





MARKET STUDY ON THE AVAILABILITY OF MERCURY-FREE PRODUCTS IN TRINIDAD AND TOBAGO

Technical Report

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Market Study on the Availability of Mercury-free Products in Trinidad and Tobago –

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List of Acronyms

ACP	Africa, Caribbean, and the Pacific (regions)
ASGM	Artisanal and Small-scale Gold Mining
ASYCUDA	Automated Systems for Customs Data
BCRC-Caribbean	Basel Convention Regional Centre- Caribbean
BRI	Biodiversity Research Institute
CFLs	Compact Fluorescent Lamps
CCFLs	Cold Cathode Fluorescent Lamps
CLiC	Clean Lighting Coalition
COP-4	Fourth Meeting of the Conference of the Parties to the Minamata Convention
	on Mercury
COPE	The Council of Presidents of the Environment
CRMMN	Caribbean Regional Mercury Monitoring Network
DCTT	Dental Council of Trinidad and Tobago
EEB	European Environmental Bureau
EEFLs	External Electrode Fluorescent Lamps
EMA	Environmental Management Authority
EPPD	Environmental Policy and Planning Division
EU	European Union
FAO	Food and Agricultural Organisation
GEF	The Global Environment Facility
GHS	Global Harmonised System for Classification and Labelling of Chemicals
GoRTT	Government of the Republic of Trinidad and Tobago
Hg	mercury
HIDLs	High Intensity Discharge Lamps
HPMV	High Pressure Mercury Vapor
HS	Harmonised System
IISD	The International Institute for Sustainable Development
IMERC	The Interstate Mercury Education and Reduction Clearinghouse
ISLANDS	Implementing Sustainable Low and Non-Chemical Development in Small
	Island Developing States (Programme)
LED	Light Emitting Diode
LFLs	Linear Fluorescent Lamps

MAPs	Mercury-added products
MBTT	Medical Board of Trinidad and Tobago
MEAs	Multilateral Environmental Agreements
MeHg	Methylmercury
MIA	Minamata Initial Assessment
МоН	Ministry of Health
MoPD	Ministry of Planning and Development
NEP	National Environmental Policy
NGOs	Non-Governmental Organisations
NWG	National Working Group
OACPS	Organisation of African, Caribbean and Pacific States
PTCCB	Pesticides and Toxic Chemicals Control Board
PTCI	Pesticides and Toxic Chemicals Inspectorate
SIDS	Small Island Developing States
SOPs	Standard Operating Procedures
SWMCOL	Trinidad and Tobago Solid Waste Management Company
T&TEC	Trinidad and Tobago Electricity Commission
THA	Tobago House of Assembly
TTBS	Trinidad and Tobago Bureau of Standards
TTCIC	Trinidad and Tobago Chamber of Industry and Commerce
TTD	Trinidad and Tobago Dollars
ТТМА	Trinidad and Tobago Manufacturers' Association
UNEP	United Nations Environment Programme
USA	United States of America
WHO	World Health Organisation
XRF	X-ray fluorescence spectroscopy
ZMWG	Zero Mercury Working Group

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About This Document

This report was developed under the project, "Phasing out of Mercury-Added Products in Trinidad and Tobago" as part of initiatives being conducted by the European Environmental Bureau (EEB)/ Zero Mercury Working Group (ZMWG). This project is being conducted and funded by the Africa, Caribbean, and the Pacific (ACP) Multilateral Environmental Agreements (MEAs) programme. The Ministry of Planning and Development (MoPD) of the Government of the Republic of Trinidad and Tobago (GoRTT) functions as the National Focal Point.

Sole responsibility for the contents of this document lies with the Consultant who developed the report.

Stakeholder consultations with private sector companies and individual professionals were conducted through surveys and interviews. In order to maintain confidentiality, these stakeholders and details on their activities related to the market study conducted are not provided. Labelling codes have been assigned for reference of certain stakeholders where necessary.

Public sector institutions have been identified although individual persons from these institutions remain unnamed in the report.

Every effort has been made to ensure that the data provided in the report does not cause commercial or other prejudice to any stakeholder.

Specific products or brands mentioned in this report should not be construed as providing any endorsement or marketing advantage.

The Consultant thanks the designated representatives from EEB/ZMWG, the MoPD and the National Working Group assigned to this project for their support and feedback provided for the development of this report.

Executive Summary

Project Background

Mercury (chemical symbol: Hg) is a naturally occurring element that has been utilised by humans for centuries in a variety of processes but is also among the top ten (10) chemicals or groups of chemicals of major health concern (WHO, 2017).

Recognising the need to address the negative effects of mercury, the Minamata Convention on Mercury was developed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds by, in part, regulating, *inter alia*, the supply, sources, trade, storage and disposal of mercury and its compounds; mercury-added products (MAPs) and processes; mercury waste; and the emissions and releases of mercury. The Minamata Convention entered into force on August 16, 2017, with 138 Parties to date (*as of October 2022*). Parties to the Minamata Convention on Mercury are required to meet the obligations set forth in the Convention's text and annexes.

Under Article 2 of the Minamata Convention, MAPs are defined as a "product or product component that contains mercury or a mercury compound that was intentionally added". Article 4 outlines measures to phase out or, in the case of dental amalgam, phase down the manufacture, import and/or export of certain MAPs.

The Government of the Republic of Trinidad and Tobago (GoRTT) is not yet a Party to the Minamata Convention on Mercury but has been actively considering acceding to the Convention and has participated in several initiatives in recent years to better inform any upcoming decision. These initiatives have included projects such as (but not limited to):

- "Development of Minamata Initial Assessment in the Caribbean: Jamaica, Saint Kitts and Nevis, Saint Lucia and Trinidad and Tobago" (2019) which resulted in the completion of a National Minamata Initial Assessment Report for Trinidad and Tobago in 2018 and;
- "Identifying Feasible Strategies for the Environmentally Sound Disposal of Spent Lighting Products in the Caribbean" which assessed the current national disposal management practices for spent mercury-added lighting products using draft environmentally sound management manuals developed under the Basel Convention for the Control of Transboundary Movement of Hazardous Wastes and their Disposal.

This project, 'Phasing out Mercury-Added Products in Trinidad and Tobago' was developed as part of the European Environmental Bureau (EEB)/ Zero Mercury Working Group (ZMWG)'s activities to support countries under the Africa, Caribbean, and the Pacific (ACP) Multilateral Environmental Agreements (MEAs) programme. It aims to develop strategies to reduce the use and releases of elemental mercury and MAPs listed in Article 4 of the Minamata Convention in the context of the ACP MEAs programme.

The project is a partnership between the European Union (EU), United Nations Environment Programme (UNEP), Food and Agricultural Organisation of the United Nations (FAO), and the Organisation of African, Caribbean and Pacific States (OACPS).

The project is being executed nationally in collaboration with the Ministry of Planning and Development (MoPD) of the GoRTT. A National Working Group (NWG) that was spearheaded by the MoPD and comprised of representatives from key governmental organisations, private sector institutions and non-governmental organisations (NGOs) was formed to oversee the project's activities.

As part of the project's activities, this market study is being conducted to determine the availability, accessibility, efficacy, and technical feasibility of replacing MAPs with alternatives that comply with Article 4 'Mercury-Added Products' of the Minamata Convention on Mercury. Due to the available data and resources available for the market study, the targeted products under this study include:

- 1. Lighting Devices
- 2. Switches, Relays and Thermostats
- 3. Medical Measuring Devices (Thermometers and Blood Pressure Gauges)
- 4. Dental Fillings
- 5. Topical Antiseptics

This market study was conducted within the context of the relevant regulatory framework of Trinidad and Tobago and in consultation with stakeholders. In addition to reviewing import data on relevant products from the Customs and Excise Division, surveys were also developed and distributed to gather feedback from public and private sector organisations/companies. While various measures were taken to encourage stakeholder participation for surveys, responses were generally low. Desktop research was conducted to further support the assessment.

Findings and Analysis of the Market Study on Target MAPs

Table 1 provides a summary of the results of the market study conducted for the targeted consumer products.

Table 1: Summary Assessment of the Availability of Minamata Convention-
compliant Alternative Products to MAPs

Lighting Devices			
Type of Product	Light Emitting Diode (LED) Lighting Devices and, to a lesser extent mercury-		
	free High Intensity Discharge Lamps (HIDLs).		
Availability	LEDs replacing Compact Fluorescent Lamps (CFLs) are		
	predominantly available on the market. The Trinidad and Tobago		
	Electricity Commission (T&TEC) has engaged in a LED bulb		
	distribution programme for the free provision to LED bulbs to		
	households which is ongoing.		
	LEDs replacing Linear Fluorescent Lamps (LFLs) are widely available		
	on the national market.		
	LEDs replacing HIDLs are available on the local market though non-		
	LED HIDLs such as High-Pressure Sodium Lamps are still imported		
	and sold at a higher rate than the LED alternatives. Based on retailer		
	feedback, these types of HIDLs (High Pressure Sodium Lamps and		
	Metal Halide Lamps) are currently imported from countries that are		
	Parties to the Minamata Convention and are therefore expected to be		
	compliant with Convention requirements.		
Efficacy/Reliability	LEDs do not contain mercury and their use results in lower energy		
	consumption which subsequently results in lower carbon emissions (in		
	comparison to mercury-added or other types of light bulbs). LEDs demonstrate		
	higher brightness (lumens) and have a longer functional lifespan than		
	mercury-added lighting products.		
Electrical Switches,	Relays and Thermostats		
Type of Product	Mercury-free switches; mercury-free relays; electromechanical or digital		
	thermostats		
Availability	No local data could be found to confirm availability as Customs and Excise		
	import data does not currently differentiate between mercury-added and		
	mercury-free varieties and feedback from stakeholders was inconclusive		
	(since these products are often components within larger products), but global		
	trends indicate that mercury-free alternatives have become widely available		
	over the past 2 decades.		
Efficacy/Reliability	While the specific suitability of switches, relays and thermostats vary across		
	multiple potential applications, research indicates that mercury-free switches,		
	relays, and thermostats are globally available, reliable and adequate for a		
	variety of functions.		
Medical Measuring	Devices – Thermometers		

Type of Product	Mercury-free thermometers may include alcohol or infrared types, but for		
	clinical use, digital thermometers are the most well-known.		
Availability	Mercury-free thermometers are the main types of thermometers in use		
	across all relevant sectors and the main types that are available on the		
	global and local market in both the public and private sectors.		
	• Feedback from medical supply companies in Trinidad and Tobago have		
	confirmed that mercury-added thermometers have become increasingly		
	unavailable as manufacture of these products has been greatly reduced		
	globally which is likely due to the preference for mercury-free varieties and		
	the phase-out efforts of Parties under the Minamata Convention on		
	Mercury.		
Efficacy/Reliability	Extensive research by the World Health Organisation (WHO) and other		
	recognised bodies have concluded that digital thermometers have a high		
	efficacy (in comparison to mercury-added thermometers and other types).		
Medical Measuring	Devices – Blood Pressure Gauges		
Type of Product	Aneroid sphygmomanometers and several types of automated (electronic)		
	blood pressure gauges.		
	(Note: some types may contain small concentrations of mercury. Currently,		
	these are not restricted under the Minamata Convention).		
Availability	Minamata Convention-compliant blood pressure measuring devices are		
	the predominant types available on the global and local market.		
	• Feedback from medical supply companies in Trinidad and Tobago have		
	confirmed that mercury-added sphygmomanometers have become		
	increasingly difficult to source and their use is generally discouraged due		
	to the high quantities of mercury involved and breakage risks. Globally,		
	the manufacture of these MAPs has reduced due to the increased		
	preference for mercury-free and technologically advanced varieties and		
	phase-out efforts of Parties under the Minamata Convention on Mercury.		
Efficacy/Reliability	• Research by the WHO concluded that mercury-free validated automatic		
	blood pressure machines produce more accurate and consistent		
	measurements (in comparison to mercury-added measuring devices).		
Dental Restoration Materials (Fillings)			
Type of Product	Composite (resin) fillings		
Availability	Composite fillings for dental restoration have become the predominant		
	preference on the global and local market for many years with 58 – 75%		
	of national dentists indicating that composites are the sole type of dental		
	restoration material in use/ in stock.		

	• Of the remaining 25 – 42% of the dental sector in Trinidad and Tobago		
	that indicated that dental amalgam was still in use or in stock, the number		
	of procedures in which dental amalgam was used is minimal.		
Efficacy/Reliability	• Global assessments on technical efficacy of composite fillings have		
	concluded that they exhibit satisfactory mechanical properties, require		
	less preparation for use and preferred by patients due to aesthetics (in		
	comparison to dental amalgam fillings).		
	Providing adequate training of dental practitioners in the preparation and		
	placement of composite fillings will ensure their effectiveness and		
	durability.		
Topical Antiseptics			
Type of Product	Several antiseptic ointments and powders including Acriflavine Solution,		
	Sulphur Powder, and Iodine Tincture.		
Availability	Numerous mercury-free alternatives are widely available and more popular on		
	the global and national markets (in comparison to Mercurochrome Solution		
	1%), as confirmed by a well-established pharmaceutical company that		
	manufactures and distributes antiseptics nationally.		
Efficacy/Reliability	Each of the mercury-free topical antiseptics on the national market appear to		
	have comparable and adequate reliability for their intended purposes.		
NOTE: An economic analysis was not conducted under this report as the alternatives are already			
common on the global market and are generally considered relatively affordable. The economic			
feasibility of mercury-free products is also made more evident when the cost of ensuring			
environmentally sound disposal of MAPs is considered.			

Conclusions and Recommendations for Trinidad and Tobago to ensure the implementation of Article 4 of the Minamata Convention on Mercury

When overall efficacy, availability and accessibility is considered, the replacement of MAPs with Minamata Convention-compliant products is determined to be both feasible and generally favoured due to the less or non-toxic nature of the mercury-free alternatives. Many of the global manufacturers of MAPs have already committed to the production of mercury free alternatives. In addition, the replacement of MAPs with mercury-free alternatives, is already an ongoing process in Trinidad and Tobago. For the complete phase out of the assessed MAPs and for the continued phase down of dental amalgam, recommendations are made below.

Short-term recommendations (can be achieved within 1 year) are as follows:

• Accession to the Minamata Convention on Mercury by the GoRTT:

The Minamata Convention sets out obligations for the prohibition of the manufacture, import and export of MAPs listed (as per Article 4 'Mercury-added products') and facilitates technical guidance and financial mechanisms to support the phase-out of MAPs. Accession to the Convention will allow Trinidad and Tobago to gain further access to support for the promotion of mercury-free alternative products.

