Republic of Namibia

National Implementation Plan

Updated National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants for Namibia

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Updated National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants for Namibia 2022

Copies of this document are available from:

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AFFF	Aqueous Film Forming Foam
BAT	Best Available Techniques
BDE	Brominated Diphenyl Ether
BEP	Best Environmental Practices
BFR	Brominated Flame Retardant
CFCs	Chlorofluorocarbons
CP	Cleaner Production
CRT	Cathode Ray Tube
DDT	Dichlorodiphenyl trichloroethane
DecaBDE	Decabromodiphenyl ether
EEE	Electrical and Electronic Equipment
EF	Emission Factor
ELV	End-of-Life Vehicle
EPR	Extended Producer Responsibility
ESM	Environmentally Sound Management
FAO	Food and Agricultural Organization of the United Nations
FFF	Fire-fighting Foam
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GHS	Globally Harmonized System of Classification and Labellling of Chemicals
HBCD	Hexabromocyclododecane
HCBD	Hexachlorobutadiene
HHP	Highly Hazardous Pesticide
IAEA	International Atomic Energy Agency
ICT	Information Communication and Technology
IEC	Information, Education and Communcation
ILO	International Labour Organization
IPM	Integrated Pest Management
IRS	Indoor Residual Spraying
IVM	Integrated Vector Management
LC50	Lethal Concentration required to kill 50% of the population
LLIN	Long Lasting Insecticidal Net
M&E	Monitoring and Evaluation
MEA	Multilateral Environmental Agreement
MEFT	Ministry of Environment, Forestry and Tourism
MHSS	Ministry of Health and Social Services
MSDS	Material Safety Data Sheet
NAMRA	Namibia Revenue Agency
NCC	National Coordinating Committee
NCRST	National Commission on Research, Science and Technology

NGO	Non-Governmental Organisation
NIP	National Implementation Plan (for the Stockholm Convention)
NMCP	National Malaria Control Programme
NSA	Namibia Statistics Agency
NSI	Namibia Standards Institution
OctaBDE	Octabromodiphenyl ether
OSH	Occupational Safety and Health
OSHEMAC	Occupational, Safety, Health and Environmental Managers Course
PAH	Polycyclic Aromatic Hydrocarbon
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated Biphenyls
PCDD	Polychlorinated dibenzo-p-dioxins
PCDF	Polychlorinated dibenzofurans
PCN	Polychlorinated naphthalene
PCP	Pentachlorophenol
PeCBz	Pentachlorobenzene
PentaBDE	Pentabromodiphenyl ether
PFAS	Perfluorinated Alkylated Substances
PFOS	Perfluorooctane Sulfonic Acid
POP-PBDE	Polybrominated diphenyl ether listed as POPs
POPRC	POPs Review Committee
POPs	Persistent Organic Pollutants
PPCE	Personal Protective Clothing and Equipment
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
RED	Regional Electricity Distributor
RNF	Recycle Namibia Forum
SADC	Southern African Development Community
SAICM	Strategic Approach to Integrated Chemicals Management
SC	Stockholm Convention
SLB	Service Level Benchmarking
TEQ	Toxic Equivalent
ToRs	Terms of Reference
UNAM	University of Namibia
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
U-POPs	Unintentionally Produced Persistent Organic Pollutants
WEEE	Waste Electrical and Electronic Equipment
WHO	World Health Organization

FOREWORD

The Government of the Republic of Namibia places great importance on protecting its people and environment from harmful and highly toxic chemicals such as Persistent Organic Pollutants (POPs). Namibia has demonstrated its commitment towards environmental and human health protection by acceding to the Stockholm Convention on POPs in 2005, and implementing our obligations under the Convention.

Namibia produced our first National Implementation Plan (NIP) for the Stockholm Convention in 2014, which described the measures that we would take to implement the requirements of the Convention. As a country, we have embarked upon several action plans in the initial NIP and have made significant progress in implementing some of these activities. We have reviewed and updated our first NIP to assess the new chemicals have been added to the Convention since 2014 and to put in place measures to protect our people and environment from their harmful effects.

In preparing this Updated NIP, we have re-assessed our capacities for managing POPs and other chemicals and taken stock of the sources and quantities of POPs that are present in our country. We have reviewed implementation of our first NIP, identified areas for improvement as well as opportunities we can exploit for strengthening chemicals management systems. It is now imperative that we improve our chemicals management systems. Many of the newly listed POPs are found in products that we handle daily such as electronic equipment and upholstery materials, and our constant interaction with these products poses major risks to our people.

The Government of the Republic of Namibia is steadfast in its commitment to implementing this Updated NIP and reducing and ultimately eliminating the risk of exposure of our population and environment to POPs. We thank the Global Environment Facility (GEF) and United Nations Environment Programme (UNEP) for its financial and technical support towards the development of Namibia's updated NIP and broader implementation of the Stockholm Convention. I also thank our committed national stakeholders who participated in the preparation of the NIP through working with us as the need arose and offering invaluable input into the whole process. We look forward to continued collaboration with all stakeholders in successfully implementing this Updated NIP together.

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REPUBLIC OF NAMIBIA
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EXECUTIVE SUMMARY

This National Implementation Plan (NIP), which is a requirement under Article 7 of the Stockholm Convention on Persistent Organic Pollutants, has been produced as a blueprint that shows the steps Namibia will take to meet its obligations under the Convention. It identifies Namibia's issues of concern with regards to the management of POPs and sets out specific action plans for addressing the priority issues of concern.

Stockholm Convention

The Stockholm Convention (SC) is a global treaty that aims to protect human health and the environment from the highly toxic Persistent Organic Pollutants (POPs). These chemicals persist in the environment for long periods of time, bio-accumulate in fatty tissues of living organisms, adversely affecting the nervous, reproductive and immune system, and can travel long distances in the environment from where they were originally produced. Currently 30 chemicals, which include certain pesticides, industrial chemicals, and unintentionally produced POPs are listed in the Convention.

The Convention requires Parties to reduce or eliminate releases from intentional and unintentional production, as well as use of POPs. It requires Parties to identify stockpiles consisting of or containing POPs, as well as products and articles in use and wastes consisting of, containing or contaminated with POPs; and reduce or eliminate releases from these stockpiles. Parties are also required to conduct information exchange; awareness raising and education; and research and monitoring on POPs.

NIP Update process

The Convention requires each Party to develop and regularly update a National Implementation Plan (NIP), which will outline the measures that the Party will take to meet its obligations under the Convention. The NIP development process involves assessment of the legal, institutional, administrative and technical infrastructure for managing chemicals; conducting inventories of POPs; identifying priority issues of concern; as well as preparing action plans for addressing the issues of concern. Socio-economic impacts of POPs and POPs interventions also need to be considered in the NIP development process. Namibia developed its initial NIP in 2014 and has updated the NIP in 2022. The initial NIP focussed mostly on the initially listed POPs (the "dirty dozen"), and the updated NIP looked at the new POPs which have been added to the Convention up to 2017. The Ministry of Environment, Forestry and Tourism coordinated the NIP Update process, and the Updated NIP was endorsed by stakeholders at a national workshop on 23 June 2022.

Institutional, policy and regulatory framework for environmental and chemicals management

Legislation and institutions for chemicals management

Namibia has a fairly strong legal framework for environmental management in general, and for the management of certain chemicals in particular. There are many Acts that deal with environmental protection and / or chemicals management. There are very few Acts that deal specifically with POPs issues, but there are a number whose provisions give them the potential mandate to deal with POPs, if this potential is exploited.

Key pieces of legislation for chemicals management include the Pesticides Regulations, the Environmental Management Act, 2007 (Act No. 7 of 2007), and the Public and Environmental Health Act, 2015 (Act No. 15 of 2015). Those with the potential to contribute to improved chemicals and POPs management include the Foodstuffs, Cosmetics and Disinfectants Ordinance 18 of 1979; the Import and Export Control Act, 1994 (Act No. 30 of 1994); the Customs and Excise Act, 1998 (Act No. 20 of 1998); the Water Resources Act, 2013 (Act No. 11 of 2013); the Local Authorities Act, 1992 (Act No. 23 of 1992); the Namibia Statistics Act, 2011 (Act No. 9 of 2011); the Research, Science and Technology Act, 2004 (Act No. 23 of 2004); and the Labour Act, 2007 (Act No 11 of 2007). These instruments are administered by relevant ministries and agencies including the Ministry of Environment, Forestry and Tourism; the Ministry of Agriculture, Water and Land Reform; the Ministry of Health and Social Services; the Ministry of Works and Transport; the Ministry of Industry and Trade; the Namibia Revenue Authority; the Namibia Statistics Agency; the National Commission on Research, Science and Technology; and the local authorities.

In spite of the presence of legislation and institutions for chemicals management, there are some challenges that have been identified which hinder the sound management of chemicals. These include the fragmentation of chemicals legislation and absence of specific, defined chemicals legislation; ineffective enforcement of certain legislation; and excessively lengthy processes for reviewing and enacting legislation. There is also lack of a coordinated approach which compromises the effectiveness of the Ministries' mandates in chemicals management. There is often overlap, which results in lack of clarity of who is supposed to do what. There is therefore a need for the functions of Ministries and state agencies pertaining to chemicals management to be harmonised.

Policies for POPs and chemicals management

Besides the Acts, there are policies and strategies whose implementation will improve management of POPs and chemicals, such as the draft E-Waste Policy which is currently under review, the National Solid Waste Management Strategy of 2018, the National Energy Policy of 2017, and the Fire Management Strategy for Namibia's Protected Areas of 2016. Vision 2030 is a document which spells out the country's development programmes and strategies to achieve its national objectives and it has, among its driving forces, health and development; sustainable agriculture; and gender equality. The sound management of chemicals is a cross cutting issue which has an important role to play in these driving forces, and there should be an improvement in the chemicals management arena in order for Vision 2030 to be realized.

The Green Economy Transition and Green Scheme Initiative, which are being promoted by the Government, provide an opportunity to incorporate mechanisms for improved chemicals management in Namibia. There are other non-regulatory mechanisms which have been employed for promoting improved chemicals management such as the Cleaner Production project and eco-certification, but the uptake of these is low, and needs to be improved.

International agreements to which Namibia is Party

Namibia is committed to sound chemicals management, as shown by its ratification of all the key chemicals Conventions, namely the Vienna Convention for the Protection of the Ozone Layer (acceded in 1993); the Montreal Protocol on Substances that Deplete the Ozone Layer, (acceded in 1993); the Basel Convention, (acceded in 1995); the Rotterdam Convention (ratified in 2005); the Stockholm Convention on Persistent Organic Pollutants (POPs), (acceded in 2005) and the Minamata Convention on Mercury (acceded in 2017). Although the country has ratified all these conventions, it needs to improve implementation by establishing mechanisms for domesticating and / or enforcing the requirements of the conventions.

It has not yet ratified conventions aimed at protecting workers from chemicals, such as the ILO Convention 170 (Chemicals Convention) on Safety in the use of Chemicals at Work of1990 and the ILO Convention 174 on Prevention of Major Industrial Accidents of 1993. Ratification of these conventions would demonstrate Namibia's total dedication to protecting its citizens through sound chemicals management. Namibia has also not yet adopted the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

Assessment of POPs issues in Namibia

Assessment with respect to Pesticides

Namibia does not manufacture pesticides – all of its pesticides are imported. All POPs pesticides are banned in Namibia and are therefore not used. Historically, though, dieldrin was used for tsetse fly control, while DDT was used extensively for agriculture up to the 1960s. Non-POPs pesticides are widely used by both the general public and also by the Government. The pesticides are available commercially. Deliberate poisoning of animals using pesticides is known to occur in Namibia and the country has been identified as one of Africa's poisoning hotspots with the vulture population now endangered because of this scourge.

The Government uses pesticides on a fairly large scale for spraying against pests that pose a national hazard, such as outbreaks of locust (Brown Locust, Red Locust and African Migratory Locust) and Army Worm. The Ministry of Agriculture, Water and Land Reform (MAWLR), which is responsible for these control operations that are normally carried out in communal areas, therefore needs to keep emergency stocks of the relevant pesticides. The Ministry has a major pesticide store at Okahandja which was built to international standards in order to avoid environmental contamination. There are other much smaller pesticide stores throughout the country where emergency pesticide

stocks are stored. These smaller stores are not built to international standards, and in most cases were converted from other uses to become temporary pesticide stores.

