



República de Moçambique

# Mozambique Hg National Inventory Level I


Prepared for MITADER  
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# MOZAMBIQUE

- ▶ Pop.:28,861,863 (2017)
- ▶ Sectors:
  - Agriculture,
  - Tourism,
  - Transport,
  - Communication,
  - Industry,
  - Mining
  - Health




# Background

- ▶ Mozambique willing to ratify of Minamata Convention
  - ▶ Need Hg National Inventory
  - ▶ Approach and Methodology was provided
  - ▶ Data Collection
  - ▶ Data analysis and Compilation in a report
  - ▶ Draft Inventory was produced and commented by UNITAR
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# Terms of Reference

- ▶ **Develop a Hg Inventory Report:** Data collection and Report according to the pattern provided.
- ▶ **Develop a National Hg Profile:** Impact in the Environment and in Human Health.
- ▶ Hg Priority Sectors and Hots de mercúrio.
  - Emission Sources and Hg Emissions
  - Effects in the Human Health and to the Environment
  - Current levels of handling, storage and Waste Management Practices
  - A&IP
  - Political Implications and Opportunities
  - Propose Mitigations of Waste Management

# Approach and Methodology

- ▶ Identification of Hg Sources Relevant Sectors
  - ▶ Letter request and Submission of Questionnaire
  - ▶ Data requested Period 2012–2018
  - ▶ Conflicting data was avoided and judgement made
  - ▶ Introduction of data in excel sheets and conversion into right unit
  - ▶ Results obtained according to Mass Balance
  - ▶ Preparation of the Report
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# Key Relevant Hg Emission Sources

- ▶ Consumption of Energy
- ▶ Production of fuel
- ▶ Production of Primary Metals
- ▶ Production of Other Materials
- ▶ Utilization and Destination of Products with Hg Content
- ▶ Incineration of waste
- ▶ Waste Landfilling/ Waste Water Treatment
- ▶ Crematories and Cemeteries

Note: There are no Control Mechanisms identified



# Mercury Input

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
<b>Energy consumption</b>				
Coal combustion in coal fired industrial boilers	Y	17,000	Coal combusted, t/y	2
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	1,360,202	Oil product combusted, t/y	7
Use of raw or pre-cleaned natural gas	Y	799,155,200	Gas used, Nm <sup>3</sup> /y	80
Biomass fired power and heat production	Y	12,543,076	Biomass combusted, t/y	376
Charcoal combustion	Y	0	Charcoal combusted, t/y	0
<b>Fuel production</b>				
Extraction and processing of natural gas	Y	4,603,939,069	Gas produced, Nm <sup>3</sup> /y	460
<b>Primary metal production</b>				
Gold extraction with mercury amalgamation – from whole ore	Y	131	Gold produced, kg/y	656
Gold extraction with mercury amalgamation – from concentrate	Y	619	Gold produced, kg/y	804
<b>Other materials production</b>				
Cement production*4	Y	1.585.000	Cement produced t/y	186

# Mercury Input

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
Use and disposal of products with mercury content				
Dental amalgam fillings ("silver" fillings)	Y	28,861,863	Number of inhabitants	118
Thermometers	Y	16,000	Items sold/y	16
Electrical switches and relays with mercury	Y	28,861,863	Number of inhabitants	473
Light sources with mercury	Y	334,000	Items sold/y	8
Batteries with mercury	?	0	t batteries sold/y	?
Paints with mercury preservatives	?	0	Paint sold, t/y	?
Skin lightening creams and soaps with mercury chemicals	?		Cream or soap sold, t/y	?
Medical blood pressure gauges (mercury sphygmomanometers)	Y	33,000	Items sold/y	2,640
Other manometers and gauges with mercury	Y	28,861,863	Number of inhabitants	17
Laboratory chemicals	Y	28,861,863	Number of inhabitants	34



# Mercury Input

Source category	Source present?			Estimated Hg input, Kg Hg/y
	Y/N/?	Activity rate	Unit	Standard estimate
<b>Waste incineration</b>				
Incineration / burning of medical waste	?	0	Waste incinerated, t/y	?
Open fire waste burning (on landfills and informally)	Y	719,018	Waste burned, t/y	3,595
<b>Waste deposition/landfilling and waste water treatment</b>				
Controlled landfills/deposits	Y	102,393	Waste landfilled, t/y	512
Informal dumping of general waste *1	Y	376,952	Waste dumped, t/y	1,885
Waste water system/treatment	?	0	Waste water, m3/y	?
<b>Crematoria and cemeteries</b>				
Crematoria	Y	69,268	Corpses cremated/y	173
Cemeteries	Y	3,394,155	Corpses buried/y	8,485
<b>TOTAL of quantified inputs*1*2*3*4</b>				<b>15,120</b>