Based on this market study, the implementation of Article 4 of the Convention is anticipated to be a smooth process for the GoRTT as Minamata Convention-compliant products already dominate the global and local market.

In terms of the impact on commerce, local distribution companies already import Convention-compliant products for sale with the demand for these types of products increasing as MAPs have become less popular. As many of these local companies also export to other Caribbean islands, the continued promotion of mercury-free alternatives by these companies can have positive impacts on their regional scope as currently nine (9) Caribbean countries are Parties to the Convention with further countries actively considering becoming Parties.

Regional projects and initiatives (such as, the Global Environment Facility (GEF) programme, "Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States") that are taking a coordinated approach for the management of chemicals and hazardous waste are also ongoing and phasing out MAPs are consistent with these initiatives.

In this regard, the GoRTT becoming a Party to the Minamata Convention will not only promote and protect human health and the environment nationally, but it will also enhance the Caribbean region's efforts, along with globally coordinated initiatives.

- Development of a Communication and Coordination Strategy to Promote Mercury-free Alternative Products:
 - The current NWG members represent government entities, private sector organisations and non-governmental organisations that may have the capacity to support MAP phase-out activities through their regulatory mandates and enhanced coordination efforts. These should include the development of mercury-free product procurement policies for the relevant public and private sector bodies. Considerations should also be made to include the Dental Council of Trinidad and Tobago (DCTT), The Medical Board of Trinidad and Tobago (MBTT) and representatives from the Ministry of Health and/or Regional Health Authorities

responsible for procurement of medical devices and material in the public healthcare sector.

Awareness strategies to educate the public as well as, relevant businesses and stakeholders and promote mercury-free alternatives should be considered through public-private partnerships which should be led by the NWG. Coordination of public awareness efforts between government stakeholders and private stakeholders in the relevant manufacturing, retail and medical sectors is essential to ensure clear communication and follow-through for the phase-out of MAPs and replacement with mercury-free alternative products. Private sector engagement can be coordinated through collective bodies such as (*but not limited to*) the Trinidad and Tobago Chamber of Industry and Commerce (TTCIC) and the Trinidad and Tobago Manufacturing Association (TTMA).

• Coordination with Related Projects and Initiatives for the Overall Protection of Human Health and the Environment:

- Under the National Environment Policy (NEP), 2018 and the Green Government Policy, 2011, the promotion of mercury-free products is already directly or indirectly addressed. For example, energy conservation objectives under the Green Government Policy, 2011, encourage the use of LED lighting for government offices. Additionally, the LED Light Bulb Distribution Program and streetlight programmes being conducted by T&TEC have encouraged energy efficiency through the promotion of LEDs. These examples link to the NEP (2018) *Priority 3: Improving the Local Environment*, in relation to green architecture and infrastructure. The objectives of the NEP (2018) and related policies should continue to be further supported by the MoPD and other members of the NWG. The possibility of coordinating efforts for promoting mercury-free products with the initiatives of the National Council for Sustainable Development, a body of key stakeholders in relevant government agencies, private sector associations and academic institutes, that was established for the implementation of the NEP, 2018, should be considered by the NWG.
- Amendments to the Dental Profession Act, Chapter 29:54, to include the protection of the public against the practices of unlicensed dentists have been proposed by the DCTT and dental professionals. These amendments may indirectly support the phase down of dental amalgam as undocumented dental amalgam use (which may

include hand-mixing of dental amalgam) may be conducted by unlicensed persons. Efforts to coordinate with the DCTT and Ministry of Health to raise awareness on this issue should be considered by the NWG.

- Trinidad and Tobago is currently involved in the overall strengthening of the regional laboratory capacities for testing of products to identify or quantify mercury content under the Caribbean Regional Mercury Monitoring Network (CRMMN) initiative developed by the Biodiversity Research Institute (BRI) and the Department of Analytical Services in Antigua and Barbuda. Activities for the initiative are ongoing and regular updates should be provided to the NWG to monitor progress.
- Trinidad and Tobago is also a participating country under the global programme, "Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (ISLANDS)" being funded by the Global Environment Facility and executed regionally by the Basel Convention Regional Centre for the Caribbean (BCRC-Caribbean). This project aims to strengthen countries' abilities to control the flow of chemicals, products and materials into their territories and to unlock resources for long term management of chemicals and wastes including integrated chemicals and wastes management in Small Island Developing States (SIDS). The project will specifically target the management of Persistent Organic Pollutants and mercury. Acceding to the Minamata Convention *prior to* the commencement of the mercury-specific activities under the project can potentially allow the GoRTT to benefit from them by garnering additional resources to implement specific projects in Trinidad and Tobago.

Longer-term recommendations (can be achieved within 1-5 years) include:

- Enhancement of the National Regulatory Framework:
 - Consider the development and adoption of amendments to the Dental Profession Act, Chapter 29:54 to formally include measures outlined in Article 4 'Mercury Added-Products' and Annex A Part II of the Minamata Convention.

- Ensure the training of Customs and Pesticides and Toxic Chemicals Inspector and the Trade Licence Unit, and the development of Standard Operating Procedures (SOPs) for the identification and restriction on the trade of MAPs¹.
- Consider the development and adoption of amendments to the Customs Act, Chapter 78:01; Pesticides and Toxic Chemicals Act 30.03; Standards Act, Chapter 82:03; and Trade Ordinance (No. 19 of 1958) Import and Export Negative Lists. Measures can be included in the amendments, where relevant, to regulate the import, export, labelling and handling of mercury, mercury compounds and MAPs.

¹ This is expected to be conducted under the regional project, "Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (ISLANDS)". Currently, as the GoRTT is not a Party to the Minamata Convention, it will only be able to learn through knowledge sharing with the other Caribbean countries involved. If the GoRTT becomes a Party prior to the commencement of the related mercury-specific activities, the country may be able to directly benefit.

Chapter 1 – Introduction

2.2 Why is Mercury an Issue?

Mercury (chemical symbol: Hg) is a naturally occurring element that has been utilised by humans for centuries in a variety of processes such as precious metal mining and amalgamation due to its unique properties. For example, mercury is temperature and pressure sensitive, is a good electricity conductor and forms alloys with other metals. Despite its useful properties, mercury is also highly toxic and can pose a serious threat to human health and the environment. According to the World Health Organisation (WHO), mercury is among the top ten (10) chemicals or groups of chemicals of major health concern (WHO, 2017).

Mercury can be released to the environment through natural activities such as volcanic eruptions, or through anthropogenic activities. It has been estimated that 10% of mercury emissions to the atmosphere occur from natural sources, while anthropogenic sources can account for 30%. The remaining 60% of emissions are due to re-emissions of mercury already in the environment, mostly as a result of previous human activity (UNEP, 2019a). Recent global mercury inventory emissions have estimated that the largest source of mercury releases is due to Artisanal and Small-scale Gold Mining (ASGM) as liquid mercury is often directly used in the process. Although the ASGM sector is the largest source of mercury releases, the most commonly occurring source of mercury releases locally is due to the disposal of mercury-added products (MAPs) which accounted for approximately 7% of global mercury releases and was noted to occur in most countries worldwide (UNEP, 2019a).

Once released, mercury cannot be destroyed but is cycled through the air, land, and water. Mercury exists in three (3) forms:

 Elemental or metallic mercury- this form is liquid at room temperature and is used in activities such as ASGM practices, some industrial processes and can be found as a component in products including but not limited to thermometers, dental amalgam, fluorescent light bulbs, and some electrical switches. If there are breakages, spills or poor maintenance of these products, mercury vapours may be released to the air. Elemental mercury may be also emitted to the air from processes when fossil fuels are burned. Once inhaled, elemental mercury can be converted to inorganic mercury in the body which can cause harmful effects on the nervous, digestive, respiratory, renal and immune systems, and may be fatal depending on the level and length of exposure. The human health effects from exposure to elemental mercury in the general environment are still unknown.

- 2. Inorganic mercury compounds- formed when mercury combines with other elements, such as sulphur or oxygen, to form compounds or salts. Inorganic compounds can occur naturally or through man-made activities for use in some industrial processes such as vinyl chloride monomer production. Inorganic mercury compounds have been used in some skin-lightening products as they inhibit the formation of melanin. Exposure to inorganic mercury compounds may occur through inhalation of vapours by persons who work in locations where the compounds are used. If ingested in large amounts, some inorganic mercury compounds can be irritating and corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity. If repeatedly ingested or applied to the skin over extended periods of time, some inorganic mercury compounds can result in long-term effects such as neurological disturbances, skin rashes and kidney abnormalities.
- 3. Organic mercury compounds- formed when mercury bonds with carbon to form compounds such as methylmercury (MeHg). In water or soil, some microscopic organisms can convert elemental or inorganic mercury to the organic mercury compound, MeHg which may bioaccumulate up the food chain. Human exposure to MeHg commonly occurs through the consumption of certain fish or shellfish contaminated with MeHg over a period of time. Significant exposure to MeHg can result in serious health implications including neurological damage. The most vulnerable populations to MeHg contamination include children and pregnant or breastfeeding women as MeHg can pass through the placenta and breastmilk. Infants born to women with mercury poisoning have been found to have serious health issues such as, developmental abnormalities and cerebral palsy (WHO, 2017 and Centre for Disease Control and Prevention, 2017).

1.2 The Minamata Convention on Mercury

Recognising that mercury is a chemical of global concern, its persistence in the environment, its ability to bioaccumulate and its significant negative effects on human health and the environment, the Minamata Convention on Mercury was adopted, ratified, and is currently being implemented. This global treaty aims to protect human health and the environment from the adverse effects of anthropogenic emissions and releases of mercury and mercury compounds, in part, by regulating, *inter alia*, the supply, sources, trade, storage and disposal of mercury and its compounds; MAPs and processes; mercury waste; and the emissions and releases of mercury.

The text of the Minamata Convention was adopted on October 10, 2013, and the Convention entered into force on August 16, 2017, with 138 Parties to date (*as of October 2022*). Parties

to the Minamata Convention on Mercury are required to meet the obligations set forth in the Convention's text and annexes.

Under Article 2 of the Minamata Convention, MAPs are defined as a "product or product component that contains mercury or a mercury compound that was intentionally added". Article 4 outlines measures to phase out or, in some cases, phase down the manufacture, import and/or export of certain MAPs (f*urther discussed in Chapter 2 of this report*).

1.3 Mercury Activities in Trinidad and Tobago

The Government of the Republic of Trinidad and Tobago (GoRTT) is not yet a Party to the Minamata Convention on Mercury but has been actively considering acceding to the Convention and has participated in several initiatives in recent years to better inform its decision. These activities² include:

- National Interest Analysis Country Brief to determine the merits of Accession to the Minamata Convention (2013) which provided a brief insight into the issues posed by mercury nationally and determined that further analytical research was required.
- Comparative Review of the Minamata Convention and Trinidad and Tobago's Waste and Chemicals Multilateral Environmental Agreements (2014) which determined the gaps and overlaps between the Minamata Convention and the Basel, Rotterdam and Stockholm Conventions. Further to this, consultations also began in 2014 (and are currently ongoing) with relevant key local stakeholders to determine the extent of mercury use nationally in order to determine the possible implications of accession to the Convention.
- "Mercury Storage and Disposal Project for the Caribbean" (2016) which resulted in a simplified national mercury inventory, legislative and policy review, and a desktop assessment of mercury storage and disposal options. The need to improve the national/regional capacity to manage mercury wastes in an environmentally sound manner was highlighted as a priority for consideration (BCRC-Caribbean, 2018).
- "Development of Minamata Initial Assessment in the Caribbean (Jamaica, Saint Kitts and Nevis, Saint Lucia, Trinidad and Tobago)" which led to the completion of a National Minamata Initial Assessment Report for Trinidad and Tobago in 2018 that included a detailed national mercury inventory, regulatory framework assessment, identification

² Further information on the key activities listed can be found at the following links:

> https://www.bcrc-caribbean.org/our-projects/mercury-management/

https://www.mercuryconvention.org/sites/default/files/documents/minamata_initial_assessment/Trinidadand-Tobago-MIA-2018.pdf

https://ipen.org/projects/mercury-fish-and-human-hair

https://briwildlife.org/hgcenter/crmmn/

of potential mercury hotspots and communication strategy to raise awareness on mercury issues.

- "Identifying Feasible Strategies for the Environmentally Sound Disposal of Spent Lighting Products in the Caribbean" (2019) which assessed the current national disposal management practices for spent mercury-added lighting products using draft environmentally sound management manuals developed under the Basel Convention for the Control of Transboundary Movement of Hazardous Wastes and their Disposal.
- "Global Mercury Hair Monitoring in Women of Child-bearing Age in Small Island Developing States Pilot Project" (2018) which aimed to promote global mercury monitoring efforts in humans to raise awareness on mercury pollution (Bell, et. Al., 2019).
- "Fish Mercury Biomonitoring in the Caribbean Region" (2019) in which mercury concentrations in samples of specific species of fish were analysed to provide the Caribbean region with data that can be utilised as the basis for future mercury biomonitoring initiatives that will be able to guide mercury hotspot identification and the development of consumption guidelines for local fish species (Evers and Sunderland, 2019).
- The Caribbean Regional Mercury Monitoring Network (CRMMN) which is currently ongoing and aims to assist Caribbean countries to meet the obligations of the Minamata Convention through the development of an integrated network of laboratories that will build the capacity for mercury testing in products and the biota (Evers and Burton, 2022).

1.4 Mercury-added Products under the Minamata Convention on Mercury

Article 4 'Mercury-added products' of the Minamata Convention on Mercury restricts the manufacture, import and export of certain MAPs (UNEP, 2021a). Annex A Part I of the Minamata Convention provides a listing of MAPs that Parties are obligated to phase out and phase out dates.

In terms of dental amalgam fillings, Parties are obligated to take several measures for the phase down of dental amalgam. These measures are included in Annex A Part II of the Minamata Convention.

At the Fourth Meeting of the Conference of Parties of the Minamata Convention on Mercury (COP-4) held in 2021-2022, Annex A of the Minamata Convention was reviewed and amended to include further obligations regarding MAPs. Table 2 provides a summary of the products regulated under Annex A inclusive of the COP-4 amendments, and the status of mercury-free alternatives currently available on the global market.