Obsolete Pesticides Inventory

The Government of Namibia conducted an inventory of obsolete pesticides in 2019. In that inventory, 69 pesticides stores were visited for data collection. These included MAWLR stores, MHSS stores, Agra facilities, Green Scheme facilities, as well as private farming estates. The inventory identified 150 different pesticides weighing 347.8 tonnes. Among the pesticides were two POPs pesticides, namely obsolete DDT weighing 1.49 tonnes and 20 litres of endosulfan, as well as a large number of unidentified pesticides (which could very well have been POPs). The presence of such large quantities of obsolete pesticides, in often poor storage sites, poses a risk of exposure for the populace and for the environment. It will be necessary for the Government to facilitate the environmentally sound management of these obsolete pesticides.

A number of issues of concern pertaining to pesticides management were identified during the inventory. These include inappropriate storage of pesticides (both usable and obsolete), poor management of pesticide waste, and lack of alternatives to pesticides. These need to be addressed and have been included in the action plans in this NIP.

Assessment with respect to PCBs

PCBs have never been produced in Namibia but have been found in transformer oil of electric transformers that are in use and those that have been decommissioned. Namibia's electricity sector is dominated by the state-owned NamPower, which owns all the country's generation and transmission facilities, as well as some distribution facilities in the rural areas of central and southern Namibia. The bulk of the distribution of electricity is undertaken by the regional electricity distribution companies (REDs) and certain local authorities such as the City of Windhoek, Keetmanshop, Mariental and other smaller towns. Currently there are three operational REDs (NORED, Cenored and Erongored). Ownership of transformers and related electrical equipment is therefore divided between NamPower, the REDs, local authorities and some of the older, larger mines, which have their own transformers.

PCB Inventory results

Due to the hazardous nature of PCBs, the Stockholm Convention requires that contaminated transformers be removed from service by 2025, and all contaminated oils and equipment be disposed of in an environmentally sound manner by 2028. In pursuance of meeting this goal, there is a regional project that is currently underway, whose objective is to dispose of PCB oils from transformers in the SADC region. Under the project, a PCB inventory was conducted for Namibia, and 1,045 transformers were identified, with 745 of them having oil samples taken for PCB testing. Of the tested samples, 11 transformers were found to be PCB-contaminated of which five are decommissioned and six are still in service. Three of the five decommissioned transformers are ready to be shipped for disposal and paperwork for their movement is being processed.

A number of issues of concern pertaining to PCB management were noted during the inventory and assessment. These include the sale of old untested transformers by some transformer owners; absence of markings on suspected and confirmed PCB-containing equipment; exclusion of some electricity distributors from the inventory; poor storage of decommissioned transformers; lack of awareness of dangers of PCBs among policy makers; and lack of PCB specific legislation and policies.

Assessment with respect to POP-PBDEs, HBB, HBCD

An inventory of POP-Polybrominated diphenyl ethers (POP-PBDEs) was conducted in Namibia in 2021 to quantify the amounts of POP-PBDEs in Namibia and identify the major issues of concern pertaining to the management of POP-PBDEs. The inventory focused on quantifying the POP-PBDEs amounts from three sources, namely Electronic and Electrical Equipment / Waste Electronic and Electrical Equipment (EEE/WEEE) or e-waste; the transport sector; and other sources (textiles, furniture, construction materials and carpets).

Inventory of POP-PBDEs from the EEE sector

The inventory process was to be conducted at the Tier 1 (preliminary) and Tier 2 (detailed) inventory levels according to the 2021 version of the "Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on POPs (draft)".

The greatest amount of commercial Octabromodiphenyl ether (c-octaBDE), which comprises the POPs hexabromodiphenyl ether and heptabromodiphenyl ether, is found in casings from cathode ray tubes (CRT) computer and TV monitors produced before 2005. From the data that was available, inventory calculations at the Tier I level showed that there were **0.69 to 2.01 tonnes of c-OctaBDEs** contained in **1468.9 tonnes of CRT plastic casings in use** which will need to be managed in the future.

Detailed inventory at the Tier II level could not be conducted because certain data such as the fraction of EEE imports that are second hand, EEE stocks (in use or stored) and EEE entering the waste stream could not be determined. The former was not available from import data, while the latter could only be collected with a full-scale field data collection exercise, for which resources (human and time) were not available. It will therefore be necessary to seek resources to do a full-scale inventory.

Inventory of POP-PBDEs from the transport sector

Commercial-Pentabromodiphenyl ether (c-PentaBDE) was mostly used in polyurethane (PUR) foam which was partly used for automotive and upholstery applications. Production of c-PentaBDE occurred between 1975 and 2004, and cars, trucks and buses contain the largest volume of POP-PBDEs. The inventory was therefore meant to concentrate on vehicles that were manufactured between 1975 and 2004. However, only a portion of the cars produced between 1975 and 2004 worldwide have been treated with c-PentaBDE. The use of c-PentaBDE also depended on the area where the vehicles were produced, with approximately 90% of c-Penta-BDE having been applied to vehicles produced in the United States/North America. In collecting inventory data for POP-PBDEs in vehicles, it was therefore necessary to collect information on the year of manufacture, and the region of manufacture.

The only inventory data that could be obtained was from the Namibia Statistics Agency indicating the number of vehicles imported into Namibia per year, but data on the year of manufacture or the region of manufacture could not be obtained. As a result, it was not possible to calculate the expected quantity of PentaBDEs from vehicles in Namibia. It will be necessary to conduct a full-scale inventory in the near future.

Other assessments showed that the Namibian Government has banned imports of vehicles older than eight years, as well as those with left hand drive mechanism (predominantly from the United States). This means that the legislation ensures that any vehicles which could potentially contain POP-PBDEs are prohibited from entering the country. Data available on UN Comtrade database however, indicated that exports of vehicles from the USA and of older vehicles have continued, implying that there is need to strengthen the enforcement of the legislation which is already in place for prohibiting the importation of potentially POP-PBDE containing vehicles.

Inventory of HBCD in construction, textiles and furniture

Data on whether HBCD is used in the construction industry in Namibia could not readily be obtained during the inventory, but available data showed that construction waste is treated as non-hazardous waste. If indeed HBCD has been used in construction, then waste disposal sites could potentially be contaminated. Data on the usage of HBCD in textiles and furniture was not readily obtainable during the inventory.

Assessment with respect to DDT

Namibia uses DDT for malaria vector control using the Indoor Residual Spraying (IRS) method as malaria is a major public health threat in Namibia. Of the 14 regions in the country, nine are considered to be malaria endemic (with 23 of out of 34 districts being considered malaria endemic). The Government uses a number of methods for dealing with malaria, with IRS being the primary vector control method. Other methods used to fight malaria include the use of long-lasting insecticide-treated nets (LLINs) which are distributed widely, early diagnosis and treatment and targeted winter larviciding. These form part of the Integrated Vector Management (IVM).

As IRS is the major intervention in malaria vector control, substantial amounts of DDT have been used for the programme over the years, with quantities ranging from 68, 34 and 23 tonnes being used for the years 2015, 2016 and 2017 respectively. In order to ensure that DDT is used safely, there is awareness raising among communities and households on safety issues pertaining to DDT use. There are also training facilities on insecticide use for disease vector control in the country.

A number of issues of concern pertaining to DDT have been identified. These include the continued use of DDT, absence of system for monitoring exposure to DDT, and improper management of DDT waste.

Assessment with respect to PFOS, its salts and PFOSF

An inventory of PFOS and related chemicals was conducted in Namibia in 2021 to quantify the amounts of PFOS and related chemicals in Namibia and identify the major issues of concern pertaining to management of PFOS and related chemicals. The inventory was conducted according to the guidance document: "Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants", developed by UNEP. The possible, significant sources of PFOS and related chemicals in Namibia were expected to be the fire-fighting foams, aviation hydraulic fluids, and the leather industry.

Inventory data was only obtained for fire-fighting foam (FFF) from some local authorities and mines, showing the quantity of foam in stock, the amount used in actual fire-fighting events, and the amount used in training events. The foams in stock at all the mines and local authorities were imported between 2017 and 2021. Although the major producers of fire-fighting foams stopped adding PFOS in 2003, the possibility of these recently purchased fire-fighting foams having PFOS could not be completely ruled out, considering that many of the Material Safety Data Sheets (MSDSs) of these foams did not implicitly state that they do not contain PFOS. Due to this lack of clarity on the MSDSs, it was therefore assumed that the firefighting foams may contain PFOS, even though they were purchased recently.

According to the inventory, there were at least 36 tonnes of fire-fighting foams in stock in the country, containing **181.4 – 544.2 kg of PFOS**. Also, between the years 2001 to 2021, a total of 6 tonnes of fire-fighting foams, containing **30.3 – 90.8 kg of PFOS**, were applied on actual fire events, while 2.8 tonnes of fire-fighting foams containing **14.2 – 42.4 kg of PFOS** were used in training events. It was noted that waste FFF is disposed of at landfills, and there is no environmental monitoring of the areas where FFF has been applied. These are issues that will need to be addressed in the NIP.

The quantities of fire-fighting foam and PFOS content identified during the inventory are expected to be an underestimate of the total amount of PFOS stocks available and that used over the years, considering that only eight of the 37 urban local authorities in Namibia provided responses for the inventory. A number of other sources of PFOS and related chemicals had been expected, but data on these possible sources could not be obtained. These expected sources include aviation hydraulic fluids and the leather industry. It will therefore be necessary to conduct a full scale PFOS inventory.

Assessment of releases of unintentionally produced POPs (U-POPs)

A U-POPs inventory was conducted using the Toolkit for the Identification and Quantification of Releases of Dioxins, Furans and other Unintentional POPs developed by UNEP (UNEP, 2013). The UNEP Toolkit divides the processes giving rise to U-POPs releases into 10 main source categories and further divides each main source category into sub-categories. Each source category releases U-POPs to any of six vectors, namely air, water, land, product, residues and bottom ash (bottom ash only receives U-POPs in the case of the main source category 'incineration').

The results of the inventory showed the main sources of U-POPs for Namibia, and their percentage contribution to emissions to be as shown in Table (a) below. Sources which are present in Namibia but for which data could not be obtained, are listed below the table.

Table (a) Percentage Contributions of Most Significant U-POPs Sources

Sub-Category	Total releases from Subcategory (g TEQ/a)	Percentage Contribution
9b. Sewage and sewage treatment	18.0072	40.1231
1c. Medical waste incineration	17.8099	39.6835
9a. Landfills, waste dumps and landfill mining	3.4777	7.7489
6b. Waste burning and accidental fires	3.3790	7.5289
6a. Biomass burning	1.7505	3.9005

3d. Household heating and cooking (biomass)	0.3478	0.7748
5c. Diesel engines	0.0321	0.0714
4a. Cement production	0.0309	0.0688
2d. Copper production	0.0228	0.0507
2g. Zinc production	0.0090	0.0201
5a. 4-stroke engines	0.0082	0.0184
3a. Fossil fuel power plants	0.0018	0.0040
8b. Crematoria	0.0013	0.0029
7d. Chlorinated aromatic chemicals	0.0012	0.0027
8e. Tobacco smoking	0.0004	0.0009
3c. Landfill, biogas combustion	0.0001	0.0003
Total	**44.8799**	**100.0000**

Sources of U-POPs which are present in Namibia but for which data was not obtained

1g. Animal carcasses burning	5b. 2-stroke engines
2a. Iron ore sintering	5d. Heavy oil-fired engines
2f. Lead production	7h. Leather refining
2k. Shredders	8a. Drying of biomass
2i. Thermal wire reclamation and e-waste recycling	8c. Smoke houses
3b. Biomass power plants	8d. Dry cleaning
4c. Brick production	9c. Open water dumping
4f. Asphalt mixing	9d. Composting
4g. Oil shale processing	9e. Waste oil treatment

The table shows the sources which emit the highest levels of U-POPs, and hence will need to be addressed most urgently. Some of the actions to be undertaken include improving sewage and solid waste management systems, as well as provision of improved fuel for domestic heating and cooking. However, given that so many sources did not have available data, this means that the inventory will need to be redone more thoroughly, so that a truly representative picture can be obtained. It will also be necessary to create a chemicals information management system that allows for chemicals management data to be complied and readily availed when needed.

