment (TNA) under UNFCCC
- National Capacity Self-Assessment (NCSA) under UNCBD, UNFCCC, UNCCD
- National Implementation Plan (NIP) under POPs
- Poverty Reduction Strategy Paper (PRSP)
- National Portfolio Formulation Exercise (NPFE) under GEFSEC
- Biennial Update Report (BUR) under UNFCCC
- Others

This project is consistent with the priorities identified in China's Minamata Initial Assessment (MIA) under the Minamata Convention. The Chinese government has made significant effort to control mercury pollution and signed the Minamata Convention on Mercury on October 10, 2013. The Convention went into effect on August 16, 2017. The GEF MIA project has set China on the right path to fulfilling its obligation under the Minamata Convention, and place sound chemicals management at the forefront of the national sustainable development agenda. The proposed project will be fully aligned with priorities identified in China's MIA, which will focus on the phase-out of mercury in medical thermometers and sphygmomanometers in key production facilities and promote the appropriate application of mercury-free alternatives in medical services.

The project is also fully consistent with the national strategies of environmental protection in China. In 2011, the National Development and Reform Commission issued the "Guiding Catalogue of Industrial Structure Adjustment (2011 version)," which encouraged R&D on and the use of mercury-free thermometers and sphygmomanometers and restricted the production of mercury-containing thermometers and sphygmomanometers. In 2014, the then Ministry of Environmental Protection issued the "National Catalogue of Environmental Protection Technology", which listed mercury-containing thermometers and sphygmomanometers as high-pollution and high-environmental-risk products. The Ministry of Ecology and Environment has initiated work to prepare a National Implement Plan for the implementation of the Minamata Convention on Mercury, including the phase-out of medical thermometers and sphygmomanometers. Considering the production of mercury-free thermometers, the standard for calibration of medical electronic thermometers (JJF 1226-2009) was issued to facilitate the production and application of electronic thermometers. There are many other related strategies and plans being explored to promote the production and application of mercury-free thermometers and sphygmomanometers.

## 8. Knowledge Management

**Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.**

Whilst a full knowledge management strategy will be developed in the course of the PPG, it is already envisioned that there will be communication with stakeholders through the production and dissemination of information via fact sheets, notes for policy makers, press releases, scientific publications, and awareness raising campaigns. The knowledge, experience and know-how gained through this project will be documented for future replication to all practitioners and other stakeholders in the sector. Complementary activities such as: (i) annual workshops bringing together community, departmental, regional and national stakeholders, private sector, associations, NGOs, etc. to discuss opportunities and constraints, share experiences and promote learning, incorporation of reports into the database of municipalities and statistics directorates; (ii) the dissemination of information on lessons learned and experiences shared through programs on media (local, national and international televisions and radio stations, internet etc.). In addition, UNDP is actively coordinating with the Minamata Convention secretariat on technical consultation aspects of project implementation and can facilitate sharing of lessons from its own portfolio, the wider GEF Chemicals portfolio and other knowledgeable partners.

**Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)**

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

| <b>Name</b>    | <b>Position</b>             | <b>Ministry</b>     | <b>Date</b> |
|----------------|-----------------------------|---------------------|-------------|
| Ms. Peng XIANG | GEF Operational Focal Point | Ministry of Finance | 10/9/2019   |

**ANNEX A: Project Map and Geographic Coordinates**

Please provide geo-referenced information and map where the project intervention takes place

To be provided if applicable