Table 2: Provisions for Mercury-Added Products Under Annex A of the Minamata Convention and a Summary on Mercury-free Alternatives Available (Lennett and Gutierrez, 2018; UNEP, 2019b; UNEP, 2021a; IISD, 2022)

Product Category	Mercury Added Product to be phased out of manufacture, import and export	Status of Mercury-free Alternative Products
Batteries	Mercury-added batteries, except for button zinc silver oxide batteries with a mercury content < 2% and button zinc air batteries with a mercury content < 2% (phase-out date: 2020)	Most batteries manufactured globally are already mercury free and widely available in Trinidad and Tobago.
Switches and Relays	Mercury-added switches and relays, except very high accuracy capacitance and loss measurement bridges and high frequency radio frequency switches and relays in monitoring and control instruments with a maximum mercury content of 20 mg per bridge, switch or relay (phase-out date: 2020)	Most switches and relays manufactured globally are already mercury free and widely available in Trinidad and Tobago.
Lighting Devices	 Compact fluorescent lamps (CFLs) for general lighting purposes that are: ≤ 30 watts with a mercury content exceeding 5 mg per lamp burner (phase-out date: 2020) ≤ 30 watts with a mercury content not exceeding 5 mg per lamp burner (phase-out date: 2025)³ Linear fluorescent lamps (LFLs) for general lighting purposes (phase-out date: 2020): (a) Triband phosphor < 60 watts with a mercury content exceeding 5 mg per lamp (b) Halophosphate phosphor ≤ 40 watts with a mercury content exceeding 10 mg per lamp High pressure mercury vapour lamps (HPMV) for general lighting purposes (phase-out date: 2020) Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for electronic displays (phase-out date: 2020): (a) short length (≤ 500 mm) with mercury content exceeding 3.5 mg per lamp (b) medium length (> 500 mm and ≤ 1 500 mm) with mercury content exceeding 5 mg per lamp I long length (> 1 500 mm) with mercury content exceeding 13 mg per lamp *NOTE: CCFLs and EEFLs containing mercury of all lengths for electronic displays not already phased 	Light Emitting Diodes (LEDs) or other technologies are widely available (globally and in Trinidad and Tobago) and are increasingly replacing mercury-added lighting devices.

³ As per COP-4 amendments.

Product	Mercury Added Product to be phased out of manufacture, import and export	Status of Mercury-free
Category		Alternative Products
Measuring	The following non-electronic measuring devices except non-electronic measuring devices installed in	Mercury-free alternatives
Devices	large-scale equipment or those used for high precision measurement, where no suitable mercury-free alternative is available (phase-out date: 2020): (a) barometers (b) hygrometers I manometers (d) thermometers I sphygmomanometers	(digital etc.) are already widely available and popular on the global market.
Cosmetics	Cosmetics (with mercury content above 1ppm), including skin lightening soaps and creams, and not including eye area cosmetics where mercury is used as a preservative and no effective and safe substitute preservatives are available (phase-out date: 2020)	Many countries have banned the sale of mercury in cosmetics, but the larger challenge is effective enforcement. Currently no bans exist in Trinidad and Tobago.
Miscellaneous	Mercury-added pesticides, biocides and topical antiseptics (phase-out date: 2020)	Mercury use in pesticides, biocides, and topical antiseptics is already banned in many countries. Currently no bans exist in Trinidad and Tobago.
	The following devices should be phased out by 2025 ³ :	Mercury-free alternatives
	 strain gauges used in plethysmographs 	are already widely
	 melt pressure transducers, melt pressure transmitters, and melt pressure sensors, except those installed in large-scale equipment or those used for high precision measurement, where no suitable mercury-free alternative is available. mercury vacuum pumps 	available and popular on the global and local markets.
	tyre balancers and wheel weights	
	photographic film and paper	
	propellant for satellites and spacecraft	

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Dental Amalgam Provisions Under Annex A Part II of the Minamata Convention requiring Parties to adopt 2 or more Phase Down Provisions

Dental Amalgam Provisions	Mercury-free
	Alternatives
Phase Down Provisions:	Composite (resin) fillings
Measures to be taken by a Party to phase down the use of dental amalgam shall take into account the Party's domestic	
circumstances and relevant international guidance and shall include two or more of the measures from the following list:	
(i) Setting national objectives aiming at dental caries prevention and health promotion, thereby minimizing the need for	
dental restoration;	
(ii) Setting national objectives aiming at minimizing its use;	
(iii) Promoting the use of cost-effective and clinically effective mercury-free alternatives for dental restoration;	
(iv) Promoting research and development of quality mercury-free materials for dental restoration;	
(v) Encouraging representative professional organizations and dental schools to educate and train dental professionals	
and students on the use of mercury-free dental restoration alternatives and on promoting best management practices;	
(vi) Discouraging insurance policies and programmes that favour dental amalgam use over mercury-free dental	
restoration;	
(vii) Encouraging insurance policies and programmes that favour the use of quality alternatives to dental amalgam for	
dental restoration;	
(viii) Restricting the use of dental amalgam to its encapsulated form;	
(ix) Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and mercury	
compounds to water and land.	
Parties are required to ³ :	
• exclude or not allow dental amalgam, by taking measures as appropriate, the use of mercury in bulk form by dental	
practitioners; and	
• exclude or not allow dental amalgam, by taking measures as appropriate, or recommend against the use of dental	
amalgam for the dental treatment of deciduous teeth, of patients under 15 years, and of pregnant and breastfeeding	
women, except when considered necessary by the dental practitioner based on the needs of the patient.	

1.5 "Phasing Out Mercury-Added Products in Trinidad and Tobago" Project

Background

The Africa, Caribbean, and the Pacific (ACP) Multilateral Environmental Agreements (MEAs) programme is a partnership amongst the European Union (EU), United Nations Environment Programme (UNEP), Food and Agricultural Organisation of the United Nations (FAO), and the Organisation of African, Caribbean and Pacific States (OACPs). Under this programme, funding was made available to the European Environmental Bureau (EEB) to support ACP countries in the implementation of the Minamata Convention on Mercury.

The EEB is Europe's largest network of environmental citizens' organisations that advocates for environmental justice and sustainable development. For the implementation of mercury measures, the EEB has partnered with the Zero Mercury Working Group (ZMWG). ZMWG is an international coalition of more than 110 public interest environmental and health non-governmental organizations from over 55 countries from around the world formed in 2005 by the European Environmental Bureau and the Mercury Policy Project. ZMWG strives for zero supply, demand, and emissions of mercury from all anthropogenic sources, with the goal of reducing mercury in the global environment to a minimum.

As part of the EEB/ZMWG's activities, the project, 'Phasing out Mercury-Added Products in Trinidad and Tobago' was developed in collaboration with the Ministry of Planning and Development of the GoRTT. This national project aims to develop strategies to reduce the use and releases of elemental mercury and those MAPs listed in Article 4 of the Minamata Convention in the context of the ACP MEAs programme. Where determined feasible and there is receptivity, this will entail assisting in the development of the following components:

- 1. Roadmap for phasing out MAPs;
- 2. Market study of mercury-free alternatives;
- 3. Assessing/focusing institutional capacity;
- 4. Mercury-free product procurement;
- 5. Single stream product management pilot projects; and
- 6. National Implementation Plan.

The focus of this report is on Component 2 as listed above which involves a market study to determine the availability, accessibility, efficacy, and technical feasibility of replacing MAPs with alternatives that comply with the Minamata Convention on Mercury. An in-depth analysis of the economic feasibility of replacing MAPs with Convention-compliant alternatives was not conducted under this report as the alternatives are already common-place on the global market and are generally considered relatively affordable. The economic feasibility of mercury-free products is also made more evident when the cost of ensuring environmentally sound

disposal of MAPs is considered. A summary of cost comparisons of certain MAPs versus their Convention-compliant alternatives is included in Annex 1 for reference.

Due to the availability of data and resources for the market study, the products targeted include:

- 1. Lighting Devices
- 2. Switches, Relays and Thermostats
- 3. Medical Measuring Devices (Thermometers and Blood Pressure Gauges)
- 4. Dental Fillings
- 5. Topical Antiseptics

Details on how these products were selected for assessment are provided in Chapter 2 of this report.

Chapter 2: Situational Analysis

2.1 Brief Country Background

The twin island republic of Trinidad and Tobago is located in the southern Caribbean between 10° 2′ and 11° 12′ N latitude and 60° 30′ and 61° 56′ W longitude (MoPD, 2022a). According to the most recent mid-year estimates conducted by the Central Statistics Office for 2021, Trinidad and Tobago's population is estimated to be 1,367,558 (MoPD, 2022b).

The national economy is heavily dependent on the energy sector which accounts for the majority of the Gross Domestic Product and comprises of oil and natural gas production, the mining and quarrying sub-sector and petrochemical production (Central Bank of Trinidad and Tobago, 2022). However, due to the COVID-19 pandemic and global economic factors, there has been a decline in energy sector production. The pandemic also negatively affected the non-energy sector which primarily includes construction; wholesale and retail trade (excluding energy); manufacturing (excluding energy); and financial and insurance activities. As of a January 2022 review, Trinidad and Tobago, 2022).

Trinidad and Tobago follows a bicameral parliamentary system based on the Westminster System. The parliament is responsible for making the national laws for good governance and for overseeing the GoRTT (Parliament of the Republic of Trinidad and Tobago, 2022). In addition to the GoRTT, the Tobago House of Assembly (THA) is an autonomous legislative body responsible for Tobago. The THA governs Tobago and handles many of the responsibilities of the central government but has limited ability to collect taxes and impose local law or zoning regulations (THA, 2022, and GoRTT, 2017).

2.2 National Legislative and Institutional Framework Related to MAPs

This section includes a brief analysis of the national regulatory framework currently in place for managing the trade and use of Minamata Convention- compliant products. A listing of the relevant legislation and institutions analysed is provided in Table 3.

Policy/ Legislation	Relevance
National Environmental Policy (NEP), 2018	Describes the national priorities for achieving environmental sustainability and sustainable development. For the management of the issues and risks associated with the implementation of the NEP's action plan (among other related activities), a National Council for Sustainable Development was established which comprises of key stakeholders in relevant government bodies,

Table 3: Brief Details on the Policy/Legislation and Institutions Relevant to ManagingTrade and Use of Minamata Convention-compliant Consumer Products

	private sector bodies, academic institutions and environmental non- governmental organisations.
The Green Government Policy, 2011	Developed to further promote the environmental principles as expressed in the National Environmental Policy which aims to minimise the adverse effects of the GoRTT's operations on the environment.
Environmental Management Act Chapter 35.05	Established and organised the Environmental Management Authority and describes regulations for environmental management.
The Customs Act Chapter 78:01	Governs import and export of goods for Trinidad and Tobago.
Pesticides and Toxic Chemicals Act Chapter 30.03	Gives authority to the Pesticides and Toxic Chemicals Inspectorate and provides for the establishment of the Pesticides and Toxic Chemicals Control Board
Standards Act Chapter 82.03	Provides provisions for the labelling of chemicals.
Trade Ordinance, 1958 and amendments	Outlines the development of 'Import and Export Negative Lists' for products.
Dental Profession Act, Chapter 29:54	Outlines measures for the dental professions in Trinidad and Tobago and provides for the establishment and functioning of the national dental council.
Institution	Relevance
Ministry of Planning and Development (MoPD)	National Focal Point for project and consists of the Environmental Policy and Planning Division (EPPD) responsible for the management of plans, strategies and policies related to the environment.
Ministry of Trade and Industry	Ministry responsible for promoting trade, investment and business of the non-energy sectors.
Ministry of Health (MoH)	Ministry responsible for the protecting citizen's health and monitoring institutions that perform health services.
Tobago House of Assembly (THA)	THA- Division of Food Security, Natural Resources, the Environment and Sustainable Development:
	Division responsible for environmental management and sustainable development in Tobago.
	THA- Division of Health, Wellness and Social Protection:
	Division responsible for management of health and social care needs of the Tobago population.
Environmental Management Authority (EMA)	Statutory body that facilitates environmental management nationally.
Customs and Excise Division	Division of Ministry of Finance that is responsible for the implementation of Customs regulations on goods which involves the protection of national physical borders, society and the environment.
Trinidad and Tobago Bureau of Standards (TTBS)	Corporate body responsible for establishing standards on goods and promoting standards development and maintenance.
Pesticides and Toxic Chemicals Control Board (PTCCB) / Inspectorate (PTCI)	Authorizes the import and export of chemicals through a licensing system. Additionally, inspects premises and registers items if marketable quantities of the item(s) are stored for the purposes of sale by wholesale, packaging, or manufacturing.

Trade Licence Unit	Unit under the Ministry of Trade and Industry responsible for administering the import of goods into and the export of goods out of Trinidad and Tobago.
Trinidad and Tobago Electricity Commission (T&TEC)	Sole national electricity body responsible for the design, construction, operation and maintenance of electrical transmission and distribution network.
Basel Convention Regional Centre- Caribbean (BCRC- Caribbean)	Inter-governmental organisation that collaborates with Caribbean countries in implementing their international obligations to multilateral environmental agreements relevant to chemicals and waste.
Dental Council of Trinidad and Tobago (DCTT)	Body responsible for managing the Dental Board of Trinidad and Tobago which comprises of all registered dentists and dental auxiliaries.
Medical Board of Trinidad & Tobago (MBTT)	Body of fully registered national medical practitioners with an established council that regulates the national medical profession.
Pharmacy Board of Trinidad and Tobago	Body of registered national pharmacists with an established council that regulates pharmacists, pharmacies and pharmaceutical drugs nationally.
Trinidad and Tobago Chamber of Industry and Commerce (TTCIC)	Private sector body representing a network of national business services across various sectors and industries. Relevant private companies under the TTCIC include several distributors and retailers of lighting devices and electrical products as well as pharmaceutical companies.
Trinidad and Tobago Manufacturers' Association (TTMA)	Private sector body representing a network of national manufacturing industries. Members include several lighting and electrical equipment companies that import or assemble relevant products.
The Council of Presidents of the Environment (COPE)	Umbrella organisation of several national environmental non- governmental organisations.

Overarching Environmental Framework

The Environmental Management Act, Chapter 35:05 (the Act), is the overarching legislation that established the EMA which is responsible for coordinating the implementation of the Act, including, the assessment of environmental impacts, protection of natural resources, and the management of pollution. The development of the NEP, 2018 is also a function of the EMA. Under Priority 4 and 5 of the NEP, efforts for transitioning to a greener economy and taking measures for fostering an environmentally responsible society are outlined. To further promote the NEP, the Green Government Policy, 2011 (based on previous versions of the NEP) was developed. It includes an outline of the recommendations to mainstream environmental sustainability into governmental operations such as:

- the replacement of mercury-added CFLs with mercury-free LEDs where appropriate,
- encouraging the use of rechargeable batteries (mercury-free) where appropriate.

These recommendations are linked to the NEP, 2018, Priority 3: Improving the Local Environment.