Identification and assessment of contaminated sites

There has never been a formal inventory of contaminated sites in Namibia, although certain sites are known / suspected to be contaminated. These include waste disposal sites and the surrounding areas, since the majority of disposal sites are not lined, and there is mixing of hazardous and non-hazardous wastes at the municipal disposal sites (except for Windhoek which has a separate hazardous waste disposal facility), so that most of the municipal solid waste disposal sites end up with hazardous waste. Other contaminated sites are those that have been contaminated by certain POPs such as PCBs at transformer storage sites; PFOS and related chemicals at sites where fire-fighting foams have been used; timber treatment sites; industrial sites where metal processing occurs; and areas where pesticides are used intensively.

The presence of such sites which are known or suspected to be contaminated. results in high risk of exposure for the public, either through contamination of groundwater, or through uptake of contaminants by plants resulting in contaminants entering the food chain. It is thus imperative that such sites be identified, documented and prioritized for remediation according to agreed criteria, so that appropriate interventions for remediating can be conducted aptly.

Current level of information, awareness and education

Awareness and understanding of chemicals management issues among members of the public is low in Namibia, just like in many other countries in Africa. Awareness of POPs issues is much lower. Government has introduced polices and strategies aimed at increasing awareness on chemicals and hazardous wastes, focusing on issues such as e-waste, solid waste management and fire management. These policies and strategies, while not directly aimed at POPs, address issues and processes which give rise to POPs emissions and releases, and their implementation can therefore contribute significantly to improved management of POPs.

Awareness of chemicals management among workers is much better than among the ordinary public, as there is a legislative requirement for the workers to be educated in chemical safety. The Regulations Relating to the Health and Safety of Employees at Work, require employers to regularly prepare and review written policies and programmes on the protection of the health and safety of workers. The programmes to be prepared should include issues of health and safety awareness and training. There are a number of organisations that provide training, education and awareness-raising for workers in chemical safety such as NOSA Namibia. The Division of Occupational Health and Safety of the Ministry of Labour, Industrial Relations and Employment Creation also provides technical support for all parties concerned in OHS, educational materials for campaigns and promotions, as well as provides information regarding the OHS regulations.

Relevant activities of non-governmental stakeholders

There are other non-governmental entities that can contribute to improved chemicals management in Namibia. These include industry associations such as Namibia Manufacturers Association, CropLife, Recycle Namibia Forum, Namibia Chamber of Mines and the Namibian Chamber of Commerce and Industry. The members of these associations all handle chemicals in one way or another or conduct processes that can releases chemicals or POPs. They therefore need to participate in order for the NIP to be implemented successfully.

Civil society organizations or NGOs can potentially play an important role in POPs management, as they are the ones that interface most closely with communities. Unfortunately, the majority of Namibian environmental NGOs focus mainly on biodiversity, climate change, individual species conservation and research, as well as Community Based Natural Resources Management (CBNRM). The number of NGOs whose activities involve promoting sustainable chemicals management, is much smaller. There is need for advocacy among the NGOs to get their buy-in into promoting sound management of chemicals. Other NGOs such as health related ones and those dealing with women and children's rights, can contribute to improved POPs management especially among women and other vulnerable groups.

Technical infrastructure for POPs assessment

The assessment of Namibia's laboratory infrastructure identified at least four analytical / environmental laboratories and noted that two of them carry out analyses to determine quality of chemicals, conduct residue analysis, identify unknown chemicals, monitor chemical contamination in water, monitor chemical contamination in the soil, monitor for workplace exposure to chemicals, and monitor for POPs in the environment. However, it was revealed during consultations with other stakeholders that some of the laboratories in Namibia had often produced inaccurate results for certain analyses. Some clients had therefore stopped sending samples for analysis to local laboratories and were now using South African laboratories. This implies that the capacity of Namibian laboratories to conduct environmental and chemical analysis is inadequate. There is thus need to build capacity in the Namibian laboratory system, both in terms of equipment and skills.

Identification of impacted populations

Studies have not been done to determine the impacts of POPs on human health and the environment. It is necessary to identify sites which are contaminated by POPs and other hazardous chemicals, then develop and implement environmental monitoring and remediation programmes. In addition, there is need to identify populations that are at risk of exposure to POPs, and also develop and implement health monitoring programmes to identify and assist those that have been impacted.

Implementation of the NIP

Implementation status for Initial NIP

Namibia prepared its initial NIP in 2014 and has conducted a number of activities that were in the first NIP. Many of these activities have been implemented in part. It is notable that the activities that have been implemented were not implemented using funds which would have been sought specifically for implementing the NIP, but more through Government initiatives. This is highly commendable as it shows the Government's commitment to promoting sound management of chemicals. Some of the activities that have been conducted include the development of a draft E-waste Policy, the development of the National Solid Waste Management Strategy of 2018, as well as the passing and operationalization of important pieces of legislation, namely the Public and Environmental Health Act and the amendment to the Pesticide Regulations. Other activities conducted include the establishment of a state-of-the-art incinerator for health care waste in Windhoek; the inventories of PCBs and obsolete pesticides; as well as the larviciding programme, which is an example of Integrated Vector Management.

Strategies for implementing the Updated NIP

Preparation and costing of action plans

Following the assessments and inventories of POPs that were conducted under the NIP Update project, issues of concern were identified. The issues of concern were prioritised by analysing the results of the assessments conducted during the NIP update, as well as reviewing the achievements of the initial 2014 NIP. Objectives for addressing the prioritized issues of concern were set, and specific action plans for implementing the objectives were prepared. The action plans were costed, and came to a total of **USD 26,025,000** (which translates to **NAD 416,400,000** using an exchange rate of 1 USD : 16 NAD). The action plans and budget are summarised in the Table (b). The objectives were grouped according to the specific components of the Stockholm Convention that they are addressing.

The specific action plans represent all the activities that Namibia will need to implement to improve the management of chemicals in general, and POPs in particular. Some of these activities are already underway and are being financed from the fiscus and from other funding sources. The budget of USD 26,025,000 is therefore not expected to be newly sought for implementing this Updated NIP but is simply indicative of the total cost of ensuring sound management of chemicals and POPs for the protection of the Namibian people and environment.

Modalities for implementing the Updated NIP

The NIP will be implemented by various stakeholders, but the process will be coordinated by the Ministry of Environment, Forestry and Tourism. The action plans that are to be implemented as part of the NIP will require funding which is to be sought from both national and international donors. Although many of the projects will require funding, it has been noted that there are several quick wins that can be obtained without large amounts of donor-funding. These are the issues that simply need the human resources that are already available to make input, in order for improvements in the management of POPs to be realized in a short time, and these activities have not been costed as they do not need any extra budget.

Table (b) Objectives for addressing issues of concern, as well as Stockholm Convention component being addressed

Objectives	Resources / Needs	
	NAD	USD
Component A: Institutional and regulatory strengthening measures (Article 3)		
1. To develop and implement mechanisms for coordinating chemicals management issues in two years	2,240,000	140,000
2. To strengthen regulatory framework for chemicals management in five years	9,680,000	605,000
3. To develop and implement a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management in two years	7,200,000	450,000

4. To strengthen administrative capacity for chemicals management in two years	160,000	10,000
5. To finalise development of new pesticides legislation in three years	480,000	30,000
6. To develop PCB-specific legislation in two years	880,000	55,000
7. To revise policy framework to include promotion of clean energy for heating and cooking and reduced reliance on wood (Article 5)	1,600,000	100,000
8. To finalise the draft e-waste policy in one year	2,080,000	130,000
9. To strengthen the legal framework for management of old and end-of-life vehicles in three years	2,400,000	150,000
Sub Total	26,720,000	1,670,000
Component B: Production, import and export, use, stockpiles, and wastes of Annex A POPs pesticides		
1. To build national capacity for Integrated Pest Management in two years	3,200,000	200,000
Sub Total	**3,200,000**	**200,000**
Component C: Production, import and export, use, identification, labelling, removal, storage, and disposal of PCBs and equipment containing PCBs		
1. To participate fully in regional PCB disposal project, ensuring all required actions are conducted within the stipulated time (Article 6)	Catered for under the SADC regional PCBs disposal project	
Component D: Production, import and export, use, stockpiles, and wastes of POP-PBDEs		
1. Reduce releases of POP-PBDEs from improper disposal of e-waste	42,400,000	2,650,000
2. Reduce imports of vehicles likely to contain tetraBDE and pentaBDE, i.e. those manufactured before 2004 and in the relevant regions	1,600,000	100,000
Sub Total	**44,000,000**	**2,750,000**
Component E: Production, import and export, use, stockpiles, and wastes of DDT (Annex B, Part II)		
1. To implement Integrated Vector Management programmes for malaria control in order to reduce reliance on DDT in five years	160,000	10,000
	2,400,000	150,000
Sub Total	**2,560,000**	**160,000**
Component F: Production, import and export, use, stockpiles, and wastes of PFOS, its salts and PFOSF (Annex B, Part III chemicals)		
1. To reduce releases of PFOS and related substances in Namibia in five years	4,800,000	300,000
Sub Total	**4,800,000**	**300,000**
Component G: Register for specific exemptions and the continuing need for exemptions (Article 4)		
1. To register for relevant specific exemptions with the SC Secretariat	-	-
Component H: Measures to reduce releases from unintentional production (Article 5)		
1. Conduct detailed U-POPs inventory	640,000	40,000

2. To install state-of-the-art incinerators in at least 20% of the hospitals in five years	64,080,000	4,005,000
3. To improve waste management in Namibia in three years	32,000,000	2,000,000
4. To promote environmentally sound sewage treatment facilities in at least five new local authorities in five years)	32,480,000	2,030,000
5. To reduce incidences of uncontrolled veld fires by at least 5% annually over a three-year period	2,400,000	150,000
6. To reduce the incidences of fires in homes by at least 20% annually over a three-year period	1,920,000	120,000
7. To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of PCDD/PCDF emissions in four years	4,000,000	250,000
Sub Total	**137,520,000**	**8,595,000**
Component I: Identification and management of stockpiles, waste and articles in use, including release reduction and appropriate measures for handling and disposal (Article 6)		
1. To finalize the national obsolete pesticides inventory in one year	320,000	20,000
2. To implement environmentally sound management (ESM) of obsolete pesticides and pesticide waste in five years	34,400,000	2,150,000
3. To manage DDT waste in an environmentally sound manner in two years	880,000	55,000
4. To conduct comprehensive POP-PBDEs inventory in EEE and e-waste inventory in one year	640,000	40,000
5. To conduct comprehensive inventory of POP-PBDEs in vehicles and end of life vehicles in 6 months	400,000	25,000
6. To conduct a detailed inventory of PFOS and related substances in Namibia	800,000	50,000
7. Conduct environmentally sound management of PFOS waste	32,480,000	2,030,000
Sub Total	**69,120,000**	**4,320,000**
Component J: Identification of contaminated sites (Annex A, B, and C Chemicals) and, where feasible, remediation in an environmentally sound manner		
1. To conduct a detailed inventory of contaminated land in Namibia, and initiate site clean-up on at least two areas in three years (Article 5)	49,840,000	3,115,000
Sub Total	**49,840,000**	**3,115,000**
Component K: Facilitating or undertaking information exchange and stakeholder involvement (Article 9)		
1. To participate in the information exchange process under the SC annually	-	
Component L: Public and stakeholder awareness, information and education (Article 10)		
1. To raise national awareness on POPs and chemicals management issues through developing and implementing a Chemicals communication strategy in two years	3,296,000	206,000
2. To develop and implement an awareness raising programme for proper pesticide management in two years, drawing from the Chemicals Communications Strategy mentioned above	1,312,000	82,000

3. To develop and implement an awareness raising programme for PCBs in two years, drawing from the Chemicals Communications Strategy mentioned in Objective 1	672,000	42,000
4. To develop and implement an awareness raising programme for PFOS in two years, drawing from the Chemicals Communications Strategy mentioned in Objective 1	352,000	22,000
Sub Total	**5,760,000**	**360,000**
Component M: Effectiveness evaluation (Article 16)		
1. Evaluate the effectiveness of the SC in achieving its objective of protecting human health and the environment from POPs in Namibia every two years	480,000 every two years	30,000 every two years
Sub Total	**480,000**	**30,000**
Component N: Reporting (Article 15)		
1. To develop a chemicals information management strategy in one year for data management	640,000	40,000
2. Meet reporting obligations to the SC secretariat through submitting the required data in a timely manner	160,000	10,000
Sub total	**800,000**	**50,000**
Component O: Research, development and monitoring (Article 11)		
1. To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least two research institution every two years, including strengthening science policy interface	550,000	55,000
2. To capacitate at least 20 percent of the Namibia analytical laboratories with requisite equipment and skilled manpower in 3 years	64,960,000	4,060,000
3. To develop and implement system for monitoring DDT exposure in three years	4,160,000	260,000
4. To assess the environmental impact of PFOS application	1,280,000	80,000
Sub Total	**71,280,000**	**4,455,000**
Component P: Technical and financial assistance (Articles 12 and 13)		
1. Strengthen capacity of relevant government ministry to access financing for POPs management projects		20,000
Sub-Total	**320,000**	**20,000**
Grand total	**416,400,000**	**26,025,000**

CHAPTER 1. INTRODUCTION

1.1 Objective of the National Implementation Plan

This National Implementation Plan (NIP) has been produced as a blueprint that shows the steps Namibia will take to meet its obligations under the Stockholm Convention on Persistent Organic Pollutants. The NIP is a requirement under Article 7 of the Convention, and it identifies Namibia's issues of concern with regards to the management of POPs and sets out specific action plans for addressing the priority issues of concern.