# Mercury Input findings

- ▶ Major inputs: 15,120 Hg–Kg/y
  - Cemeteries
  - Open Fire burning
  - Medical blood pressure gauges, and
  - Gold Extraction with amalgamation and Natural Gas Extraction and Processing and this may lead in the future as more gas will be produced in the northern Province of Cabo Delgado
- ▶ Minor inputs
  - Coal combustion, and
  - Use of diesel, gasoline and other fuels
  - Dental amalgam fillings

# MERCURY RELEASES

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
<b>Energy consumption</b>						
Coal combustion in coal fired industrial boilers	2.3	0.0	0.0	0.0	0.0	0.0
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	7.5	0.0	0.0	0.0	0.0	0.0
Use of raw or pre-cleaned natural gas	79.9	0.0	0.0	0.0	0.0	0.0
Biomass fired power and heat production	376.3	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	0.0	0.0	0.0	0.0	0.0	0.0
<b>Fuel production</b>						
Extraction and processing of natural gas	69.1	92.1	0.0	138.1	0.0	161.1
<b>Primary metal production</b>						
Gold extraction with mercury amalgamation – from whole ore	131.3	262.5	262.5	0.0	0.0	0.0
Gold extraction with mercury amalgamation – from concentrate	619.4	96.5	88.5	0.0	0.0	0.0
<b>Other materials production</b>						
Cement production*3	130.0	0.0	0.0	55.7	0.0	0.0

# MERCURY RELEASES

Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Use and disposal of products with mercury content						
Dental amalgam fillings ("silver" fillings)	2.4	51.8	9.4	7.1	23.6	23.6
Thermometers	1.6	4.8	0.0	0.0	9.6	0.0
Electrical switches and relays with mercury	47.3	0.0	47.3	0.0	378.2	0.0
Light sources with mercury	0.4	0.0	0.0	0.0	7.9	0.0
Batteries with mercury	?	?	?	?	?	?
Paints with mercury preservatives	?	?	?	?	?	?
Skin lightening creams and soaps with mercury chemicals	?	?	?	?	?	?
Medical blood pressure gauges (mercury sphygmomanometers)	264.0	792.0	0.0	0.0	1,584.0	0.0
Other manometers and gauges with mercury	1.7	5.1	0.0	0.0	10.1	0.0
Laboratory chemicals	0.0	11.1	0.0	0.0	11.1	11.5

# MERCURY RELEASES


Source category	Estimated Hg releases, standard estimates, Kg Hg/y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
Incineration / burning of medical waste	?	?	?	?	?	?
Open fire waste burning (on landfills and informally)	3,595.1	0.0	0.0	0.0	0.0	0.0
Waste deposition/landfilling and waste water treatment						
Controlled landfills/deposits	5.1	0.1	0.0	-	-	-
Informal dumping of general waste *1	188.5	188.5	1,507.8	-	-	-
Waste water system/treatment *2	?	?	?	?	?	?
Crematoria and cemeteries						
Crematoria	173.2	0.0	0.0	-	0.0	0.0
Cemeteries	0.0	0.0	8,485.4	-	0.0	0.0
<b>TOTAL of quantified releases*1*2*3</b>	<b>5,690.0</b>	<b>1,500.0</b>	<b>8,890.0</b>	<b>200.0</b>	<b>2,020.0</b>	<b>200.0</b>

# MERCURY RELEASES

Estimated Hg releases, standard estimates, Kg Hg/y					
Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
5,690.0	1,500.0	8,890.0	200.0	2,020.0	200.0

- ▶ Major releases
  - Land: Cemeteries and Informal Waste dumping
  - Air: Open Fire Burning
  - Water: Informal dumping
- ▶ Minor Releases
  - Other manometers gauges
  - Combustion of Diesel, gasoline, etc
  - Dental amalgam fillings

# GAP OF DATA AND CHALLENGES

- ▶ Differences exist from different Hg Data materials and sources (WHO, EIA, USGS, COMTRADE, FAO, etc.);
  - ▶ Data was scarce for certain subcategories
  - ▶ Delay in various institutions providing data and information
  - ▶ Institutions do not provide requested data as per questionnaire
  - ▶ Others do not respond at all
  - ▶ Difficulties in finding certain data (WWTP, Hg in paints, Medical Waste, etc);
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# CONCLUSION AND RECOMENDATIONS

- Being major input: Cemeteries, Open Fire burning, Medical blood pressure gauges, Gold Extraction with amalgam and Natural Gas Extraction.
- Being major releases: Land: Cemeteries and Informal Waste dumping, Air: Open Fire Burning and Water: Informal waste dumping
- People are not aware about Hg nor environment and human health and Socio-economic impacts.
- Legislation stringent (existing and new necessary), awareness shall focus on waste management, gold extraction with amalgamation
- Although there are benefits in using Hg for mining and medical instrumental, negative impacts shall be highlighted for balanced decision making



**THE END**

QUESTIONS?