The THA also carries out the functions outlined in the Environmental Management Act, Chapter 35:05 in Tobago, through a Memorandum of Understanding with the EMA.

The line ministry for the EMA is the MoPD that manages plans, strategies and policies related to the environment through the EPPD. The BCRC-Caribbean is also hosted by the GoRTT through the MoPD.

Framework for the Management of the Trade of Consumer Products

In Trinidad and Tobago, the responsibility for examining and controlling the imports/exports of toxic chemicals, chemical compounds and chemicals in products is jointly carried out by the Customs and Excise Division and the PTCI. In terms of toxic chemicals, the Pesticides and Toxic Chemicals Act 30.03, gives authority to the PTCI for the authorisation of toxic chemicals (Thompson, 2020).

Under the regulations of the Customs Act, Chapter 78.01, the Customs and Excise Division is given the authority to control the import and/or export of goods that are prohibited under other regulations mandated by the GoRTT. Therefore, the MoPD, EMA or other regulatory bodies that control chemicals can provide a restricted goods list to the Customs and Excise Division for their enforcement (Thompson, 2020).

It is a national requirement for products imported to be accurately labelled according to labelling standards developed and regulated by the TTBS through the Standards Act, Chapter 82.03. These product labelling standards are separate from the Global Harmonised System of Classification and Labelling of Chemicals (GHS) classifications and coordination between them is not required to be considered (Thompson, 2020).

The GoRTT is a Party to the International Convention on the Harmonised Commodity Description and Coding System which outlines agreed upon Harmonised System (HS) Codes for categories and sub-categories of products up to the six-digit level. Updates to the HS Codes are managed periodically by the World Customs Organisation. It is noted that countries can choose to extend the six-digit HS codes to eight and ten digits in order to represent further sub-categories of products without consulting the World Customs Organisation (Secretariat of the Minamata Convention, 2021).

Currently the products being assessed under this market study are categorised in Trinidad and Tobago according to the HS Codes listed in Annex 2 of this report. It is noted that LED lighting (which is mercury-free) is now distinguished from other lighting devices (may include mercury-added and other types of mercury-free lighting) under the eight-digit HS Code

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8543.70.90. No other product categories currently clearly distinguish between potential MAPs and their Mercury-free alternatives.

Globally, the ASYCUDA (Automated System for Customs Data) World Electronic Customs platform has been recommended for countries to efficiently manage imports and exports of goods. In addition to this platform allowing for the declaration of trade commodities by a country's Customs and Excise Division, it also allows for pre-arrival screening of goods to be imported and overall efficient trade data management (Thompson, 2020).



Figure 3: Diagram showing the linkages for electronic data management for the import and export of goods.

As Figure 3 illustrates, the TTBizLink, which is managed by the Ministry of Trade and Industry, is a national single electronic platform that links to the ASYCUDA World System. It provides safe access to various trade and other related government services. Chemicals covered under the Import and Export Negative Lists are also controlled through this online platform (Thompson, 2020).

In Trinidad and Tobago, the Customs and Excise Division enabled the use of the ASYCUDA World platform data exchange with the PTCCB and PTCI, as well as with other key agencies.

It is noted that the MoPD does not directly access the platform but has programmes that utilise it for related purposes.

Analysis of the Legislative and Institutional Framework for the Phase Out of MAPs

Through the work being conducted by the Secretariat of the Minamata Convention on Mercury and the UNEP Global Mercury Partnership's Mercury in Products partnership area, and in consultation with other stakeholders, a draft guidance document has been developed to support countries in the development of new HS Codes to further distinguish between MAPs and their mercury-free alternative products through the development of eight- or ten-digit HS codes. Should the GoRTT decide to implement measures to promote the trade of mercuryfree alternative products, amendments to the Customs Act, Chapter 78:01; Pesticides and Toxic Chemicals Act 30.03; Standards Act, Chapter 82:03; and Trade Ordinance (No. 19 of 1958) Import and Export Negative Lists should be made to distinguish between mercury, mercury compounds or MAPs and their mercury-free alternatives.

Amendments to the Import and Export Negative Lists would facilitate the denial of the importation of products if mercury presence is identified. If MAPs are included on the Import and Export Negative Lists, the Trade Licence Unit would be responsible for conducting investigations, submitting reports and issuing Import and Export Licenses if needed for products that are subject to control. For mercury and mercury compounds⁴, the decision to not grant the import license or to cancel an issued import license is made by the PTCCB and is communicated to the holder or applicant via the Registrar. Under the Pesticides and Toxic Chemicals Act, Chapter 30.03, the importer is mandated to ensure the disposal of the chemicals that have been denied entry (Thompson, 2020).

Training of the Customs and Excise Division's Customs Officers and the PTCI's Inspectors should be conducted to ensure their awareness of the need for monitoring product labelling and assessing Safety Data Sheets to identify mercury-free alternative products (Thompson, 2020). Personnel should also be equipped with and trained in the use of tools to aid in the identification of mercury in products being imported such as handheld XRF (X-ray fluorescence) Analysers (BCRC-Caribbean, 2018). All training activities conducted should also include or result in the development of Standard Operating Procedures that can be referenced as needed by relevant personnel (Thompson, 2020).

The MoPD is key for the coordination of efforts to promote Minamata Convention-compliant products amongst the institutions already mentioned and other bodies in the public and private sector. Governmental coordination with the private sector is essential to ensure compliance

⁴ "mercury and mercury compounds" referring to elemental mercury and chemical substances consisting of mercury and other chemical elements.

with the phase out of MAPs and promotion of alternative products on the market. Potential manufacturers, importers, distributors, and retailers of consumer products can be engaged through collective bodies such as the TTCIC and TTMA. Many relevant private companies responsible for import and assembly of products for their sale have outlined corporate social and environmental responsibility as part of their core values. Efforts to promote more environmentally sound products should therefore be included under their initiatives

For the management of mercury-free dental restoration materials, coordination with the DCTT and the MoH is recommended. The provisions of the Minamata Convention that should be adopted by Parties can be coordinated through the DCTT and can be formally recognised by amendments to the Dental Profession Act, Chapter 29:54.

The promotion of mercury-free measuring medical devices and mercury-free dental fillings in the public health sector should also be coordinated in collaboration with the MoH and bodies such as the MBTT and Pharmacy Board of Trinidad and Tobago as needed. Public awareness efforts can also be enhanced through engagement of environmental Non-Governmental Organisations (NGOs) such as COPE.

Several other bodies are also involved in related initiatives for the promotion of mercury-free alternative products. For example, a national initiative for the promotion of the more energy efficient (mercury-free) LED lighting commenced in 2020 with T&TEC's LED Light Bulb Distribution Programme for households which is currently ongoing. The BCRC-Caribbean also continues to execute several regional projects for the environmentally sound management of chemicals and hazardous wastes such as the regional project, "Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (ISLANDS)" funded by the GEF.

2.3 Status of Mercury-Added Products in Trinidad and Tobago

2.3.1. Previous Research

The priority focus for the GoRTT would be in meeting its obligations under the MAP-specified obligations of the Minamata Convention on Mercury once it has ratified. This would include phasing out the import of MAPs, ensuring the phase out of export/distribution of MAPs to other Caribbean islands and, where applicable, restricting the manufacture of MAPs within the country.

From 2016 – 2019, the GoRTT, participated in a sub-regional project, "Development of Minamata Initial Assessment in the Caribbean- Jamaica, Saint Kitts and Nevis, Saint Lucia and Trinidad and Tobago" (MIA Project). The MIA Project was funded by the Global Environment Facility (GEF), implemented by UNEP, and executed by the Basel Convention

Regional Centre-Caribbean (BCRC-Caribbean), with the MoPD acting as the National Executing Body.

Through this project, an inventory of sources of mercury releases was conducted based mainly on 2016 quantitative data. Due to assumptions made on the mercury content present in fossil fuels being extracted and refined, the majority of mercury releases (77%) was assumed to be due to the extraction and use of fossil fuels. The second largest source of mercury releases was estimated to be due to waste incineration and burning (9%), followed by the use and disposal of consumer products with intentional use of mercury (5%) (BCRC-Caribbean, 2018). In addition to these consumer products, the use and disposal of medical blood pressure gauges and the preparation, use and disposal of dental amalgam (assessed under the source category: "Other intentional product/process use") was estimated to be the fourth largest source of mercury releases in Trinidad and Tobago at 4.25% of total releases (BCRC-Caribbean, 2018).

Figure 1 shows the MAP sub-categories identified as responsible for mercury releases in Trinidad and Tobago based on 2016 data and assumptions. The sum of mercury releases from all MAPs quantified was used to determine the percentage distribution of mercury releases for each MAP sub-category.



Figure 1: Estimated Percentage Distribution of Mercury Releases within the MAP Categories Identified in the Inventory of Mercury Releases in the MIA Project (created using data from BCRC-Caribbean, 2018. NOTE: See Footnote.⁵)

⁵ See Footnotes 5 and 6 which note that mercury releases for the products, 'Switches and relays' and 'Manometers and Gauges' were made based on various uncertainties and assumptions which may have led to over-estimations.

Switches and relays with mercury were assumed to cause the largest amount of mercury releases for the MAPs identified.⁶ Mercury is used in some switches and relays, generally found in various electronic equipment due to its high density, conductivity and sensitivity to temperature (UNEP, 2019b). Mercury content can range widely across these products with some being recorded as having 0.001 grams of mercury per item and others having up to 400 grams of mercury per item depending on type (UNEP, 2019b). Since these products are typically found as components of larger products, determining quantities that are in use in a country and their mercury content is extremely difficult which resulted in default calculations being used for the 2016 inventory. One of the common types of equipment that have been known to contain switches are thermostats. Mercury-added thermostats may contain more than one mercury switch resulting in even higher mercury content per item (IMERC, 2018). This was noted for consideration under this report's market study.

Manometers and gauges were assumed to be the second largest MAP source of mercury releases under the inventory. However, this was made based largely on the assumption that all products listed under the category, "Other instruments" provided by a Customs and Excise Division 2016 import datasheet were mercury-added manometers and gauges⁷ as HS Codes did not differentiate between mercury-added and mercury-free instruments. Additionally, barometers, hygrometers and other similar measuring devices may have fallen under the "Other instruments" category amongst several different types of blood pressure gauges which are also known to be popular on the global market as seen in Figure 2. Therefore, it is noted that the mercury releases estimated from manometers and gauges under the inventory were over-estimated.

⁶ It is important to understand that estimations for this product were made based on default calculations used in the inventory that utilised population size and electrification rates since the number of switches and relays imported per year could not be estimated.

⁷ This is likely to have resulted in an over-estimation of mercury releases from this product category (BCRC-Caribbean, 2018)


Figure 2: Types of Blood Pressure Measuring Devices (WHO, 2020)

For the assessment on **dental amalgam** under the MIA Project, quantities of dental amalgam imported or used were not able to be captured as dentists contacted did not maintain detailed logs of dental amalgam use and Customs and Excise data did not have any clear HS Code category for these products. Instead, the national inventory of mercury releases from **dental amalgam** estimate used default formulae that used the number of dentists per 1,000 inhabitants (estimated to be 0.2) as well as the number of inhabitants (BCRC-Caribbean, 2018). The releases estimated considered mercury inputs during the preparation, use and disposal of amalgam. Dental sector stakeholders engaged for the inventory indicated that, similarly to worldwide trends, dental amalgam was no longer a popular dental restoration material and instead mercury-free, teeth-coloured composite fillings have become the preference due to availability and aesthetics. It was noted that dental amalgam was still included in the practical training of dental students in the local dental school (BCRC-Caribbean, 2018).

While mercury-added **batteries** were determined to be the fourth largest source of mercury releases from MAPs according to the 2016 inventory data, 2019 global market data on mercury-added batteries found that many well-known global battery suppliers such as, Duracell, Energizer, Varta and Panasonic only supply mercury-free batteries. Furthermore, as of January 2021, China prohibited the manufacturing and import of mercury-added batteries except for the types still allowed under the Minamata Convention (UNEP, 2019b).

Assumptions made on Customs and Excise import data were undertaken to estimate the import of **mercury-added light sources** such as, CFLs, LFLs, High Intensity Discharge Lamps (HIDLs) since Customs and Excise Division's HS Codes did not differentiate between mercury-free Light Emitting Diodes (LEDs) and other types of lighting at the time of the

inventory (BCRC-Caribbean, 2018). Under the MIA Project, it was estimated that mercuryadded lighting devices resulted in 7% of the mercury releases from MAPs with the largest source being from CFLs (BCRC-Caribbean, 2018).

The national inventory on **mercury-added thermometers** in Trinidad and Tobago found that on average 5,550 mercury-added thermometers are imported per year based on 2016 import data provided by the Customs and Excise Division. Since current HS Codes do not distinguish between mercury-added and mercury-free devices, the number of mercury thermometers imported was determined through the assumption that 20% of the total imports recorded under HS Code 9025.11.00 (Liquid-filled thermometers and pyrometers [not combined with other instruments] for direct reading) were mercury-added (BCRC-Caribbean, 2018). Stakeholder consultations conducted under the MIA Project indicated that while mercury-free digital thermometers have overtaken the market, there may be instances of mercury-added thermometer use in laboratories and schools for educational purposes (BCRC-Caribbean, 2018).

2.3.2 MAPs Identified for Consideration Under Market Study

Due to the availability of data and resources for the market study, five (5) main products were targeted for assessment. Based on the results of the 2016 national inventory of mercury releases, the following products were identified for review under this study:

- 1. Lighting Devices
- 2. Switches, Relays and Thermostats
- 3. Medical Measuring Devices (Thermometers and Blood Pressure Gauges)
- 4. Dental Fillings

Additionally, **topical antiseptics** were also identified for review. Mercurochrome is a known topical antiseptic in which mercury disodium salts are the main ingredient (Mohite and Bhatnagar, 2008). Mercurochrome was not identified as present under the MIA Project, but it was recently observed on the local market by the Consultant. Since it is a product that Parties of the Minamata Convention are to phase out under Article 4, it has been included under the market study.

Due to the recent global market assessment on batteries noted previously, most batteries are largely assumed to be mercury-free. As such, batteries were not considered as key products of focus under this market study⁸.

⁸ **Mercury-added cosmetics** have been identified as a potential area of concern across the Caribbean but have not been included under this study as more in-depth assessments are expected to be conducted under future global and regional projects.