1.2 The Stockholm Convention

The Stockholm Convention (SC) is a global treaty that aims to protect human health and the environment from Persistent Organic Pollutants (POPs), which are a group of chemicals with the following properties.

- They are highly toxic to both humans and wildlife and they adversely affect the nervous, reproductive and immune systems. Their effects include cancer, allergies, hypersensitivity, and disruption of the endocrine system.
- They persist in the environment for long periods of time before breaking down into less harmful substances.
- They bio-accumulate in fatty tissues of living organisms to concentrations higher than that in surrounding environments.
- They can travel long distances in the environment (up to thousands of kilometres) from where they were originally produced. They are mainly transported over long distances on air currents, in water or by migratory species and disturb environments which are far they were produced.

POPs can be grouped into three classes, namely pesticides, industrial chemicals and unintentionally produced POPs (also known as U-POPs which arise primarily as a result of combustion of chlorine or other halogen-containing materials and wastes). There is therefore a wide range of sources of POPs, and the potential for human or environmental exposure is high.

Because of the global nature of the POPs problem, the world's governments came together to collectively address the issue of POPs, and in May 2001, adopted the Stockholm Convention. The Convention came into force in May 2004. The Convention requires parties to eliminate the production and use of all intentionally produced POPs (listed under Annex A of the SC), restrict the use of certain chemicals (listed under Annex B), and reduce and eliminate the release of unintentionally produced POPs (listed under Annex C).

When the Stockholm Convention was adopted in 2001, 12 chemicals (referred to as the "Dirty Dozen") were listed as POPs. Since then, 18 more chemicals have been added, bringing the total number of chemicals listed in the SC to 30. The full list of the 30 POPs is shown in Table 1.

Table 1 POPs listed in the Stockholm Convention

Name of POP	Class	Annex in Convention	Use
Originally included in the SC in 2001			
Aldrin	Pesticide	A	Was applied to soil to kill termites, grasshoppers, and other insect pests
Chlordane	Pesticide	A	Was used to control termites and as a broad-spectrum insecticide on a range of agricultural crops
Dichloro-diphenyl-trichloroethane (DDT)	Pesticide	B	Was sprayed on a variety of agricultural crops, especially cotton, but is currently being used only for malaria vector control in several countries
Dieldrin	Pesticide	A	Was used principally to control termites and textile pests, as well as insect-borne diseases and insects living in agricultural soils.
Endrin	Pesticide	A	Was sprayed on the leaves of crops such as cotton and grains; and was also used to control rodents such as mice
Heptachlor	Pesticide	A	Was used to kill soil insects and termites; and also more widely to kill cotton insects, grasshoppers, other crop pests, and malaria-carrying mosquitoes
Hexachlorobenzene	Pesticide	A	Was used for treating seeds as it kills fungi that infect food crops; it was also used to control wheat bunt
	(U-POP)	C	Is also a by-product of the manufacture of certain industrial chemicals and exists as an impurity in several pesticide formulations
Mirex	Pesticide	A	Was used mainly to combat fire ants; and has been used against other types of ants and termites; and has also been used as a fire retardant in plastics, rubber, and electrical goods
Toxaphene	Pesticide	A	Was used on cotton, cereal grains, fruits, nuts, and vegetables; and also, to control ticks and mites in livestock
Polychlorinated biphenyls (PCBs)	Industrial chemical	A	Used as a dielectric fluid in electrical transformers, capacitors, voltage regulators, electromagnets; and as an additive in paint, carbonless copy paper, and plastics
	U-POP	C	Are also a by-product of certain industrial processes involving chlorinated substances
Polychlorinated dibenzo-p-dioxins; – also referred to simply as dioxins (PCDD)	U-POP	C	Are produced unintentionally due to incomplete combustion, as well as during the manufacture of pesticides and other chlorinated substances They are emitted mostly from the burning of hospital waste, municipal waste, and hazardous waste, as well as from automobile emissions, peat, coal, and wood
Polychlorinated dibenzofurans also referred to simply as furans (PCDF)	U-POP	C	Are produced from processes similar to those giving rise to polychlorinated dibenzo-p-dioxins
Added to the SC in 2009			
Alpha hexachlorocyclohexane (alpha HCH)	Pesticide and by-product	A	Is a constituent of technical hexachlorocyclohexane (HCH) which is used as an organochlorine insecticide or chemical intermediate to manufacture enriched hexachlorocyclohexane (lindane)

Beta hexachlorocyclohexane (beta HCH	Pesticide and by-product	A	Is a constituent of technical HCH which is used as an organochlorine insecticide or chemical intermediate to manufacture enriched HCH (lindane)
Chordecone	Pesticide	A	Was used as an insecticide on tobacco, ornamental shrubs, bananas, citrus trees; and in ant and cockroach traps
Lindane	Pesticide	A	Is used as an insecticide on fruit and vegetable crops, for seed treatment and in forestry. It is also used as a therapeutic pesticide in humans (for treatment against scabies and head lice).
Hexabromobiphenyl	Industrial chemical	A	Is used as a fire retardant in thermoplastics for constructing machine housings such as radio and television parts; in coatings and lacquers; and in polyurethane foam for upholstery
Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether)	Industrial chemical	A	Is used as a flame retardant for housings of office equipment; nylon; and low-density polyethylene adhesives and coatings
Tetrabromodiphenyl ether and Pentabromodiphenyl ether (commercial pentabromodiphenyl ether)	Industrial chemical	A	Is used as a flame retardant additive in flexible polyurethane foam for furniture and upholstery and in electronic equipment
Pentachlorobenzene	Pesticide, Industrial chemical	A	Is used in polychlorinated biphenyls products, in dyestuff carriers, as a fungicide; in flame retardants; as a chemical intermediate in the production of quintozene; and as a soil fungicide
	U-POP	C	Also produced unintentionally during combustion in thermal and industrial processes; and also appears as an impurity in products such as solvents or pesticides
Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	Industrial chemical	B	is found in products such as electric and electronic parts; fire-fighting foam; photo imaging; hydraulic fluids; carpets; leather; upholstery; packaging; industrial and household cleaning products and pesticides
Added to the SC in 2011			
Endosulfan	Pesticide	A	A broad spectrum, non-systemic insecticide which is used to control a number of insects on food crops such as grains, tea, fruits, and vegetables; and on non-food crops such as tobacco and cotton. It is also used as a wood preservative.
Added to the SC in 2013			
Hexabromocyclododecane (HBCD)	Industrial chemical	A	A flame retardant additive, providing fire protection during the service life of vehicles, buildings or articles, as well as protection while stored. The main uses of HBCD globally are in expanded and extruded polystyrene foam insulation, while the use in textile applications and electrical and electronic appliances is smaller.
Added to the SC in 2015			
Hexachlorobutadiene (HCBD)	Industrial chemical	A	Most commonly used as a solvent for other chlorine-containing compounds

Pentachlorophenol and its salts and esters (PCP)	Pesticide	A	Has been used as herbicide, insecticide, fungicide, algaecide, disinfectant and as an ingredient in antifouling paint. Some applications were in agricultural seeds, leather, wood preservation, cooling tower water, rope and paper mill system. Its use has significantly declined due to the high toxicity of PCP and its slow biodegradation.
Polychlorinated naphthalenes (PCNs)	Industrial chemical and by-product	A and C	Make effective insulating coatings for electrical wires. Others have been used as wood preservatives, as rubber and plastic additives, for capacitor dielectrics and in lubricants.
Added to the SC in 2017			
Decabromodiphenyl ether (commercial mixture, c-decaBDE)	Industrial chemical	A	DecaBDE is used as an additive flame retardant and has a variety of applications including in plastics/polymers/ composites, textiles, adhesives, sealants, coatings and inks. DecaBDE containing plastics are used in housings of computers and TVs, wires and cables, pipes and carpets.
Hexachlorobutadiene	Industrial chemical and by-product	C	It is used as a solvent for other chlorine-containing compounds. It is also produced as a by-product in the production of carbon tetrachloride and tetrachloroethene.
Short chain chlorinated paraffins (SCCP)	Industrial chemical	A	These can be used as a plasticizer in rubber, paints, adhesives, flame retardants for plastics as well as an extreme pressure lubricant in metal working fluids.
Added to the SC in 2019			
Dicofol	Pesticide	A	Dicofol is an organochlorine miticidal pesticide that has been used in agriculture to control mites on a variety of field crops, fruits, vegetables, ornamentals, cotton, tea. It was also used an acaricide for cotton, citrus and apple crops
Perfluorooctanoic acid (PFOA), its salts and PFOA related compounds	Industrial chemical	A	PFOA, its salts and PFOA-related compounds are used widely in the production of fluoroelastomers and fluoropolymers, for the production of non–stick kitchen ware, food processing equipment. PFOA-related compounds, including side-chain fluorinated polymers, are used as surfactants and surface treatment agents in textiles, paper and paints, firefighting foams

1.2.1 Requirements of the Stockholm Convention

The requirements of the Stockholm Convention, which this National Implementation Plan addresses, are summarized below:

Article 3 deals with measures to reduce or eliminate releases from intentional production and use of POPs. It requires Parties to:

- prohibit and/or take the legal and administrative measures necessary to eliminate the production, use, import and export of Annex A chemicals and
- Restrict the production and use of Annex B chemicals.

Article 4 establishes a Register of specific exemptions for the purpose of identifying the Parties that have specific exemptions listed in Annex A or Annex B. It does not provide for exemptions that may be exercised by all Parties. The Register includes:

- A list of the types of specific exemptions reproduced from Annex A and Annex B;
- A list of the Parties that have a specific exemption listed under Annex A or Annex B; and
- A list of the expiry dates for each registered specific exemption.

Article 5 deals with measures to reduce or eliminate releases from unintentional production. It requires each Party to take measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination. The measures to be taken include:

- Developing and implementing an action plan designed to identify, characterize and address the release of the chemicals listed in Annex C;
- Promoting the application of available, feasible and practical measures that can expeditiously achieve a realistic and meaningful level of release reduction or source elimination;
- Promoting the development and use of substitute or modified materials, products and processes to prevent the formation and release of the chemicals listed in Annex C, and
- Promoting, in accordance with its action plan, the use of best available techniques and best environmental practices for both existing sources, and new sources.

Article 6 deals with measures to reduce or eliminate releases from stockpiles and wastes. It requires Parties to:

- Develop appropriate strategies for identifying stockpiles consisting of or containing chemicals listed either in Annex A or Annex B, as well as products and articles in use and wastes consisting of, containing or contaminated with a chemical listed in Annex A, B or C;
- Identify, to the extent practicable, stockpiles consisting of, or containing chemicals listed either in Annex A or Annex B on the basis of the strategies referred to above;
- Manage stockpiles, as appropriate, in a safe, efficient and environmentally sound manner; and
- Take appropriate measures so that such wastes, including products and articles upon becoming wastes, are handled, collected, transported and stored in an environmentally sound manner, and also disposed of in the most appropriate manner.

Article 7 requires each party to produce a National Implementation Plan (NIP), which details how the party will implement the provisions of the Convention. The requirements of the National Implementation Plan are described further under Section 1.2.2 in this document.

Article 8 deals with the listing of the chemicals under the different annexes. It makes provision for each party to submit proposals for listing a chemical in a particular annex.

Article 9 deals with information exchange and requires each party to facilitate or undertake the exchange of information relevant to:

- The reduction or elimination of the production, use and release of persistent organic pollutants; and
- Alternatives to persistent organic pollutants, including information relating to their risks as well as to their economic and social costs.

Article 10 on public awareness, information and education, requires parties to promote and facilitate awareness among policy and decision makers with regard to POPs. Parties should ensure that all available information on POPs is made available to the public and the information is kept up to date. In pursuance of this article, parties should ensure that appropriate education programmes are put in place for groups such as women, children and the least educated, as well as for workers, scientists, educators and technical and managerial personnel.

Article 11 on research, development and monitoring, requires Parties to undertake appropriate research, development, monitoring and cooperation pertaining to persistent organic pollutants and, where relevant, to their alternatives and to candidate persistent organic pollutants, including on their:

- Sources and releases into the environment;
- Presence, levels and trends in humans and the environment;
- Environmental transport, fate and transformation;

- Effects on human health and the environment;
- Socio-economic and cultural impacts;
- Release reduction and/or elimination;
- The results of such research, development and monitoring activities should be made available to the public.

Other articles in the Convention deal with technical assistance issues, financial resources and mechanisms, reporting, effectiveness evaluation, non-compliance and settlement of disputes, among other issues.

1.2.2 Requirements of the National Implementation Plan (NIP)

The Stockholm Convention, in Article 7, requires each party to produce, within two years of its entry into force and / or amendments for the country, a National Implementation Plan (NIP). The NIP is expected to be reviewed and updated on a periodic basis. The requirements of Article 7 are given in Box 1.

Box 1: Article 7 of the Stockholm Convention

ARTICLE 7

Implementation Plans

1. Each party shall:
a. Develop and endeavour to implement a plan for the implementation of its obligations under this Convention;
b. Transmit its implementation plan to the Conference of Parties within two years of the date on which this Convention enters into force for it; and
c. Review and update, as appropriate, its implementation plan on a periodic basis and in a manner to be specified by a decision of the Conference of the Parties.
2. The Parties shall, where appropriate, cooperate directly or through global, regional and sub-regional organizations, and consult their national stakeholders, including women's groups and groups involved in the health of children, in order to facilitate the development, implementation and updating of their implementation plans.
3. The Parties shall endeavour to utilize and, where necessary, establish the means to integrate national implementation plans for persistent organic pollutants in their sustainable development strategies where appropriate.

Development and review / update of a NIP by a country shows its commitment to implementing its obligations under the Convention; therefore by updating its NIP, Namibia has shown its commitment to meeting its obligations.

1.2.3 The NIP Update Process in Namibia

Namibia developed its initial NIP in 2014. The NIP has been updated in a process that has been coordinated by the Ministry of Environment, Forestry and Tourism, which is the national focal point for the Stockholm Convention. The process involved five key stages, which included setting up coordinating mechanisms; establishing POPs inventories and conducting baseline assessments; identifying priorities and reviewing objectives and action plans; formulating the NIP; and endorsing the NIP.

Setting up Coordinating Mechanisms

The Ministry of Environment, Forestry and Tourism, as the executing agency, set up the National Coordinating Committee (NCC), to oversee the development of the NIP. The NCC comprised relevant Government Departments and other key POPs stakeholders.

Establishing POPs Inventories and Baseline Assessments

The inventories were conducted by Inventory Task Teams. Five Inventory Task Teams were set up for the following classes of POPs:

- Obsolete Pesticides;

- Listed polybrominated diphenyl ethers (POP-PBDEs);
- Perfluorooctane sulfonic acid (PFOS) and related compounds;
- Unintentionally-produced POPs (U-POPs); and
- PCBs (the PCB inventory was done by a Consultant).

The baseline assessments included an Assessment of the Infrastructure for the Management of Chemicals, Including POPs.

Identifying priorities and reviewing objectives and action plans

The POPs inventories and infrastructure assessment identified POPs issues of concern in Namibia. Objectives and action plans from the original NIP were then reviewed and reformulated to include newly identified issues of concern.

Formulating the NIP and action plans

The actions plans were edited, and the draft NIP was compiled in June 2022.

Endorsing the NIP

The NIP was endorsed at a national stakeholder workshop on 23 June 2022.

1.2.4 Scope of the NIP

The scope of the updated NIP covers the original POPs that formed the "dirty dozen". It also covers the new industrial POPs, (POP-PBDEs, HBB, HBCD, PFOS), the new POPs pesticides (lindane, alpha and beta HCH, endosulfan, pentachlorophenol, its salts and esters, polychlorinated napthalenes), and the new U-POPs (PeCBz) and HCBD.

The inventories and baseline assessments used data for 2018 in the majority of cases. Where data for 2018 was unavailable, the most recent available data was used instead.

The action plans that are presented in this NIP were developed on the assumption that the NIP would be implemented from January 2023 over a period of five years maximum. Some action plans run for less than five years, though.

1.2.5 Structure of the NIP

The NIP document has three Chapters, namely:

- Chapter 1: Introduction, which gives background information on the Stockholm Convention, the purpose of the NIP, and the methodology that was followed for the NIP update process in Namibia;
- Chapter 2: Country Baseline Information, which gives an overview of the country profile in terms of physical and demographic context, political and geographic structure and the economy. It also presents the results of the assessment of POPs, in terms of the inventory findings and the infrastructure assessments;
- Chapter 3: Strategies and Elements of Action Plans of the NIP, gives an overview of the priority POPs issues identified for Namibia, and describes the action plans that were developed for addressing the priority issues.

1.3 Further considerations

1.3.1 Socio-economic assessment

Assessing the socio-economic impacts of POPs is an important process which shows how the continued use and / or production of POPs can affect the social and economic status of populations and of a nation as a whole. It also shows how interventions to reduce and eventually eliminate POPs can affect the social and economic wellbeing of different sectors of society.

In developing the National Implementation Plan, it is important that a socio-economic assessment of POPs be conducted because economic and social development as well as poverty eradication are the overriding priorities of developing country parties (UNEP, 2013). Giving due considerations to social and economic impacts of POPs usage and POPs eradication measures will thus produce a context-specific NIP which is more relevant and acceptable to the policy makers. Since POPs are released from so many products which are commonly used by society, and from several

processes which can potentially expose large populations, the need to conduct a socio-economic assessment of their usage and eradication measures becomes even more important.

A socio-economic assessment provides a means of analysing and managing the intended and unintended social and economic impacts, both positive and negative, of planned interventions (policies, programs, plans, and projects). Social impacts are the changes to individuals and communities that come about due to actions that alter the day-to-day way in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society, while economic impacts are the changes in financial / monetary status that occur to individuals or communities as a result of a particular activity.

In the context of managing POPs, social and economic impacts might include the following:

- contamination of air, water and soil, and threat to food safety and drinking water safety;
- degradation of ecosystem services.
- vulnerability arising from exposure to POPs;
- deterioration or improvement in health;
- loss or improvement in livelihoods;
- changes in cost of living;
- cost of contaminated site management and remediation;
- changes in employment, income and workplace protection;
- changes in levels of equity of wealth distribution;
- opportunities for enterprise development (including small and medium enterprises);
- changes in demand for public services, such as health and education.

For Namibia, some of the socio-economic considerations that have been identified as part of the NIP development process are shown in Table 2.

Table 2 POPs management socio-economic assessment summary

Chemical / chemical group[1]	Proposed management action[2]	Environmental benefit	Social/human health benefit	Economic implication[3]
POPs Pesticides	Build capacity for Integrated Pest Management	Reduction in environmental contamination from the pesticides	Reduction in human exposure to pesticides will result in improved health outcomes	A healthy community and workforce will result in more working hours and higher productivity
PCBs	To dispose of PCB contaminated oils through participating in the regional PCB disposal project	Protection of the environment from PCB contamination, especially those areas where decommissioned transformers are currently stored	Those who work with transformers will be protected from exposure to PCBs and from all the adverse health effects such as risks of chloracne and other such effects	The cost of replacing PCB contaminated transformers which are still in service will be very high, and these might not be replaced because of the cost implications
Hexa-BDE and hepta-BDE	Implement finalized e-waste policy fully, focusing on establishing financial mechanism for economically viable e-waste management, raising awareness on e-waste management, developing infrastructure for e-waste management, developing technical guidelines and standards for e-waste management)	E-waste will be disposed of in an environmentally sound manner, which will protect the environment from the brominated flame retardants that currently leak into it.	Raising awareness on e-waste management will enable the population to dispose of their e-waste appropriately, and protect them from exposure to the brominated flame retardants	One of the environmentally sound mechanisms for managing waste is recycling to recover precious metals, and while the proper infrastructure for this will be very costly, the intervention will result in job creation, and contribute significantly to economic growth for the country

1 Addresses only the chemical/chemical group identified as priority in Namibia

2 As per the respective action plan included in Chapter 3.3

3 Only qualitative assessment conducted

TetraBDE and pentaBDE	Reduce imports of vehicles likely to be contaminated with POP-PBDEs, through enforcing the existing relevant legislation	There will be reduced contamination of the environment (through inappropriate vehicle disposal) due to a decline in number of vehicles reaching end of life quickly	There will be reduced exposure of the public to POP-brominated flame retardants in the vehicles, which will result in a healthier population	Although these older vehicles contain POPs, they are the ones which are affordable to a certain percentage of the population, and banning their import will lower the standard of living of those who cannot afford the newer ones. However, the ban will promote the purchase of locally assembled vehicles, strengthening the country's economy
DDT	Implement Integrated Vector Management programmes to reduce reliance on DDT	Reduction in usage of DDT will lead to reduced risk of DDT getting into the environment through washing of sprayed walls (which has been reported to happen despite the awareness raising conducted during IRS)	Protection of at-risk populations from DDT exposure, mainly the spraymen and people who live in areas where DDT is sprayed	Currently DDT is one of the cheaper chemicals for malaria vector control, hence switching to other chemical alternatives will be more expensive, which could lead to continued reliance on DDT. On the other hand, continued reliance on DDT could lead to eventual contamination of agricultural produce, leading to a ban on exports from Namibia, which will adversely affect the economy
PFOS	Develop and implement PFOS phase out plan	Reduced environmental contamination, especially in areas where PFOS-containing fire-fighting foam is sprayed	Reduced exposure for people who may be getting PFOS from contaminated water, which will lead to a healthier population	Replacing PFOS-contaminated fire-fighting foams will be a costly exercise
Unintentionally produced POPs	Implement the National Waste Management Strategy as a way to reduce the U-POPs released from waste disposal and waste burning	There will be lower PCDD / PCDF emissions due to a reduction in waste disposal and burning, and improvement of disposal infrastructure	There will be reduction in PCDD / PCDF exposure from burning of waste, which will result in a healthier population.	Strengthening of recycling systems will lead to employment creation and enhancement of circular economy, which will reduce reliance on expensive raw materials Establishment of proper waste disposal infrastructure will be costly, and implementation of this intervention may thus be delayed due to competition with other more pressing social development issues
Contaminated sites	Conduct a detailed inventory of contaminated land and initiate site clean-up on at least two areas	Site clean up will remove contaminants which may be adversely affecting wildlife and plant life in the affected areas.	Site clean up will reduce exposure for communities who will have been living in the vicinity of the contaminated sites	Site clean-ups will free valuable land (which was previously unusable) to be used for various economic and social purposes such as agriculture, housing, social amenities

1.3.2 Gender considerations

It is important to incorporate gender considerations into NIP development as women, men and children have different exposure levels to POPs, and are affected differently by different POPs, and thus need to have their special requirements addressed appropriately. There are differences in workplace exposure, differences in household exposure, and differences in physiological susceptibility.

As women are more often involved in menial workplace tasks such as cleaning, they are usually at greater risk from hazardous ingredients and chemicals contained in cleaning agents. Women also play an important role in subsistence farming, and are often responsible for pesticide application, usually without the appropriate PPE, which puts them at risk of exposure to pesticides, including POPs.