Chapter 3 – Methodology

3.1 Background and Desktop Research

Under the 'Phasing out of Mercury-added products in Trinidad and Tobago' project, a National Working Group (NWG) comprising of representatives from key governmental and private sector institutions was formed. The member bodies of the NWG are:

- MoPD [National Focal Point for the project]
- EMA
- THA- Division of Food Security, Natural Resources, the Environment and Sustainable Development
- THA- Division of Health, Wellness and Social Protection
- BCRC-Caribbean
- Customs and Excise Division
- MoH
- Ministry of Trade and Industry
- TTBS
- TTCIC
- TTMA
- T&TEC
- COPE
- Trinidad and Tobago Solid Waste Management Company (SWMCOL)
- Energy Chamber of Trinidad and Tobago
- Ministry of Energy and Energy Industries

Throughout the duration of the project, the NWG serves as the coordinating body that provides overall guidance, evaluation, and monitoring of the project's activities. The MoPD serves as the overall National Focal Point for the project responsible for overseeing the NWG.

A virtual Inception Meeting was held on 23 September 2021 by the MoPD in coordination with the EEB/ZMWG to introduce the NWG to the project. Following the recruitment of the Consultant for the development of the market study, members of the NWG were consulted on stakeholders to be engaged for market data collection; to provide assistance in stakeholder follow-up; and for the provision of institutional background data for the study.

Desktop research and analysis on the issue of MAP phase-out was conducted through an assessment of previously conducted related projects and initiatives as detailed in the other

chapters of this report. Market study challenges and mitigation measures can be found in Annex 3.

3.2 Market Survey- Stakeholder Engagement

A list of stakeholder contact information for data collection on the target MAPs (and their related mercury-free alternatives) was created. To initiate communication, an official introductory letter from the MoPD was sent to each stakeholder informing them of the project's activities, introducing them to the Consultant conducting the assessment and inviting them to participate.

Questionnaires relevant to each of the target MAPs were developed via the Google Forms platform and shared with stakeholders via email. Invited participants were informed that individual company/respondent's data would not be shared publicly. In order to maintain confidentiality, respondents were assigned identification codes.

The questionnaires were distributed with a starting two-week timeline for responses that was extended to six-weeks in some cases based on stakeholder feedback. Due to the COVID-19 protocols in place during the survey, in-person interviews were generally discouraged. Follow-up calls and emails were the main forms of communication conducted during the survey period to encourage stakeholder participation. Stakeholder responses to the surveys were generally low and as such, various tools and options were considered to fill in the gaps. A summary of the data collection based on each target MAP sector is detailed below.

Each questionnaire developed is provided in Annex 4 of this report.

Lighting Devices

For survey distribution, stakeholder outreach focused on large-scale retailers, and/or distributors of lightings devices rather than medium-scale or small-scale businesses. Seven (7) large-scale lighting companies were identified and contacted for participation in the market survey. The operations of the companies contacted include wholesale distribution and those servicing the commercial and industrial sectors in Trinidad and Tobago, as well as (for some) in various Caribbean countries. To gather more information on the current use of lighting devices, lighting user surveys were distributed to twelve (12) organisations; eleven (11) large health clinics and one (1) university campus.

Despite numerous attempts to engage prospective participants, including requesting the assistance of the TTMA and TTCIC, qualitative data was only received from two (2) of the lighting companies (that represent conservatively 20% of the national market) contacted and one (1) lighting user. Quantitative data was gathered mainly from national import data received

from the Customs and Excise Division for the period 2017 – 2021. Quantitative data was also received from 1 of the 7 lighting companies contacted.

To complete the market analysis for the lighting sector, desktop research was conducted which analysed data from related initiatives as well as available product catalogues from the 7 lighting companies initially targeted. Related projects assessments included, "Identifying Feasible Strategies for the Environmentally Sound Disposal of Spent Lighting Products in the Caribbean" (BCRC-Caribbean, 2019) and "Technical & Economic Assessment of Mercury-Free Lighting: Latin America & the Caribbean Region" (Clean Lighting Coalition, 2022).

Switches, Relays and Thermostats

Switches, relays and thermostats containing mercury are used in an expansive array of products and processes across the commercial and industrial sector. A narrow target group of electrical and lighting companies was identified for stakeholder survey distribution -to provide some insight into the use of these products in the lighting sector. Of the 7 large-scale companies contacted for data on lighting devices, five (5) were selected to complete a survey on switches and relays (and thermostats) as their operations included servicing the industrial and commercial sectors with these related products. Additionally, 1 medium-scale retail company was also contacted for data collection. Similarly, for the stakeholder outreach on lighting devices, responses were low despite numerous attempts to engage invited participants. Responses were obtained from 1 of the six (6) stakeholders contacted, however the data obtained did not provide sufficient information to make projections on the national market for switches, relays and thermostats. Desktop research on global market trends was therefore analysed to further supplement information on these products.

Medical Measuring Devices

To gather data on thermometers and blood pressure gauges, a survey was initially developed for major users of these products. However initial informal feedback obtained from the private clinics/medical centres invited to participate in the survey indicated that the incentive to participate was low. This was due to the generally busy schedules of the administrative offices in medical facilities and the low prevalence of mercury-added thermometers and mercuryadded sphygmomanometers in the medical sector in recent years. The inclusion of laboratories and schools for survey engagement was considered but due to the extensive number of these stakeholders, it was determined that suppliers of medical measuring devices should be engaged for data collection instead. The strategy for data collection for this sector was therefore revised to engage local medical supply companies.

Fourteen (14) popular medical supply companies across Trinidad and Tobago were assessed. Emails were sent to each company and follow-up calls were made which resulted in responses from eight (8) of the companies. Company product catalogues were also reviewed where available, to obtain information from each of the 14 medical supply companies.

Dental Fillings

For data collection on the use of dental amalgam fillings versus mercury-free fillings, assistance was sought primarily from the DCTT for survey distribution. The DCTT is the body responsible for managing the Dental Board of Trinidad and Tobago which comprises of all registered dentists and dental auxiliaries. According to the DCTT website, there are 625 registered dentists in Trinidad and Tobago as of April 2022. Following the initial correspondence to registered dentists by the DCTT, additional follow-up was conducted by the Consultant.

Due to the large number of registered dentists, the survey was utilised as the primary tool for data collection. While the total population size was listed to be 625 registered dentists, once the list of registered dentists was reviewed to determine the number of active dentists with valid contact information for the survey, the population proportion for survey distribution was determined to be 512 dentists. The dental survey was distributed over a six-week period resulting in 77 respondents.

Statistically, there is a 95% probability that the data from the 77 respondents is representative of the total dentist population with a margin of error of +/- 8.4%.

Topical Antiseptics

Based on observations and inquiries made in popular pharmacies throughout Trinidad, one (1) company was identified as the most popular distributor of Mercurochrome Solution 1%, a mercury-added antiseptic. The medium-sized pharmaceutical company was contacted via email to verify details on the product and to complete a Google Forms survey. Representatives from the company were receptive and provided feedback within the initial two-week timeline. A well-known pharmacy in South Trinidad was also contacted via phone to verify costs and popularity of a range of topical antiseptics in stock.

Summary

Identification codes were assigned to stakeholders from which data was obtained for the assessment as shown in Table 4.

Sector	Market Survey Respondents	Respondents' Identification
		Codes
Lighting Devices	Lighting Importers/Retailers:	Respondent 1: LDC1
	3 respondents (of 7 stakeholders	Respondent 2: LDC2
	contacted)	Respondent 3: LDC3
	Lighting Devices Users:	Respondent 1: LDU1
	1 respondent (of 12 stakeholders	
	contacted).	
Electrical	2 respondents (of 5 stakeholders	Respondent 1: ESRT1
Switches, Relays	contacted)	Respondent 2: ESRT2
and		
Thermometers		
Medical	Public and Private Medical Centres: 0	Medical Supply Companies 1-15:
Measuring	respondents (of 16 contacted).	MSC1- MSC15
Devices	Medical Supply Companies: 15 assessed	
Dental Fillings	77 Dentists responded (of 512 contacted)	Respondents 1 – 77:
		D1 – D77
Topical Antiseptics	1 respondent (of 1 contacted)	Respondent 1: PC1

Table 4: Identification Labelling Codes Assigned to Market Survey Stakeholders.

Chapter 4: Findings and Analysis

4.1 Product Assessments

4.1.1 Lighting Devices

Quantitative data for lighting sources was mainly obtained from import data provided by the Customs and Excise Division. Assumptions were made as follows:

- 1. All lighting devices under the following HS Codes were considered to contain mercury:
 - 8539.31.00 Fluorescent, hot cathode discharge lamps
 - 8539.32.00 Mercury or sodium vapor lamps; metal halide lamps
 - 8539.39.00 Other: Electrical discharge lamps, other than fluorescent (hot cathode), mercury or sodium vapor, metal halide or ultraviolet lamps
 - 8539.41.00 Arc Lamps
 - 8539.49.00 Other: Ultra-violet or infra-red lamps
- 2. The lighting devices under HS Code 8543.70.90 (Light-Emitting Diode [LED] Lamps) were mercury-free and included the key varieties of lighting devices referring to:
 - LED (Light Emitting Diodes) Light Bulbs (standard size substitutes for CFLs)
 - Linear/Tube LEDs
 - LED bulbs replacing High Intensity Discharge Lamps

Trends observed over a five (5) year period indicated that there has been a progressive decrease in the total mercury-added lighting products⁹ imported, particularly from 2019 to 2020 (45% decrease in imports) and 2020 to 2021 (32% decrease in imports). The onset of the COVID-19 pandemic may have been a factor that impacted imports of these products; however, the import of mercury-free LED bulbs was the highest in 2020 (Figure 4). It is possible that the 2020 imports of mercury-free LED bulbs were also influenced by T&TEC's LED Light Bulb Distribution Programme through which household bulb distribution commenced in September 2020. This may explain the reduced imports of mercury-free LED bulbs in 2021 as 2020 imports to procure stocks reduced the demand in the following year¹⁰.

One company (referred to as LDC1) provided quantitative data on the import and sales of lighting devices in Trinidad and Tobago from 2019 – 2021. LDC1 is the parent company of three (3) well-known local lighting retailers and provided aggregated data for all 3 companies.

⁹ "Total mercury-added lighting products" assumed to be the sum of products listed under HS Codes: 8539.31.00, 8539.32.00, 8539.39.00, 8539.41.00 and 8539.49.00.

¹⁰ Verification of these assumptions could not be completed under the timeframe of this assessment.

The average yearly import data from 2019 - 2021 of LDC1 and of the Customs and Excise Division were compared to make the assumption that LDC1 represents less than 20% of the total lighting market in Trinidad and Tobago (further detailed in Table 5).



Figure 4: Customs Import Data of the Number of Mercury-Added Lighting Devices Versus Mercury-free (LED) Lighting Devices over a 5 Year Period

LDC1 also noted that their lighting products were imported from the United States of America (USA), Panama and China.

Source	Average Yearly Imports Based on 2019 – 2021 Data (items)		
	Fluorescent, hot cathode discharge lamps	Mercury or sodium vapor lamps; metal halide lamps	Light-Emitting Diode (LED) Lamps
LDC1	407,599	39,023	637,524
Customs and Excise Division	2,358,781	263,621	5,061,591
Percentage Calculation showing how representative LDC1 data is of the total imports of Lighting Devices for Trinidad and Tobago based on Customs and Excise Division Data	17%	15%	13%

Table 5: Comparison of Yearly Average Import Data of Lighting Devicesfrom LDC1 and Customs and Excise Division and Assumptions Made

The import data received from LDC1 also broke down some of the key categories of lighting products detailed by HS Codes into more specific lighting device types which allowed for more targeted assessments of the various categories of lighting devices.

Figure 5 illustrates the comparisons made for market trends in imports and sales based on LDC1 data received. For single-ended light bulbs referring to mercury-added CFLs and their mercury-free LED alternatives, both imports and sales of mercury-free LEDs have significantly surpassed those of the mercury-added CFLs for the past 2 years.

In contrast to single-use lighting device trends observed, Figure 5 illustrated that while the import and sales of mercury-added LFLs (Triband Phosphor <60 watts) have decreased each successive year from 2019 – 2021, the number of LFLs being imported and sold is still significantly higher than their mercury-free linear/tube LED alternatives.

A major factor that potentially affects the popularity of mercury-free single-ended LEDs and mercury-free double-ended (linear/tube) LEDs is the difference in upfront sale price of these items in comparison to their mercury-added counterparts. This was also reinforced by feedback received from LDC1 and another major lighting company contacted (labelled as LDC2), as well as LDU1, the major lighting user identified in the market survey. According to a market study conducted by the Clean Lighting Coalition (CLiC), the upfront sale price of

mercury-free LED tubes assessed in Trinidad and Tobago was on average approximately 25% more than the mercury-added LFLs (CLiC, 2022).



Figure 5: Import and Sales Trends for Company LDC1 from 2019 – 2021 for Single-Ended and Double-Ended Light Bulbs

For the average consumer, a more affordable sale price for an everyday household product is typically more attractive and more feasible. However, it is important to recognise that while the sales price (upfront cost) of an item may be cheaper at the onset, LED light bulbs are expected to have a longer lifespan and consume less than half of the amount of power (watts) needed for the same level of brightness (lumens) when compared to mercury-added LFLs or CFLs, resulting in cheaper electricity costs over time (CLiC, 2022). Figure 6 from the 2022 Report, "Technical and Economic Assessment of Mercury-Free Lighting: Latin America & the Caribbean Region" provides a summarised economic analysis of mercury-added CFLs and LFLs versus their mercury-free LED alternatives. The economic analysis demonstrates that when power-savings and life expectancy of bulbs are assessed, mercury-free LEDs are ultimately more economically viable, relatively non-toxic, and often last twice as long as mercury-added lamps.



Figure 6: Summary of Economic Analysis Conducted in Trinidad and Tobago of Mercury-added CFLs and LFLs versus LED Alternatives Respectively (CLIC, 2022)

As noted, LDC1 import data was estimated to represent 15% of the local imports for High Intensity Discharge Lamps (HIDLs) that are assumed to be mercury-added. LDC1 import data indicated a decrease in HPMV Lamps by 24% from 2019 to 2020, and a further decline by 17% in 2021, while sales showed a 30% decrease from 2019 to 2020, and an additional 67% decrease in 2021. HPMV Lamps have been used for purposes such as lighting of streets, parking lots and factories. In Trinidad and Tobago, the most well-known purpose for these products was for street-lighting (as the 2018 MIA Report indicated that HPMV Lamps were previously used). In communications with the Sectoral Programmes and Projects Unit of the Ministry of Public Utilities, it was noted that as of 2022, mainly High-Pressure Sodium Vapour Lamps are currently in use as streetlights and they are gradually being replaced by mercury-free LEDs under a green initiative that began in 2016 and is currently ongoing.