Again, women are generally responsible for keeping the home clean, which includes the use of cleaning agents, managing the garden and getting rid of any pests around the home. The cleaning agents may contain hazardous chemicals, while the pesticides used in the garden and for controlling household pests are often bought in the streets, especially those used by low-income households. Pesticides bought off the streets are usually unregistered and could very well be POPs, which exposes these women. The women are also responsible for management of household waste, which includes hazardous household waste. Often the waste is burned, especially where collection by the local authority is poor, and waste burning exposes the women to the U-POPs that are released. Women are also responsible for preparing family meals, and 48.6 % of Namibian households use wood for cooking (NSA, 2017). Use of the wood for cooking again exposes women to the U-POPs and polycyclic aromatic hydrocarbons (PAHs) released from this process.

Men, women, and children have different susceptibilities to the effects of chemical exposure due to their different physiological make-up. Children are generally at greater risk of harm from chemical exposure because chemicals can interfere with key developmental processes. The risk is worsened in children because of their small size (relative to dose) and their intake of proportionally greater amounts of environmental contaminants in water and air (relative to body size). Their lack of awareness of the dangers of chemicals, and subsequent lack of personal protection further compounds their susceptibility to exposure.

Women have relatively higher physiological susceptibility to the impacts of chemical exposure particularly due to their reproductive cycles. At particular stages of their lives, such as pregnancy, lactation, and menopause, women's bodies undergo rapid physiological change, making them more vulnerable to health damage from toxic chemicals. A substantial portion (up to 33 percent) of a woman's chemical burden can be passed on to her baby during gestation (through the placenta) as well as via breastfeeding (UNDP, 2011).

Due to these differences in exposure and susceptibility, it is imperative that gender considerations be mainstreamed into planning processes, including the development of NIPs. This is best done through:

- Raising awareness of the linkages between chemical exposures, the effects on human health and the environment, and gender differences in risks and impacts among relevant sectors of society
- Ensuring collection of sex-disaggregated data and information relevant to sound management of chemicals (SMC)
- Integrating sex-disaggregated data in data analysis and diagnostics
- Integrating gender aspects in identification of national opportunities and priorities for SMC

CHAPTER 2. COUNTRY BASELINE

2.1 Country Profile

2.1.1 Geography

Namibia is located in the south-western part of Africa lying between latitudes 150 and 290 south of the equator and between longitudes 110 45" and 250 15" east of the Greenwich Meridian. Namibia shares its borders with Angola in the north (1376 km), Zambia in the northeast (233 km), Botswana in the east (1360 km), South Africa in the southeast and south (855 km) and the Atlantic Coast in the west (1572 km)4.

Namibia has a total land area of 825,234 square kilometres with the savanna covering 64% of the country's land surface, dry woodlands 20%, and desert vegetation 16%. Forty-seven percent of Namibia's total land area is classified as agricultural land, with 1% of cropland irrigated5. The country has had 13 administrative regions since 1993, until 2013, when a 14th region was added by the division of Kavango into Kavango East and Kavango West. Figure 1 shows the administrative regions of Namibia before the division of Kavango Region (shown on the map as Okavango).

Figure 1 Administrative boundaries of Namibia

Namibia has typical desert conditions in that it is dry with rainfall that is extremely variable. Generally, higher rainfall of more than 600 mm per year falls in the north-east, while the far south and far west normally receive less than 50 mm per year. The only permanent rivers in Namibia flow mainly along the country's northern and southern borders. These are the Orange River in the South, and the Kunene, Okavango, Zambezi and Chobe Rivers in the North. Rivers arising within the country are normally dry and most flow west or south. River courses that flow eastwards rarely have any water.

Namibia has two Transfrontier Conservation Areas (TFCAs). These are the /Ai-/Ais Richtersveld TFCA, which was declared in 2003 and is jointly run by authorities in Namibia and South Africa, as well as Kavango-Zambezi (KAZA) TFCA, shared between Angola, Botswana, Namibia, Zambia and Zimbabwe. The KAZA, which is the world's largest conservation area, was officially launched in 2012, and represents a paradigm shift in conservation away from national parks and toward an integrated multiple land used concept.

4 Available from https://www.info-namibia.com/info/namibias-geography

5 Available from https://www.land-links.org/country-profile/namibia

2.1.2 Population

Since independence in 1990, Namibia has undertaken Population and Housing Censuses every 10 years but because of the coronavirus pandemic the census that was scheduled for 2021 has not yet taken place. In addition to these censuses, the Government also undertakes Demographic and Health Surveys, Labour Force Surveys, and Household Income and Expenditure Surveys. According to the 2011 Population and Household Census, the population of Namibia was 2,113,077 at the time. The population has grown rapidly over the years, especially in the urban areas. According to data compiled by the World Bank in 2020, the population of Namibia has increased to 2,540,916 giving a 20% increase in a period of 9 years6.

In terms of population distribution, 43% of the population lives in the urban areas, with the majority of the rural population being concentrated in the central-north, along the Okavango River and in the Zambezi region where rainfall is highest and staple crops can be grown (NSA, 2013). Elsewhere, rural populations are scattered in low densities on farms and in small villages.

School attendance rates for children aged between 7 and 16 years have been more or less constant from 1991, although there was a slight decrease in attendance from 2001 to 2011. In 1991, the attendance rate was 86.7%, while that for 2001 was 88.7% and that for 2011 decreased to 83.8%.

2.1.3 Political Structure

Namibia is a sovereign, democratic state whose main organs are the Executive, the Legislature and the Judiciary. It is headed by a President who is Head of State and of the Government. The executive power of the country lies in the President and the Cabinet. The President appoints a Prime Minister, who is the leader of Government business in Parliament, and coordinates the work of the Cabinet and advises and assists the President in the execution of the functions of the Government.

Namibia is divided into regional and local units, which consist of regions and Local Authorities. Namibia comprises 14 regions, each with a regional council. The Local Authorities comprise 16 municipalities, 14 town councils, 16 village councils and 12 settlement areas7.

2.1.4 Economy

Namibia is classified as an upper middle-income country with an estimated annual GDP per capita of USD 4084.24 (World Bank, 2020)8. The Namibian economy is characterised by a non-tradable sector (comprising Government industries), and an export oriented primary industry (NPC, 2012).

Gross Domestic Product (GDP)

The tertiary industry is the biggest contributor to GDP (accounting for 59.1% of GDP in 2020), while the primary industry contribution has declined over the last 2 decades, falling from 24% in 2002, to about 19% in 2012, to 18.8% in 2020.9

The primary industry is dominated by the mining and quarrying sector, followed by the agriculture and forestry sector, and lastly the fishing and fish processing sector. The secondary industry is dominated by manufacturing which contributes 11.1% of the 16.7% contributed by the industry as a whole.

Figure 2 shows the percentage contributions of each industry to the to GDP in 2020.

6 Available from https://data.worldbank.org/country/namibia

7 Available from: http://www.mrlgh.gov.na/

8 Available from https://data.worldbank.org/country/namibia

9 Available from https://nsa.org.na/page/publications

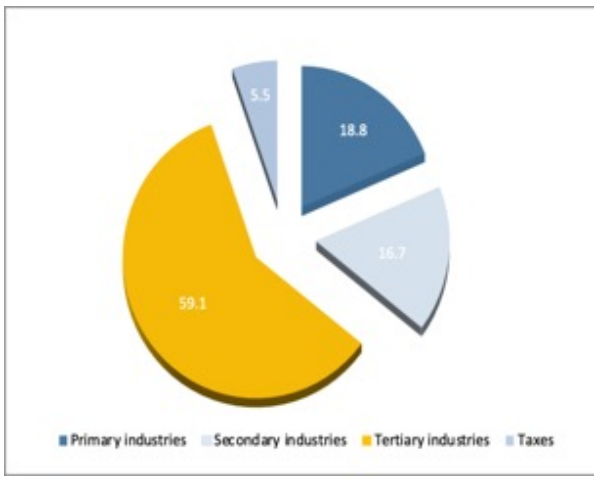

Figure 2 Contribution of the different industries to the GDP for 2020
(Source: NSA –Annual National Accounts 2020)

The manufacturing sector contributed 13% to GDP in 2012. A further analysis of the manufacturing sector on its own revealed the biggest contributor to GDP to be the beverages sector at 22% of the total manufacturing in 2012, followed by the basic non-ferrous metals at 21 %. Manufacturing of chemicals contributed only 7% of the total manufacturing contribution.

2.1.5 Industrial Sector

The industrial sector (secondary industry) is quite active in Namibia, although its contribution to the economy is significantly less than that of the services industry (tertiary industry) as shown by Figure 2 in which the secondary industry contributes only 16.7% of the to the GDP in comparison to the tertiary industry which contributes 59,1%.

The main industrial activities in Namibia are mining and mineral processing, as well as manufacturing of a wide variety of products. Minerals that are mined include uranium, diamonds, and base metals such as zinc, copper and lead. Products that are manufactured include beverages and various foods, fabricated metals, chemicals and related products, textile and wearing apparel, non-metallic mineral products, rubber and plastic products, leather and related products, wood, and wood products, as well as publishing and printing.

2.1.6 Agricultural Sector

The agricultural sector is an important sector in the Namibian economy, although on average, its contribution to GDP is fairly small. In 1995, its contribution was 6.9 %, in 2004 it was 5.3%, (MAWF, 2005) while in 2012 it was 5% (NSA, 2013). However, its contribution over the years has increased to 9.2% in 202010. Agriculture is still the main source of livelihood for the majority of the rural population, mainly the subsistence rural population (NPC, 2003). It is estimated that more than 70 percent of the population in the country depend to a greater or lesser extent, upon the agricultural sector.

At a commercial scale, livestock makes a much greater contribution to the agricultural output (MAWF, 2005), with livestock farming making up 42.4% of agriculture's contribution to the GDP11. Cropping on the commercial scale makes a lower contribution than livestock's but it is still significant as it makes up 32.6% of the agricultural sector's contribution. The main commercial crops are maize, grapes, and wheat. At the communal scale however, crops make a larger contribution, as compared to livestock. The remaining 25% is accounted for by a wide array of other smaller activities such as forestry and fishing and others.12

As a way of improving the agricultural sector's contribution to GDP, the Government, through the Ministry of Agriculture, Water and Land Reform has embarked on the Green Scheme Initiative. The Green Scheme Initiative

10 Publications - Namibia Statistics Agency (nsa.org.na)

11 Publications - Namibia Statistics Agency (nsa.org.na)

12 https://nsa.org.na

aims to encourage the development of irrigation based agronomic production in Namibia13. Its mission is to create an enabling, commercially viable environment through effective public-private partnerships. This will be achieved through attracting and enabling large scale commercial farming enterprises to establish commercially viable entities in remote, undeveloped rural areas to act as Service Providers for the successful and sustainable settlement of small-scale farmers.

The presence of a viable agricultural sector means that quite a lot of agrochemicals should be in use, although exact quantities used were not readily available during this assessment. The Government's drive to increase agricultural activity in the country using such schemes as the Green Scheme mentioned above, means that the use of agrochemicals is likely to increase in the near future.

2.1.7 Environmental Problems in Namibia

The major environmental concerns in Namibia include land degradation and soil erosion, deforestation, water management, waste and pollution, and climate change (HSF et al, 2011).

Land Degradation

Land degradation is caused mostly by overstocking and overgrazing. Often in rural areas, poverty forces people into these unsustainable environmental management practices in order to ensure food supply. Other activities that contribute to land degradation include unsustainable harvesting of forest resources, wild plants and game, and the clearing of land for farming or housing. Land degradation results in deforestation, soil erosion, bush encroachment, soil salinization, and decreased availability of palatable grasses.

Deforestation

Deforestation in Namibia is caused mainly by expansion of land which is cleared for agriculture and infrastructure development, cutting of wood for fuel and domestic purposes, uncontrolled wildfires, habitat destruction by elephants, selective logging through timber concessions, and unlicensed curio carving. Between 1990 and 2011, 2% of the forest area in Namibia disappeared as a result of the causes mentioned above (HSF et al, 2011). The deforestation leads to loss of resources used for human activities, and results in desertification and severe land degradation.

Water Supply

Water supply is a major challenge in Namibia, since the country is one of the most arid in Southern Africa. 22 per cent of Namibia can be classified as desert, having a mean annual rainfall of less than 100 mm, 33 per cent classified as arid, with a mean annual rainfall of between 100 and 300 mm, 37 per cent classified as semi-arid, with a mean annual rainfall of between 301 and 500 mm, and 8 per cent as sub-humid, with a mean annual rainfall of between 501 and 700 mm (GRN, 1997). In addition to the rainfall being generally low, it is also extremely variable in both quantity and distribution.

Water is required for sustenance, agriculture, and industrial development. Industrial activities are causing surface and groundwater pollution, which is further decreasing the availability and quality of the scarce water resources. Provision of sustainable water supply is therefore a key issue requiring the Government's attention.

Waste and Pollution

Namibia in general and Windhoek (its capital) in particular, are considered clean in comparison with the rest of the African continent. With the increase in industrialisation since the 1990s, there has been an increase in the potential for environmental pollution. Mining is one of the key economic activities, and it is a potential source of pollution. The rise in population has also resulted in an increase in the amount of waste generated in Namibia. While waste management in Windhoek has improved over the years, the same level of improvement still needs to be cascaded to other local authorities, as the waste management industry there is still underdeveloped (HSF, 2011).

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[13] http://www.mawf.gov.na/Programmes/greenscheme.html

Climate Change

The Namibian climate is highly variable, and this makes it more vulnerable to climate change than other countries with more stable climates. Namibia's initial national communication to the United Nations Framework Convention on Climate Change (2002) gave a prediction of some of the impacts of climate change assuming that there is only a modest degree of policy intervention to limit emissions of greenhouse gases. It predicted that mean annual temperature will increase by 2 to 60C by 2100 in Namibia. Rainfall is also expected to decrease, especially in the central inland areas.

The combined effect of increased temperature and decreased rainfall is likely to cause a gradual decrease in agricultural productivity. The decrease in agricultural productivity may result in the use of more agricultural chemicals to counter this effect. The increase in temperature is also expected to extend the area in which malaria (an important cause of adult mortality) is endemic, from the current northern region, to spread southwards towards the central regions of the country. This trend has become apparent in recent years. Climate change is therefore expected to lead to a significant increase in chemicals usage in Namibia.

2.2 Institutional, policy and regulatory framework for environmental management, including POPs

2.2.1 Current legislation and regulations for addressing chemicals management, including POPs

Namibia has a fairly strong legal framework for environmental management in general, and the management of certain chemicals in particular. The Supreme Law of the land, the Namibian Constitution, says in Article 95 (l) that the State will adopt policies that promote the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future. This shows that issues of environmental protection are viewed as being important at the highest level.

Besides the Constitution, there are many other Acts that deal with environmental protection and / or chemicals management. There are very few Acts that deal specifically with POPs issues, but there are a number whose provisions give them the potential mandate to deal with POPs, if this potential is exploited. Table 3 lists some of the relevant Acts (which are currently dealing with POPs issues, or have the potential to), their key provisions, as well as the Ministry responsible for enforcing the Act.

It must be pointed out that this section is very similar to what was in the initial NIP of 2014, except for the addition of three new important pieces of legislation – the Public and Environmental Health Act of 2015, the amended regulations for Registration of Fertilizers, Farm Feeds, Sterilising Plants And Agricultural Remedies of 2020, and the Namibia Revenue Agency Act of 2017.

Table 3: Detailed description of relevant acts which can be used for POPs management

Act	Provisions	Responsible Office / Ministry / Agency
Environmental Management Act of 2007	The Act promotes the sustainable management of the environment by establishing principles which include: • Adoption of high benefit and low-cost options for reduction of waste generation and pollution at source • Promotion of reduce, reuse and recycle in waste management • Polluter-Pays-Principle • Precautionary Principle	Ministry of Environment, Forestry and Tourism
Environment Investment Fund of Namibia Act of 2001	The Act establishes the Environmental Investment Fund which is meant to support projects aimed at promoting sustainable use and management of natural resources, maintaining the natural resource base and ecological processes. The Fund can be used for training, education, awareness raising, as well as the development of policies and strategies.	Ministry of Environment and Tourism
Public and Environmental Health Act of 2015	The Act provides for the management of waste, which is useful regarding POPs because poor waste management leads to emissions of U-POPs • Section 51 requires local authorities to ensure collection, disposal and recycling of waste in accordance with applicable laws • Section 52 requires all generators of special, industrial, hazardous or infectious waste to be registered with the local authority concerned. If the generator is the local authority, it must be registered with the Chief Health Officer in the Health Ministry. • Any such waste that is awaiting disposal should be stored under environmentally sound conditions and should be labelled in accordance with universal biohazard symbols. • Section 53 requires all waste to be deposited only at a disposal site or incinerator approved by the local authority. The operator of such a waste disposal site must be registered with the local authority. The waste disposal site must be fenced and must be kept in such a way as to prevent fly breeding or other public health risk. • Section 53 also prohibits burning of waste either in a public or private place, or at a waste disposal site.	Act is administered primarily by the Ministry of Health and Social Services, but the functions pertaining to the management of waste are enforced by the local authorities.
Namibia Revenue Agency Act of 2017 (became operational in 2021)	The Act set up the Namibia Revenue Authority whose functions include providing customs and excise services that facilitate trade, maximise revenue collection and protect Namibian borders from illegal importation and exportation of goods.	Namibia Revenue Agency
Amendment Regulations on Registration of Fertilizers, Farm Feeds, Sterilising Plants And Agricultural Remedies (2020)	The Regulations, which are under the Fertilizers, Farm Feeds And Agricultural Remedies Act of 1947, provide for the requirement to import pesticides only under an import. This requirement has long been identified as being critical for effective pesticides management.	Ministry of Agriculture, Water and Land Reform

Marine Pollution (Prevention of Pollution from Ships) Act of 1986	The Act provides for the protection of the sea from pollution by oil and other harmful substances discharged from ships.	Ministry of Works and Transport
Prevention and Combating of Pollution of the Sea by Oil Act (1981) and the Amendment Act, No.24 of 1991	The Act provides a framework for the prevention and combating of pollution of the sea by oil, and for determining liability for damage caused by the discharge of oil from ships, tankers or offshore installations.	Ministry of Works and Transport
Forest Act of 2001	The Act provides for the management of veld fires, which are a major source of unintentional POPs	Ministry of Environment, Forestry and Tourism
Foodstuffs, Cosmetics and Disinfectants Ordinance 18 of 1979.	It provides for the protection of consumers from the harmful effects of chemicals in consumer products; protection from residual pesticides found in agricultural products and other foodstuffs; setting of standards for acceptable levels of residual concentrations in line with the World Health organization.	Ministry of Health and Social Services
Namibia Institute of Pathology Act of 1999	The Act provides for: • The establishment of medical laboratories • The conducting of research into the pathology of diseases and performing medical laboratory services relating to the occurrence, cause, prevention, diagnosis or treatment of any illness, disease • Training of staff for medical laboratories	Ministry of Health and Social Services
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act of 1947	The Act provides for the appointment of a Registrar of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies; for the registration of fertilizers, farm feeds, agricultural remedies and stock remedies. It regulates or prohibits the sale, importation, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies.	Ministry of Agriculture, Water and Land Reform
Petroleum (Exploration and Production) Act of 1991	The Act prohibits pollution of any water body by the spilling of petroleum, drilling fluid, chemical additive, any gas or any waste product or effluent.	Ministry of Mines and Energy
Petroleum Products and Energy Amendment Act of 2000	The Act requires the National Energy Council to keep abreast of international developments in the field of energy supply. The Act obliges the National Energy Council to ensure that the latest environmentally friendly technologies are applied in energy supply.	Ministry of Mines and Energy
Import and Export Control Act of 1994	The Act provides for control of imports and exports.	Ministry of Industry and Trade
Standards Act of 2005	The Act provides for the promotion, regulation and standardisation relating to the quality of commodities. It establishes the Namibia Standards Institution whose functions include preparing, issuing and promoting Namibian standards and other standards, including specifications and codes of practice, in relation to any commodity. The Act provides for the incorporation of standards into national law.	Ministry of Industry and Trade

Customs and Excise Act of 1998	The Act prohibits the importation of goods requiring import certificates / permits, unless such certificate / permit is available.	Ministry of Industry and Trade
Water Resources Management Act of 2013 (Act No.11 of 2013)	Fundamental principles under the Act include the Polluter-Pays-Principle, as well as Duty-of-Care by disposers of waste and effluent, to prevent pollution. The Act provides for the setting of water quality standards, the establishment of laboratories for monitoring water quality, as well as the development of national programmes for testing and monitoring water quality. It also provides for water pollution control.	Ministry of Agriculture, Water and Land Reform
Local Authorities Act of 1992	The Act provides for the local authority to provide sewage management and drainage systems, as well as waste management services to its residents, for all types of waste.	Ministry of Urban and Rural Development
Local Authorities Fire Brigade Services Act of 2006	It provides for emergency response to natural disasters, industrial incidences such as fires, and other anthropogenic disasters.	Ministry of Urban and Rural Development
Disaster Risk Management Act of 2012	The Act provides for the establishment of institutions for disaster risk management in Namibia. (The definition of disaster in the Act includes serious disruption of community functioning that may result from major accidents and pollution).	Office of the Prime Minister
Namibia Statistics Act of 2011	The Act requires statistics producers who collect statistics under the Act to • produce, disseminate and make the statistics available to users, as a public good, and • formulate an access to information policy which details how the public may access the statistics. Statistics which may be collected include agricultural statistics, industrial statistics, distributive trade statistics, international trade statistics, natural resources and environmental statistics.	Namibia Statistics Agency
Road Traffic and Transport Regulations of 2001	These regulate the transportation of dangerous goods by aligning it with the standard specifications in the South Africa Bureau of Standards.	Ministry of Works and Transport
Research, Science and Technology Act of 2004	The Act provides for the promotion, co-ordination and development of research, science and technology (RST) in Namibia.	National Commission on Research, Science and Technology
Labour Act of 2007	The Act requires employers to • provide safe and healthy working conditions • provide adequate PPCE • ensure that employees are given the necessary instructions to work safely and without risk to health • report any accident at the workplace • report any prescribed disease that is contracted at the workplace.	Ministry of Labour, Industrial Relations and Employment Creation

Regulations Relating to the Health and Safety of Employees at Work of 1997, under the Labour Act of 1992	The Regulations require employers to: • provide training and education for employees in safety management • report any accident or dangerous occurrence to the Chief Inspector. The Regulations require all cases of occupational diseases to be reported (by the diagnosing medical practitioner) to the Chief Medical Officer of Occupational Health and Safety. The list of occupational diseases in the Regulations include among others: • Diseases caused by exposure to various types of specified chemicals including toxic halogen derivatives of aliphatic or aromatic hydrocarbons, (in which class POPs are found). • Poisoning caused by any type of pesticide or chemical agent including their mixtures • Cancer caused by physical, chemical or biological agents The Regulations list the requirements for hazardous substances pertaining to: transportation; duties of suppliers, manufacturers and importers; safety data sheets; labelling of containers; storage and handling of hazardous substances; notification of the use of carcinogens; hazardous substances exposure limits; exposure measurements of hazardous substances; and biological monitoring.	Ministry of Health and Social Services, Ministry of Labour, Industrial Relations and Employment Creation
Municipal Solid Waste Regulations	A number of local authorities such as Windhoek, Walvis Bay, Swakopmund have their own regulations which enhance their capacities to manage solid waste.	

2.2.1.1 Weaknesses with the current legal infrastructure for chemicals management

Namibia has so many laws that are meant to promote and achieve sound environmental management. The proper implementation of these should also result in sound chemicals management, thereby protecting human health and the environment from the harmful effects of chemicals. However, it has been noted that this is not being achieved, due to some of the following reasons:

a. Lack of specific, defined chemicals legislation / fragmentation of current chemicals legislation

There is no specific legislation on chemicals management for Namibia. Various issues pertaining to chemicals management are dealt with by various pieces of legislation, but there is no one act that oversees all issues to do with chemicals. This has resulted in several important aspects pertaining to chemicals management being overlooked. Examples of aspects of chemicals management which have not received adequate attention include:

- Weak control mechanisms to regulate transboundary movement of chemicals or chemical wastes
- Lack of audit or tracking of chemicals
- Poor air pollution monitoring, both at national and local government level
- No legislative controls for incineration of hazardous waste
- Inadequate legislation on chemical residues in food and exposure limits for food
- Slow and inadequate processes for identifying, banning and de-registration of banned POPs
- There is therefore a real need to harmonise the legislation for chemicals management, in order to ensure that all aspects of chemicals management are covered. This could be done through the development of framework legislation for chemicals management.

b. Ineffective enforcement and implementation of legislation

The enforcement and implementation of the current legislation for chemicals management is weak, mainly due to the fragmentation of the legislation. The fragmentation has resulted in overlap between certain pieces of legislation, leading to lack of clarity over who exactly is supposed to do what. This situation is compounded by the lack of coordination between the different implementing Ministries, which makes the enforcement of legislation a real challenge.