Aside from street-lighting, while LDC1's import and sales data indicated that HPMV Lamps appear to be on the decline in Trinidad and Tobago, LED HIDLs still do not appear to be as popular as High-Pressure Sodium Lamps or Metal Halide Lamps (see Figure 7). Under the Minamata Convention, Parties are required to phase out the manufacture of mercury-added HIDLs by 2020. According to LDC1's import data, HIDLs were imported from the USA, Panama and China all of whom are Parties to the Minamata Convention. As such, products purchased post-2020 from these countries are expected to be mercury-free.



Figure 7: LDC1 Import and Sales Data from 2019 – 2021 for Various Types of HIDLs.

As discussed in Chapter 2 of this report, the promotion of LEDs across all lighting devices is being promoted under the National Environmental Policy 2018. Additionally, within the private sector there is the added factor of the promotion of corporate social and environmental responsibility. LDC2 company launched a public awareness campaign that involved a LED

mascot visiting supermarkets and other public areas to promote LED bulbs. LDC2 also indicated that they submitted a proposal to the Ministry of Energy and Energy Industries to seek collaboration for the promotion of LED bulb use which is pending acknowledgement. They have also presented on the benefits of LED bulb use to members of the THA.

For the promotion of LED lighting devices nationally, strong public-private sector partnerships with distributors and retailers are needed.

4.1.2 Switches, Relays and Thermostats

Obtaining quantitative data to inform the market study of mercury-added versus mercury-free switches, relays and thermostats in the electrical and lighting sector was unsuccessful under this survey. Company ESRT1 indicated that they were generally unsure of the presence of mercury in their switches, relays and thermostats and were unable to provide information on the sources of their imports. However, they did indicate that products typically distributed by the company were imported from the USA, Panama and China. Online product and service catalogues for 2 of the 6 companies contacted for the survey did not provide any product information on whether the electrical switchboards and related products contained mercury switches or relays.

Global trends indicate that mercury-free switches, relays and thermostats have become widely available and more popular over the past twenty (20) years (UNEP, 2019b). Studies conducted in the USA indicate that as of 2016, all known thermostat manufacturers in the USA have phased out the production and sales of mercury thermostats in favour of mercury-free alternatives (IMERC, 2018). Based on 2014 data, over twenty (20) well-known USA-based manufacturers of electrical switches and relays also phased out the production and sales of various types of mercury switches and relays (IMERC, 2014). Several of these USA-based manufacturing brands are popular in Trinidad and Tobago, such as GE Appliances. However, 2019 research indicated that certain types of mercury-added electrical switches and relays were still available from other suppliers such as Newark Element 14, Gordo Sales Inc., Comus International (all based in North America) as well as several suppliers based in India (UNEP, 2019b). It is unclear whether these are suppliers to the Trinidad and Tobago market, however imports of lighting and electrical products have been noted in the past from the USA, China and South America (BCRC-Caribbean,2018).

Table 6 below summarises the types of mercury-free switches, relays and thermostats that have become readily available on the global market in comparison to their MAP counterparts (IMERC, 2014; IMERC, 2018).

Table 6: Alternatives to Mercury-Added Electrical Switches, Relays and Thermostats (IMERC, 2014; IMERC, 2018)

Potentially Mercury-added	Mercury-free Alternative(s)
Component or Product	
Float switch	Mechanical, magnetic dry reed, optical, conductivity, metallic ball,
	sonic or ultrasonic, pressure transmitter, alloy, thermal, and
	capacitance float switches
Tilt switch	Metallic ball, electrolytic, mechanical, solid-state, and capacitance tilt
	switches; potentiometers
Pressure switch	Mechanical or solid-state switches
Temperature switch	
Mercury displacement relay	Dry magnetic reed, electro-mechanical, and solid-state relays;
Mercury wetted reed relay	silicon-controlled rectifiers
Mercury contact relay	
Flame sensor	Electronic ignition systems
Mercury thermostat	Electromechanical Thermostats (e.g., reed switch, snap-switch etc.);
	Digital Thermostat (electronic programmable)

4.1.3 Medical Measuring Devices – Thermometers and Blood Pressure Gauges

Fourteen (14) popular medical supply companies were contacted. Thirteen (13) of the companies confirmed that mercury-free thermometers and blood pressure gauges were currently the sole types in stock and have been in recent years.

A sales representative from one (1) of the companies contacted noted that mercury-added thermometers were previously sold by their company but in recent years became unfeasible to import as chemical-free (digital) thermometers were more easily accessible. It was also noted that due to the presence of mercury in thermometers, more paperwork and time were required to obtain clearance from the Customs and Excise Division when importing.

Additionally, it was noted that due to the onset of the COVID-19 pandemic, mercury-free noncontact infrared thermometers have become increasingly popular to minimise the spread of disease through contact.

Only one (1) medical supply company (*referred to as MSC1*) indicated that in addition to mercury-free medical measuring devices, mercury-added thermometers and mercury-added sphygmomanometers (referred to as Mercury Desktop Blood Pressure Kit) are also currently available on an order request basis from customers which included those in the medical sector. The overall healthcare products that they distribute are supplied directly from

manufacturers and distributors in North America, the United Kingdom, China, Malaysia, and India, all of whom are Parties to the Minamata Convention on Mercury that agreed to phase out the export of these products by 2020, except for India which has requested an extension in their timeline to phase out manufacture, import and export of MAPs to 2025. It is therefore assumed that MSC1 may be importing MAPs from India which will no longer allow exports from 2025.

In terms of the technical efficiency of mercury-free medical measuring devices, ensuring that healthcare professionals are regularly trained and that standardized methodologies are utilised to measure temperature and blood pressure is key to maintaining efficacy in their use (WHO, 2020).

4.1.4 Dental Restoration Materials

Seventy-seven (77) dentists provided feedback via the Dental Filling Survey that was distributed under the market study. Figure 8 indicates that the proportion of respondents that had 'between 10 -20 years of professional experience' and 'over 20 years of professional experience' was 35.1% each, while the remaining respondents had under 10 years of professional dental experience. The majority of respondents (over 70%) indicated that they operate in personal private dental practice clinics.





Based on the statistical analysis of the Dental Survey results, it is assumed that the 77 responses obtained have a 95% probability of being representative of the dental sector of Trinidad and Tobago within a range of +/- 8.4%. This was used to make inferences about the national dental sector as follows.

It can be assumed that between 58% – 75% of dentists in Trinidad and Tobago no longer use dental amalgam in their dental restoration operations, nor do they have dental amalgam in stock.

Of the estimated 25% – 42% of the dental population that may still use dental amalgam, the frequency of dental amalgam use by these dentists is also considered to be relatively minimal in comparison to mercury-free (composite) dental filling material. The form of amalgam utilised was predominantly pre-capsulated (single-dental restoration capsules of pre-dosed amalgam), although 2 respondents indicated that small quantities of powdered or pellet forms were also used.

Of the survey respondents that indicated that dental amalgam is used and/or is still in stock, more than half stated that dental amalgam fillings were utilised in less than 10% of dental restoration procedures in the last three (3) years. Only 2 respondents indicated that dental amalgam was often used (approximately 40% – 70% of dental filling procedures); one respondent currently operates in the public healthcare sector while the other is based in their personal private clinic. Only 8% of respondents indicated that they worked in the public sector and of those dentists, half indicated that dental amalgam was present in their operations.

Currently, responses indicated that dental amalgam fillings are typically preferred in instances when controlling oral fluids (moisture control) is difficult, for teeth that are difficult to access (such as third molars) or in some cases that require extensive operations. A survey respondent noted that while moisture control may be an issue in certain cases, it is manageable and emphasis on dental training to ensure that dental practitioners are able to effectively use mercury-free fillings in various scenarios should be highlighted and is already being taught at the dental school in Trinidad and Tobago. In preparation for the Minamata Convention on Mercury's COP-4 held in 2021-2022, several Parties to the Convention and related stakeholders provided feedback on the technical efficacy of mercury-free fillings and concluded that mercury-free composite fillings exhibit satisfactory mechanical properties, require less preparation for use and provide better aesthetics since they are tooth-coloured (UNEP, 2021b).

As of 2022, Part II of Annex A of the Minamata Convention on Mercury that refers to dental amalgam has been updated to include that Parties, "shall exclude or not allow, by taking measures as appropriate, or recommend against the use of dental amalgam for the dental treatment of deciduous teeth, of patients under 15 years, and of pregnant and breastfeeding women, except when considered necessary by the dental practitioner based on the needs of the patient". Dental amalgam use is strongly discouraged for vulnerable population groups

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including children due to the potential health effects associated with mercury exposure on developing bodies.

Figure 9 illustrates that, according to the survey, most dentists agree that mercury-free fillings are preferred when assessing safety for use by patients, ease of application by dentists, effectiveness, and ease of disposal. In terms of availability on the market and from suppliers, mercury-free filling materials are also preferred.



Figure 9: Survey Respondents' Preference of Dental Amalgam Versus Mercury-free Alternatives based on Various Factors

Most dentist respondents indicated that they were aware of the environmental and health impacts of mercury and that dental amalgam was being phased down globally. A representative from the dentistry school in Trinidad and Tobago indicated that the curriculum for dental students has been modified over the years to include consideration of the Article 4 provisions of the Minamata Convention on Mercury and to encourage the adoption of proper safety measures for the disposal of dental amalgam waste. This aligns with global trends that indicated that when dental practices in 80 countries were surveyed, 75% indicated that the application of mercury-free dental restoration materials were taught in schools and the majority were also taught about the environmental and health concerns associated with mercury (WHO, 2021).

When asked their opinions on the potential barriers to phasing out dental amalgam in the national dental sector, the majority saw no major challenges, but it was noted that amalgam may still be preferred for some exceptional cases.

Based on the survey responses, it is estimated that over the past 3 years, approximately 3,000 pre-capsulated (single-dose) dental amalgams were used in dental restoration procedures. The average of 1,000 dental amalgam fillings per year for a population of over 1.4 million persons is minimal.

Some dentists also raised the issue of potentially undocumented dental amalgam use by unlicensed dental practitioners that operate in Trinidad and Tobago. According to the DCTT, there are numerous unlicensed dental practitioners that operate in Trinidad and Tobago and may appeal to persons who do not have dental insurance or the financial means to pay for proper dental care. Although unlicensed dental practitioners do not have the required dental qualifications, their operations are not technically illegal under the current laws of Trinidad and Tobago. As of mid-2021, amendments to the Dental Profession Act, Chap 29:54 were being considered to protect the public against unlicensed dental practitioners. The DCTT as well as the Trinidad and Tobago Dental Association have made public awareness efforts to educate the public on this issue. On the DCTT's online website, there is also a listing of registered national dentists available to the public.

4.1.5 Topical Antiseptics

Through observations made at local pharmacies, the presence of mercurochrome antiseptic was noted amongst a variety of other mercury-free topical antiseptics sold at retail outlets. Mercurochrome Solution 1% Antiseptic appeared to be predominantly manufactured and distributed locally by one medium-sized pharmaceutical company (*referred to as PC1*) based in Trinidad and Tobago who provided further details on their products. It was noted that the mercury compound, mercurochrome salts (full product name: Mercury dibromofluorescein disodium salt), were imported from distributors based in the United Kingdom as recently as 2017 for the production of the mercury-added antiseptic. PC1 produces Mercurochrome Solution 1% Antiseptic in 30 millilitre (ml) and 120 ml volumes and have estimated that between 3,000 - 5,000 bottles and 1,000-3,000 bottles of the respective volumes were produced per year in the past 3 years.

Mercurochrome Solution 1% Antiseptic is listed as one among eight (8) similar antiseptics being distributed by PC1. Other topical antiseptics being sold include Acriflavine Solution, Sulphur Powder, and Iodine Tincture among others.

PC1 did not find any clear indication of preference for mercury-added antiseptics or the range of mercury-free alternatives and the pharmacy that was contacted for pricing also stated that while Mercurochrome Solution 1% was in stock, it was not a popular item. It is assumed that customers who purchase mercurochrome antiseptic may be doing so because they are accustomed with using the product over the years.

Based on the feedback received from PC1, which is considered to be one of the main producers of mercury-added antiseptics locally, mercurochrome salts have already become increasingly difficult to source on the global market. As a result, considerations on the discontinuation of the production of Mercurochrome Solution 1% Antiseptic have already been made due to the scarcity and increasing cost on the global market of the key mercury-added ingredient.

PC1 noted that no challenges for their business operations would be anticipated if the GoRTT decides to move toward mercury-free product promotion or the implementation of bans on the further import of mercury-added antiseptics.

With the multitude of mercury-free alternatives available, phasing out mercury-added topical antiseptics in Trinidad and Tobago is expected to be a relatively smooth transition.

Chapter 5: Conclusions and Recommendations

Across the globe, there are currently 137 Parties to the Minamata Convention on Mercury that have agreed (among other obligations) to phase out the manufacture, import and export of MAPs listed under the Convention and phase down the use of dental amalgam. Many of these countries have already phased out¹¹ these products according to the Convention's 2020 deadline with few countries, such as India and China, requesting exemptions to phase out certain MAPs within the next few years. As such, the manufacture of MAPs has declined in recent years with mercury-free alternative products becoming increasingly popular and overtaking the global market. The findings of the national market study conducted reflect global trends as it was found that Minamata Convention-compliant products already dominate the market in Trinidad and Tobago. It is therefore anticipated that the GoRTT's implementation of the Minamata Convention in relation to Article 4 'Mercury-added products' would be a smooth process in the event that the GoRTT becomes a Party.

Further factors that have determined the feasibility of replacing MAPs identified with mercuryfree alternatives in Trinidad and Tobago¹² are provided in Table 7 below.

Lighting Devices			
Type of Product	LED Lighting Devices and, to a lesser extent mercury-free HIDLs.		
Availability	LEDs replacing CFLs are predominantly available on the market. The		
	T&TEC has engaged in a LED bulb distribution programme for the		
	free provision to LED bulbs to households which is ongoing.		
	LEDs replacing LFLs are widely available on the national market.		
	• LEDs replacing HIDLs are available on the local market though non-		
	LED HIDLs such as High Pressure Sodium Lamps are still imported		
	and sold at a higher rate than the LED alternatives. Based on retailer		
	feedback, these types of HIDLs (High Pressure Sodium Lamps and		
	Metal Halide Lamps) are currently imported from countries that are		
	Parties to the Minamata Convention and are therefore expected to be		
	compliant with Convention requirements.		
Efficacy/Reliability	LEDs do not contain mercury and their use results in lower energy		
	consumption which subsequently results in lower carbon emissions (in		
	comparison to mercury-added or other types of light bulbs). LEDs demonstrate		

Table 7: Summary Assessment of the Availability of Minamata Conventioncompliant Alternative Products to MAPs

¹¹ In reference to the manufacture, import and/or export of MAPs.

¹² Economic analysis included in Annex 1 of this report.

	higher brightness (lumens) and have a longer functional lifespan than	
	mercury-added lighting products.	
Overall Feasibility	• The growing popularity of LEDs lighting devices over the past three (3) to	
of Replacing	five (5) years indicates a gradual phase-out of CFLs, LFLs, and HPMV	
MAPs with	Lamps for Mercury Convention-compliant lighting products.	
Mercury-free	• LED lighting is also proven to be more energy efficient which further	
Alternatives	promotes MAP phase out under various energy efficient/green policies	
	being promoted by the Government and private sector.	
	• Research has indicated that when factors such as wattage, brightness,	
	energy efficiency and lifespan are assessed, LED alternatives are	
	approximately 50% more economically feasible. Public awareness	
	strategies should be conducted to educate suppliers and consumers of	
	cost savings to further promote the use of LEDs, especially for LEDs	
	replacing LFLs.	
	• LED-replacing HIDLs have a higher efficacy than other types of HIDLs	
	including High Pressure Sodium Lamps or Metal Halide Lamps. While the	
	latter types are expected to be compliant with the Minamata Convention	
	and are still generally more popular that their LED alternatives 1 FDs are	
	recommended for use in this lighting category where feasible.	
	Current Customs HS Codes already distinguish between LED lighting	
	devices and non-LED lighting devices however, amending the Custom	
	Codes to distinguish amongst the types of LED lighting devices will	
	enhance identification of their trade	
Electrical Switches,	Relays and Thermostats	
Type of Product	Mercury-free switches; mercury-free relays; electromechanical or digital	
	thermostats	
Availability	No local data could be found to confirm availability as Customs and Excise	
	import data does not currently differentiate between mercury-added and	
	mercury-free varieties and feedback from stakeholders was inconclusive	
	(since these products are often components within larger products), but global	
	trends indicate that mercury-free alternatives have become widely available	
	over the past two (2) decades.	
Efficacy/Reliability	While the specific suitability of switches, relays and thermostats vary across	
	multiple potential applications, research indicates that mercury-free switches,	
	relays and thermostats are globally available, reliable and adequate for a	
	variety of functions.	

Overall Feasibility	• In terms of the practical use, mercury-free alternative electrical switches,	
of Replacing	relays and thermostats appear to be widely available and highly reliable	
MAPs with	for their variety of applications.	
Mercury-free	• While mercury-free alternatives have become the main type on the global	
Alternatives	market over the past twenty (20) years, there may still be a small	
	percentage of MAPs entering the Trinidad and Tobago market. Identifying	
	which of these products contain mercury has proven to be a challenge.	
	• While recommendations for addressing these MAPs under HS Codes and	
	labelling standards can be made nationally as well as the promotion of	
	public awareness, there is global consensus on overall feasibility of	
	replacing these MAPs with mercury-free alternatives.	
Medical Measuring	Devices – Thermometers	
Type of Product	Mercury-free thermometers may include alcohol or infrared types, but for	
	clinical use, digital thermometers are the most well-known.	
Availability	• Mercury-free thermometers are the main types of thermometers in use	
	across all relevant sectors and the main types that are available on the	
	global and local market in both the public and private sectors.	
	• Feedback from medical supply companies in Trinidad and Tobago have	
	confirmed that mercury-added thermometers have become increasingly	
	unavailable as manufacture of these products has been greatly reduced	
	globally which is likely due to the preference for mercury-free varieties and	
	the phase-out efforts of Parties under the Minamata Convention on	
	Mercury.	
Efficacy/Reliability	Extensive research by the WHO and other recognised bodies have concluded	
	that digital thermometers have a high efficacy (in comparison to mercury-	
	added thermometers and other types).	
Overall Feasibility	Mercury-added thermometers have been largely phased out in the public and	
of Replacing	private medical sector and in retail. Public awareness and ensuring regular	
MAPs with	training of healthcare students and professionals in the use of mercury-free	
Mercury-free	digital thermometers should be incorporated into the health sector and via	
Alternatives	public communications.	
Medical Measuring	Devices – Blood Pressure Gauges	
Type of Product	Aneroid sphygmomanometers and several types of automated (electronic)	
	blood pressure gauges.	
	(Note: some types may contain small concentrations of mercury. Currently,	
	these are not restricted under the Minamata Convention).	
Availability	• Minamata Convention-compliant blood pressure measuring devices are	
	the predominant types available on the global and local market.	

	• Feedback from medical supply companies in Trinidad and Tobago have		
	confirmed that mercury-added sphygmomanometers have become		
	increasingly difficult to source and their use is generally discouraged due		
	to the high quantities of mercury involved and breakage risks. Globally,		
	the manufacture of these MAPs has reduced due to the increased		
	preference for mercury-free and technologically advanced varieties and		
	phase-out efforts of Parties under the Minamata Convention on Mercury.		
Efficacy/Reliability	Research by the WHO concluded that mercury-free validated automatic		
	blood pressure machines produce more accurate and consistent		
	measurements (in comparison to mercury-added measuring devices).		
Overall Feasibility	• Mercury-added sphygmomanometers have been largely phased out in the		
of Replacing	public and private medical sector.		
MAPs with	• Public awareness and ensuring regular training of healthcare students		
Mercury-free	and professionals in the use of Minamata Convention-compliant blood		
Alternatives	pressure measuring devices should be incorporated into the health sector		
	and via public communications.		
Dental Restoration Materials (Fillings)			
Type of Product	Composite (resin) fillings		
Availability	• Composite fillings for dental restoration have become the predominant		
	preference on the global and local market for many years with 58 - 75%		
	of national dentists indicating that composites are the sole type of dental		
	restoration material in use/ in stock.		
	• Of the remaining 25 – 42% of the dental sector in Trinidad and Tobago		
	that indicated that dental amalgam was still in use or in stock, the number		
	of procedures in which dental amalgam was used is minimal.		
Efficacy/Reliability	• Global assessments on technical efficacy of composite fillings have		
	concluded that they exhibit satisfactory mechanical properties, require		
	less preparation for use and preferred by patients due to aesthetics (in		
	comparison to dental amalgam fillings).		
	• Providing adequate training of dental practitioners in the preparation and		
	placement of composite fillings will ensure their effectiveness and		
	durability.		
Overall Feasibility	Under the Minamata Convention on Mercury, Parties are expected to take two		
of Replacing	(2) or more provisions to phase down its use.		
MAPs with	Measures outlined in Annex A Part II of the Convention that are already being		
Mercury-free	implemented nationally by the DCTT and dental schools include:		
Alternatives	• Promoting the use of cost-effective and clinically effective mercury-free		
	alternatives for dental restoration:		

	• Encouraging representative professional organizations and dental		
	schools to educate and train dental professionals and students on the use		
	of mercury-free dental restoration alternatives and on promoting best		
	management practices;		
	Promoting the use of best environmental practices in dental facilities to		
	reduce releases of mercury and mercury compounds to water and land		
	As of 2022, Parties shall, "exclude or not allow, by taking measures as		
	appropriate the use of mercury in bulk form by dental practitioners". The		
	deptol survey showed also that the enconsulated form was the prodominant		
	the used eligning with the should provide a		
	type used, aligning with the above provision.		
	As of 2022, Parties will also be expected to take appropriate measures to		
	prevent dental amalgam use for patients under 15 years of age, and of		
	pregnant and breastfeeding women, except when considered necessary. This		
	can be achieved through coordination with the DCTT but can also be further		
	enhanced by amending the Dental Profession Act. Chapter 29:54 to include		
	this and formally recognise the other provisions of the Minamata Convention		
	that are already in place nationally previously stated		
	that are already in place nationally previously stated.		
	The DCTT and other dental sector bodies have also put forward amendments		
	to this Act to protect the public against the practices of unlicensed dentists.		
	Unlicensed dentists are also assumed to have a higher likelihood of using		
	dental amalgam. Efforts to coordinate with the DCTT and Ministry of Health to		
	raise awareness on this issue should be considered by the NWG.		
Topical Antiseptics			
Type of Product	Several antiseptic ointments and powders including Acriflavine Solution.		
	Sulphur Powder, and Iodine Tincture.		
Availability	Numerous mercury-free alternatives are widely available and more popular on		
	the global and national markets (in comparison to Mercurochrome Solution		
	1%), as confirmed by a well-established pharmaceutical company that		
	manufactures and distributes antiseptics nationally.		
Efficacy/Reliability	Each of the mercury-free antiseptics on the national market appear to have		
	comparable and adequate reliability for their intended purposes.		
Overall Feasibility	On the local and global market, reliable mercury-free topical antiseptics		
of Replacing	are widely available and affordable		
MAPs with	• The main pharmaceutical company in Trinidad and Tobago that		
Mercury-free	manufactures and distributes Mercurochrome Solution 1% has indicated		
Alternatives	that they have already been considering its discontinuation since the		
Alternatives	marcuny have already been considering its discontinuation since the		
	mercury ingredient has become more expensive and difficult to source.		

Recommendations for Trinidad and Tobago to ensure the implementation of Article 4 of the Minamata Convention on Mercury are divided into short-term (within 1 year) and long-term (1-5 years) as follows:

Short-Term Recommendations:

• Accession to the Minamata Convention on Mercury by the GoRTT:

The Minamata Convention sets out obligations for the prohibition of the manufacture, import and export of MAPs listed (as per Article 4 'Mercury-added products') and facilitates technical guidance and financial mechanisms to support the phase-out of MAPs. Accession to the Convention will allow Trinidad and Tobago to gain further access to support for the promotion of mercury-free alternative products.

Based on this market study, the implementation of Article 4 of the Convention is anticipated to be a smooth process for the GoRTT as Minamata Convention-compliant products already dominate the global and local market.

In terms of the impact on commerce, local distribution companies already import Convention-compliant products for sale with the demand for these types of products increasing as MAPs have become less popular. As many of these local companies also export to other Caribbean islands, the continued promotion of mercury-free alternatives by these companies can have positive impacts on their regional scope as currently nine (9) Caribbean countries are Parties to the Convention with further countries actively considering becoming Parties.

Regional projects and initiatives (such as, the GEF ISLANDS programme) that are taking a coordinated approach for the management of chemicals and hazardous waste are also ongoing and phasing out MAPs are consistent with these initiatives.

In this regard, the GoRTT becoming a Party to the Minamata Convention will not only promote and protect human health and the environment nationally, but it will also enhance the Caribbean region's efforts, along with globally coordinated initiatives.

- Development of a Communication and Coordination Strategy to Promote Mercury-free Alternative Products:
 - The current NWG members represent government entities, private sector organisations and non-governmental organisations that may have the capacity to

support MAP phase-out activities through their regulatory mandates and enhanced coordination efforts. These should include the development of mercury-free product procurement policies for the relevant public and private sector bodies. Considerations should also be made to include DCTT, MBTT and representatives from the MoH and/or Regional Health Authorities responsible for procurement of medical devices and material in the public healthcare sector.

Awareness strategies to educate the public as well as, relevant businesses and stakeholders and promote mercury-free alternatives should be considered through public-private partnerships which should be led by the NWG. Coordination of public awareness efforts between government stakeholders and private stakeholders in the relevant manufacturing, retail and medical sectors is essential to ensure clear communication and follow-through for the phase-out of MAPs and replacement with mercury-free alternative products. Private sector engagement can be coordinated through collective bodies such as (but not limited to) the TTCIC and TTMA.

• Coordination with Related Projects and Initiatives for the Overall Protection of Human Health and the Environment:

- Under the NEP, 2018 and the Green Government Policy, 2011, the promotion of mercury-free products is already directly or indirectly addressed. For example, energy conservation objectives under the Green Government Policy, 2011, encourage the use of LED lighting for government offices. Additionally, the LED Light Bulb Distribution Program and streetlight programmes being conducted by T&TEC have encouraged energy efficiency through the promotion of LEDs. These examples link to the NEP (2018) *Priority 3: Improving the Local Environment*, in relation to green architecture and infrastructure. The objectives of the NEP (2018) and related policies should continue to be further supported by the MoPD and other members of the NWG. The possibility of coordinating efforts for promoting mercuryfree products with the initiatives of the National Council for Sustainable Development, a body of key stakeholders in relevant government agencies, private sector associations and academic institutes, that was established for the implementation of the NEP, 2018, should be considered by the NWG.
- Amendments to the Dental Profession Act, Chapter 29:54, to include the protection of the public against the practices of unlicensed dentists have been proposed by the DCTT and dental professionals. These amendments may indirectly support the

phase down of dental amalgam as undocumented dental amalgam use (which may include hand-mixing of dental amalgam) may be conducted by unlicensed persons. Efforts to coordinate with the DCTT and MoH to raise awareness on this issue should be considered by the NWG.

- Trinidad and Tobago is currently involved in the overall strengthening of the regional laboratory capacities for testing of products to identify or quantify mercury content under the CRMMN initiative developed by the Biodiversity Research Institute (BRI) and the Department of Analytical Services in Antigua and Barbuda. Activities for the initiative are ongoing and regular updates should be provided to the NWG to monitor progress.
- Trinidad and Tobago is also a participating country under the global programme, "GEF ISLANDS" being executed regionally by the BCRC-Caribbean. This project aims to strengthen countries' abilities to control the flow of chemicals, products and materials into their territories and to unlock resources for long term management of chemicals and wastes including integrated chemicals and wastes management in SIDS. The project will specifically target the management of Persistent Organic Pollutants and mercury. Acceding to the Minamata Convention *prior to* the commencement of the mercury-specific activities under the project can potentially allow the GoRTT to benefit from them by garnering additional resources to implement specific projects in Trinidad and Tobago.

Long-Term Recommendations:

- Enhancement of the National Regulatory Framework:
 - Consider the development and adoption of amendments to the Dental Profession Act, Chapter 29:54 to formally include measures outlined in Article 4 'Mercury Added-Products' and Annex A Part II of the Minamata Convention.
 - Ensure the training of Customs, Pesticides and Toxic Chemicals Inspector and the Trade Licence Unit, and the development of SOPs for the identification and restriction on the trade of MAPs¹³.

¹³ This is expected to be conducted under the regional project, "Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (ISLANDS)". Currently, as the GoRTT is not a Party to the Minamata Convention, it will only be able to learn through knowledge sharing with the other Caribbean countries involved. If the GoRTT becomes a Party prior to the commencement of the related mercury-specific activities, the country may be able to directly benefit.

Consider the development and adoption of amendments to the Customs Act, Chapter 78:01; Pesticides and Toxic Chemicals Act 30.03; Standards Act, Chapter 82:03 and; Trade Ordinance (No. 19 of 1958) Import and Export Negative Lists. Measures can be included in the amendments, where relevant, to regulate the import, export, labelling and handling of mercury, mercury compounds and MAPs.

References

- BCRC-Caribbean. 2018. Trinidad and Tobago Minamata Initial Assessment Report.
 BCRC-Caribbean, Trinidad and Tobago. Available at:
 https://www.mercuryconvention.org/en/parties/minamata-initial-assessments
- Bell, L.; Evers, D.; Johnson, S.; Burton, M.; Regan, K.; Ingram, I.; DiGangi, J.; Federico; J.; Samanek, J.; Petrlik, L. (2019) Mercury Threat to Women & Children Across 3 Oceans. A joint study by the Biodiversity Research Institute, the International POPs Elimination Network, Arnika Association, and Island Sustainability Alliance (Cook Islands). November 2018. Berkeley California.
- Central Bank of Trinidad and Tobago. 2022. Economic Bulletin Volume XXIV No. 1 January 2022. ISSN: 1818 – 0027. Available at: https://www.centralbank.org.tt/sites/default/files/page-file-uploads/economic-bulletin-january-2022-20220103.pdf
- Centre for Disease Control and Prevention. 2017. Mercury Factsheet. [online] Available at: https://www.cdc.gov/biomonitoring/Mercury_FactSheet.html
- Clean Lighting Coalition (CLiC). 2022. Technical & Economic Assessment of Mercury-Free Lighting: Latin America & the Caribbean Region. Clean Lighting Coalition, 2022. [online] Available at: <u>https://cleanlightingcoalition.org/wpcontent/uploads/sites/96/CLiC-Regional-Profiles-GRULAC.pdf</u>
- Evers, D. C. and M. Burton. 2022. Caribbean Region Mercury Monitoring Network. Biodiversity Research Institute, Portland, Maine. Science Communications Series BRI 2022-03. 8 pages.
- Evers, D.C. and E. Sunderland. 2019. Technical Information Report on Mercury Monitoring in Biota: Proposed components towards a strategic long-term plan for monitoring mercury in fish and wildlife globally. UN Environment Programme, Chemicals and Health Branch, Geneva, Switzerland. 40 pp.
- Government of the Republic of Trinidad and Tobago (GoRTT). 2017.[untitled] Available
 https://www.ttconnect.gov.tt/gortt/portal/ttconnect/!ut/p/a1/04_Sj9CPykssy0xPLMnMz
 0vMAfGjzOK9A40MTD0tjQ38Aw0sDYyCPA1dDUy9jd2DDIEKIIEUBLm7ARW4mhp6
 elcZGxgYEKffAAdwJKg_ODVPP1w_Cq8yLwMMBZjOBCvA446C3NCICs9MRwCWE
 Lx4/dl5/d5/L2dBISEvZ0FBIS9nQSEh/?WCM_GLOBAL_CONTEXT=/gortt/wcm/conn
 ect/GorTT%20Web%20Content/ttconnect/home/about+t+and+t/general+informat

ion/language.

- Government of the Republic of Trinidad and Tobago (GoRTT). 2018. National Environmental Policy. [online] Available at: http://www.ema.co.tt/new/images/policies/national-environmental-policy2018.pdf.
- International Institute for Sustainable Development (IISD). 2022. Summary of the Second Segment of the Fourth Meeting of the Conference of the Parties to the Minamata Convention on Mercury: 21-25 March 2022. Earth Negotiations Bulletin. 28 March 2022. Vol. 28. No. 65 [online] Available at: <u>https://enb.iisd.org/Minamata-Convention-Mercury-COP4-2</u>.
- Interstate Mercury Education and Reduction Clearinghouse (IMERC). 2014. IMERC Fact Sheet- Mercury Use in Switches & Relays. [online] Available at: <u>https://www.newmoa.org/prevention/mercury/imerc/about.cfm</u>
- Interstate Mercury Education and Reduction Clearinghouse (IMERC). 2018. IMERC Fact Sheet- Mercury Use in Thermostats. [online] Available at: https://www.newmoa.org/prevention/mercury/imerc/about.cfm
- Lennett D, Gutierrez R. 2018. Minamata Convention on Mercury: Ratification and Implementation Manual. Washington, DC: National Resources Defense Council. Available at: <u>https://www.nrdc.org/sites/default/files/minamata-convention-on-mercury-manual.pdf</u>
- Ministry of Planning and Development (MoPD). 2022a. International Trade. Central Statistics Office, Ministry of Planning and Development. Available at: https://cso.gov.tt/subjects/international-trade/
- Ministry of Planning and Development (MoPD). 2022b. Population Statistics. Central Statistics Office, Ministry of Planning and Development. Available at: https://cso.gov.tt/subjects/population-and-vital-statistics/population/
- Mohite, P. and Bhatnagar, M. 2008. Mercurochrome 1% as an antiseptic for burns: Economical - but is it efficacious and safe?. The Internet Journal of Surgery. Volume 21 Number 2. Available at: <u>https://doi.org/10.1002/14651858.CD011821.pub2</u>
- Parliament of the Republic of Trinidad and Tobago. 2022. About. Available at: https://www.ttparliament.org/about/
- Secretariat to the Minamata Convention. 2021. Draft guidance document on the use of customs codes under the Minamata Convention. Secretariat of the Minamata Convention on Mercury. Available at: https://www.mercuryconvention.org/en/documents/draft-guidance-document-usecustoms-codes-under-minamata-convention-pdf-version
- Tobago House of Assembly (THA). 2022. About the Assembly. Available at: https://www.tha.gov.tt/about-the-assembly/

- Thompson, Lawrence. 2020. Institutional Capacity Needs Assessment Report For Customs and Excise Departments for the Control of Trade in Chemicals and Waste for Eight Participating Countries (Antigua and Barbuda, Barbados, Belize, Guyana, Saint Kitts and Nevis, Saint Lucia, Suriname, and Trinidad and Tobago). BCRC-Caribbean. April 13, 2020.
- UNEP. 2019a. Global Mercury Assessment 2018. UN Environment Programme, Chemicals and Health Branch Geneva, Switzerland
- UNEP. 2019b. Toolkit for Identification and Quantification of Mercury Releases, Reference Report and Guideline for Inventory Level 2. Version 1.5, November 2019. UNEP Chemicals Branch, Geneva, Switzerland
- UNEP. 2021a. Minamata Convention on Mercury Text and Annexes. UNEP, Geneva, Switzerland.
- UNEP. 2021b. Matters for consideration or action by the Conference of the Parties: mercury-added products and manufacturing processes in which mercury or mercury compounds are used: information on dental amalgam. Information on dental amalgam. Note by the secretariat. Conference of the Parties to the Minamata Convention on Mercury Fourth Meeting. UNEP/MC/COP.4/5. 12 August 2021. UNEP.
- World Health Organisation (WHO). 2017. Mercury and health. [online] Available at: <u>http://www.who.int/mediacentre/factsheets/fs361/en/</u>.
- World Health Organisation (WHO). 2019. Strategic planning for implementation of the health-related articles of the Minamata Convention on Mercury <u>https://apps.who.int/iris/rest/bitstreams/1257674/retrieve</u>
- World Health Organisation (WHO). 2020. WHO technical specifications for automated non-invasive blood pressure measuring devices with cuff. Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO
- World Health Organisation (WHO). 2021. Review of Minamata Convention initial assessment reports: key findings for health. Geneva: World Health Organization; Licence: CC BY-NC-SA 3.0 IGO.
- World Health Organization (WHO), 2017b. Road map to enhance health sector engagement in the Strategic Approach to International Chemicals Management towards the 2020 goal and beyond. WHO. [online] Available at: https://apps.who.int/iris/rest/bitstreams/1141165/retrieve

Annexes

<u>Annex 1 – Brief Economic Analysis of Minamata Convention-compliant</u> <u>Products</u>

Table A1: Economic Affordability of Minamata Convention-compliant Products in Comparison to MAPs

Economic Affordability of Minamata Convention-compliant Products in Comparison to MAPs Lighting Devices

- LEDs replacing CFLs have a lower sale price than CFLs while LEDs replacing LFLs are still more expensive in terms of sale price than LFLs (by approximately 25% on average). Once factors such as lamp wattage, brightness and lifespan are assessed, LEDs are found to be more economically viable than the MAPs.
- Due to the large variations in costs of the different types of HIDLs based on the different applications and fixtures required, cost differences were not able to be assessed. For this study, it is assumed that the economic feasibility of mercury-free LED versions of HIDLs would be similar to that of other LED lighting devices.

Electrical Switches, Relays and Thermostats

- While specific costs of switches, relays and thermostats vary across the multiple potential applications, research suggests that there is no significant difference in cost between mercury-added and mercury-free switches, relays and thermostats.
- Higher costs may also be associated with the mercury-added types of these products when considerations are made for the need for environmentally sound storage and disposal. As such, mercury-free alternatives are considered generally more economically affordable.

Medical Measuring Devices – Thermometers

- Mercury thermometers have similar retail prices as basic digital thermometers. Prices of digital thermometers may vary based on several features such as temperature memory storage.
- Higher costs may also be associated with the mercury thermometers when considerations are made for their need for environmentally sound storage and disposal.

Medical Measuring Devices – Blood Pressure Gauges

- Mercury sphygmomanometers are approximately half of the sale price of other automated varieties, but higher costs may also be associated with the mercury sphygmomanometers when considerations are made for their need for environmentally sound storage and disposal.
- Retail cost was also not determined to be a significant driver affecting the purchase of mercury sphygmomanometers.

Dental Restoration Material

- Dental amalgam is still considered to cost 25 50% less than composite fillings on average, however composite fillings continue to become more affordable with technical advancements.
- In Trinidad and Tobago, dental insurance policies do not differentiate between the different types of dental restoration material and a fixed percentage reimbursement on procedures is typically offered.
- Parties and related stakeholders that provided information in preparation for COP-4 detailed that for global trends indicated that the price difference between mercury-added and mercury-free alternatives is already being reduced as improvements in techniques are made. Reference was also made to the additional costs and efforts required for handling dental amalgam waste disposal which have made dental amalgam use less economically feasible for practitioners in countries with waste management mechanisms in place.

Topical Antiseptics

- No significant difference in cost to the consumer was noted when mercurochrome was compared to several other types as indicated below (based on sales prices in Trinidad and Tobago Dollars [TTD] obtained from a popular local pharmacy in South Trinidad):
 - Mercurochrome Solution 1% (30 ml) TT \$5.50
 - Acriflavine Solution (30 ml) TT \$5.50
 - Iodine Tincture (30 ml) TT \$11.50
 - Sulphur powder (15 grams) TT \$6.95
- The main local mercurochrome distributor noted that the cost of mercurochrome salts used for the manufacture of Mercurochrome Solution 1% has increased and is no longer considered as economically feasible to import.

Annex 2 – HS Codes of Relevant Consumer Products

Table A2: HS Codes for the Consumer Products of Concern under this Study.

Product Category	HS Code
Lighting Devices	
Fluorescent, hot cathode discharge lamps	8539.31.00
Mercury or sodium vapor lamps; metal halide lamps	8539.32.00
Other: Electrical discharge lamps, other than fluorescent (hot cathode), mercury or sodium vapor, metal halide or ultraviolet lamps	8539.39.00
Arc Lamps	8539.41.00
Other: Ultra-violet or infra-red lamps	8539.49.00
Light-Emitting Diode (LED) Lamps	8543.70.90
Electrical Switches and Relays	
Isolating Switches and Make-and-break Switches for a Voltage Exceeding 1,000 V	8535.30.00
"Other- Electrical apparatus for switching, protecting, or making connections for a	8535.90.00
voltage exceeding 1,000V"	
Relays for a voltage not exceeding 60 V	8536.41.00
Relays for a voltage greater than 60 V and not exceeding 1000 V	8536.49.00
Switches, for a voltage not exceeding 1,000 V	8536.50.00
Thermometers	1
Liquid-filled thermometers and pyrometers (not combined with other instruments), for direct reading	9025.11.00
Other: (may include Digital thermometers)	9025.19.00
Blood Pressure Measuring Devices	1
Other instruments and appliances- may include sphygmomanometers- Devices for measuring blood pressure	9018.90.00
Amalgams	
Amalgams of precious metals; etc.	2843.90.00

Mercury or Mercury Compounds		
Mercury	2805.40.00	
*Note: Mercurochrome may be shipped under various product names including "Merc	ury Compound"	
or "Sodium Salts". While HS Codes currently categorise "Mercury", mercurochrome may be		
categorised under several other HS Codes that are listed under Chapter 28 of the Customs Act:		

"Inorganic Chemicals; Organic or Inorganic Compounds of Precious Metals, or Rare-Earth Metals,

of Radioactive Elements or of Isotopes" or Chapter 30 "Pharmaceutical Products".
Annex 3 – Methodology Considerations: Market Study Challenges and

Mitigation Measures

For the market study, the challenges for data collection and analysis were considered in order to better inform the methodology for this assessment. A summary is provided in the below table.

Table A3: Summary of Perceived Challenges in Stakeholder Survey Distribution and Measures Taken to Address Challenges

Perceived Challenge	Measures Taken to Mitigate Challenges
Due to the ongoing impacts of the COVID-19 pandemic, various protocols were put in place to reduce in-person contact. While the public sector offices and the majority of private sector offices were re-opened under restrictions in the last quarter of 2021, many offices remained under "work-from-home"/ staff rotation mandates which may have negatively impacted stakeholder engagement.	Stakeholder engagement was conducted mainly via virtual meetings, emails, and phone-calls. Questionnaires developed for data collection were distributed online via the Google Forms platform.
There was a general lack of data or lack of responsiveness from stakeholders.	User friendly formats for questionnaires and for dispensing project updates were utilised. Assistance from key members of the NWG was sought to enhance stakeholder communication. Available data from related projects and desktop research was assessed where possible.
The holiday periods of Christmas 2021 and Easter 2022 are typically periods when stakeholders are on vacation or offices may be taking "downtime" which may have a negative impact on stakeholder responsiveness.	The timeline for key stakeholder engagement and market survey distribution was set from February – early April 2022 in order to avoid the holiday periods.

Annex 4 – Market Surveys

Surveys developed for this market survey were developed and distributed via Google Forms.

PDF versions of the surveys developed can be accessed via the following online link:

https://www.dropbox.com/sh/s5fp0hkd7aehwoj/AADfpXh2ugm9QqvRD2cdKZ3ba?dl=0)