The Ministry of Environment, Forestry and Tourism, which is the leading ministry for chemicals management issues, is also hampered by a severe lack of capacity for chemicals management in terms of human resources, and this fact hinders effective chemicals management in Namibia.

Another factor which has led to the poor enforcement of the legislation is the lack of community education and awareness of legislation (MET, 2012). Sometimes the public break the law simply because they do not know what the law requires.

It has also been observed that fines / penalties are not deterrent enough, in some cases. An example is the Forest Act of 2001, where the penalty for causing a forest fire only involves compensating the party that suffers damage, and there is no other punitive measure.

c. Excessively lengthy process for reviewing / enacting legislation

The length of time that is spent on the legislative review process can be unsustainably long. An example of this is the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act of 1947, which has been under revision for the last 25 years. The Act is fundamental for sound pesticides management and has many shortfalls which have already been identified as constraining pesticide management. The lengthy revision process means that the inadequacies that are identified in the current Act remain unaddressed. While regulations under this Act have been amended in the last two years, still the length of time taken was too excessive.

d. Lengthy periods before operationalization of Acts

The length of time that is spent before an enacted piece of legislation is operationalized is also too long. An example of such is the Environmental Investment Fund Act. This was promulgated in 2001 but was only operationalized in 2011. It may be necessary to investigate the reasons why operationalization of Acts takes so long. It will also be important to ensure that when Acts are being developed, mechanisms are also being put in place to ensure that they are operationalized as quickly as possible after enactment.

2.2.2 Non-Regulatory mechanisms for chemicals management

2.2.2.1 Government policies which can contribute to improved chemicals management

In addition to the legal instruments for chemicals management, Namibia also has a number of policies which can be applied to achieve improved chemicals management. Although policies are not legally binding, they provide a framework and direction of how an organisation / nation can get to achieve its goals. Some of the more relevant policies whose implementation would lead to improved chemicals management (and ultimately POPs management), are described below.

It is important to note that the policies are more less the same as the ones listed in the initial NIP of 2014, except for the first five that are listed, which are all new, having been developed after 2014.

a. National Policy on Management of Waste Electrical and Electronic Equipment (WEEE) 2021 – 2031

The Policy, which was developed in 2020, has as its goal, 'to ensure the efficient, equitable and sustainable management of WEEE that is safe for the environment, protects human health and propels a circular economy in Namibia'. The objectives of the policy include introducing a legal and institutional framework for management of e-waste; establishing a financial mechanism for efficient and sustainable management of e-waste; delivering knowledge, capacity building and awareness of e-waste; developing guidelines, technical standards and enforcement mechanism for e-waste; and developing infrastructure for the management of e-waste.

The development of this policy by the Government is highly commendable, and its implementation should result in a significant reduction of the POP-PBDEs from entering the environment, as e-waste will be managed in an environmentally sustainable manner.

b. The National Solid Waste Management Strategy of 2018

The objectives of the Strategy include strengthening the institutional, organizational and legal framework for solid waste management; instilling a culture of waste minimization and expanding recycling systems; enforcing improvements in municipal waste disposal standards; planning and implementing feasible options for hazardous waste management; and implementing formalized solid waste collection and management systems in all populated areas. The effective implementation of this policy will lead to a reduction in emissions of U-POPs, since poor waste management has been identified as being one of the main reasons for high emissions of U-POPs.

c. National Energy Policy of 2017

This Policy has, as one of its objectives: "To limit the adverse impacts of Namibia's energy sector on the natural environment". In the policy, the Government resolves to promote investments in environmentally friendly energy technologies and practices; foster a culture of environmental stewardship throughout the energy sector; support research, development, and innovation of nationally appropriate energy technologies and practices; and annually report on the environmental impacts and mitigation measures relevant to and applied in the country's energy sector. Since the energy sector is one of the contributors to U-POPs emissions (especially through fossil fuel power stations, and biomass usage for heating and cooking), implementation of this policy through providing safe and clean sources of energy can address these sectors and lead to a significant reduction in U-POPs emissions.

d. The National Agricultural Policy of 2015

The policy has 'sustainable farming' as one of the policy principles and also calls for the promotion of Integrated Pest Management in crop production. There could be potential to use this policy to promote safe management of agrochemicals, although the policy is not very specific on this.

The 1995 National Agricultural Policy was more inclined towards environmental protection, This policy and acknowledged the importance of the protecting the environment in the face of increasing agricultural productivity. It encouraged the use of Environmental Impact Assessments for agricultural projects so as to ensure that any environmental impacts arising from the projects would be identified and measures for their mitigation would be put in place before the onset of the project.

e. The Fire Management Strategy for Namibia's Protected Areas of 2016

This Strategy puts forward mechanisms for controlling wildfires in Namibia's Protected Areas. Implementation of this Strategy will result in reduced wildfires, which will lead to a reduction in U-POPs emissions that arise from wild forest fires.

f. The Namibia's Industrial Policy of 2012

The Policy is anchored on Namibia's Vision 2030 and is meant to promote industrialisation. According to the Policy, by 2030, Namibia should be characterised as "a prosperous and industrialised country, developed by her human resources, enjoying peace, harmony and political stability". The Policy has ten underlying principles, one of which is that it emphasises sustainable manufacturing and development practices (MTI, 2012). The Policy promotes innovation, research and development (R&D) and proposes an innovation agenda focused on strategic R&D in the areas of environmentally friendly production methods, resource efficiency and energy, among other things.

g. National Policy on Climate Change for Namibia

The main purpose of the national climate change policy of Namibia is to provide the legal framework and national strategy for the development, implementation, monitoring and evaluation of climate change mitigation and adaptation activities. The policy also provides a legal basis for resource mobilisation to address climate change adaptation and mitigation.

Although Namibia does not contribute significant amounts of greenhouse gasses to global emissions, it is highly vulnerable to the effects of climate change. The Namibia Climate Change Policy therefore primarily focuses on Climate Change Adaptation measures while necessary attention is also given to mitigation. The policy promotes the exploration and utilisation of available global mitigation techniques for the country's economic benefit such as benefits from energy efficiency through Clean Development Mechanism of UNFCCC. This is done through the use of cleaner, more energy efficient technologies, and adapting existing renewable technologies to be more economically viable. The use of cleaner technologies will result in a decrease in emissions of Unintentionally Produced POPs arising from industrial processes.

h. Water Supply and Sanitation Policy of 2008

This policy has, as one its guiding principles, the need to pursue environmentally sustainable development and efficient utilisation of the water resources of the country and environmentally sustainable development of sanitation services in addressing the various needs. The policy therefore promotes recycling through safe and hygienic recovery and use of nutrients, organics, trace elements, water and energy.

i. National Public Health Laboratory (NPHL) Policy and NPHL Strategic Plan, 2012

The NPHL Policy is aimed at establishing the necessary environment for setting comprehensive standards for public and private laboratories. The policy defines the laboratory governance, coordination and collaboration structures and provides an environment and infrastructure that will assure the delivery of quality laboratory services to all and support the priority health initiatives of the national health plan. The NPHL Strategic Plan is meant to provide a framework for implementing the Policy. Implementing the Policy and Strategic Plan is expected to improve public health surveillance and response, which is a critical component in monitoring impact of chemicals, POPs and other environmental toxins on human health.

2.2.2.2 National Programmes and Plans for Sustainable Development (with Potential for Chemicals Management)

Besides the laws and policies for environmental and chemicals management, Namibia also has other programmes and plans in place to achieve sustainable development. The successful implementation of these programmes and plans will result in sound environmental and chemicals management. The following paragraphs describe some of these programmes and plans:

a. National Development Plans

The Namibian Government, through the National Planning Commission (NPC) regularly prepares National Development Plans (NDPs) which are meant to direct and coordinate development. The development efforts are meant to uplift the standards of living for Namibians. The NDPs, together with Namibia's Vision 2030 (explained in paragraph b. below), serve as the country's integrated planning framework for sustainable development.

Since Independence, there have been four NDPs, which built on a transitional NDP from 1992 – 1995. These are:

- NDP 1 (1995 – 2000), which focused on four areas: stimulating economic growth, creating employment, reducing inequalities in income distribution, and reducing poverty
- NDP 2 (2001 - 2006), whose vision was "sustainable and equitable improvement in the quality of life of all Namibians",
- NDP 3 (2007 - 2012), whose theme was "Accelerated Economic Growth and Deepening Rural Development"
- NDP 4 (2012/2013 – 2016/2017), which has the three goals of high and sustained economic growth, increased income equality and employment creation. During NDP4, four economic sectors, namely Logistics, Tourism, Manufacturing and Agriculture, will enjoy priority status.

b. Vision 2030

Vision 2030 was adopted in 2004 and is a document which clearly spells out the country's development programmes and strategies to achieve its national objectives14. Although the five-year NDPs began before the formulation of Vision 2030, they have acted as short-term vehicles for realising the objectives of Vision 2030. The principle of sustainable development is the cornerstone on which the strategies for realizing the objectives of Vision 2030 are centred15. Vision 2030 focuses on a number of themes to realise the country's long-term vision. The themes are:

- Inequality and Social Welfare
- Human Resources Development and Institutional Capacity Building
- Macroeconomic issues
- Population, Health and Development
- Namibia's Natural Resources Sector
- Knowledge, Information and Technology
- Factors of the External Environment

The driving forces for realising the objectives of Vision 2030 comprise the following:

- Education, Science and Technology
- Health and Development
- Sustainable Agriculture,
- Peace and Social Justice, and
- Gender Equality

The sound management of chemicals is a cross cutting issue which play an important role in the driving forces for realising the objectives of Vision 2030 (namely Health and Development; and Sustainable Agriculture). It thus follows that in order for Vision 2030 to be realised, there should be an improvement in the chemicals management arena for Namibia.

c. Green Economy Transition

This initiative promotes an economy which is seen as one that "improves and balances human well-being for all Namibians through the efficient and sustainable use of all resources". The Green Economy Transition is to be guided by the commitment to "promote environmentally sound investments and production systems with innovative technology improvements offering sustainable ways towards an industrialised country" (MET, 2011). The process is supposed to complement and contribute to key existing strategies (and institutions) in Namibia, particularly the Vision 2030 and the National Development Plan Framework (MET, 2012). Although a green economy policy framework is not yet in place in Namibia, several activities have been carried out towards the development of green economy transition. These include:

i. A rapid trade and environment assessment in 2009 to identify "green" opportunities and to bring together stakeholders from sectors such as international trade, environment, tourism, agriculture, water and energy, among others;

14 http://www.gov.na/vision-2030

15 http://www.met.gov.na/Documents/Vision%202030.pdf

ii. The production, in 2011, of a paper exploring the role of biotrade with the wider green economy transition;

iii. The green economy "kick-off" conference in 2011, which introduced the theme and offered a preliminary chance to identify and explore how a green economy transition could drive sustainable development in Namibia (At the conference, the green economy transition elements specific to Namibia were identified, and cross sectoral working groups were also set up to identify green economy potentials, best practices and challenges);

iv. The synthesis workshop in 2011, at which the findings from the working groups were presented and built upon.

d. Green Scheme Initiative

This initiative was conceptualised and introduced by the Government of Namibia to encourage the development of irrigation based agronomic production in Namibia with the aim of increasing the contribution of agriculture to the country's Gross Domestic Product (GRN, 2013). The objectives of the Green Scheme Programme include:
To increase agricultural production and sector contribution to GDP;

i. To promote research and adaptation of technology to increase productivity;
ii. To promote skills development and transfer of technology;
iii. To promote investment in food production and agro-industry;
iv. To mobilise private and public capital for investment in agriculture;
v. To promote food security at national and household level;
vi. To diversify agricultural production and products for the domestic and export market;
vii. To promote value addition and job creation;

The Green Scheme Initiative is an important initiative for improving the livelihoods of Namibians. The second and third objectives provide an apt opportunity for the programme to employ the use of Integrated Pest Management, which should lead to a reduction in the use of agrochemicals.

2.2.2.3 Other Non-Regulatory Mechanisms for Managing Chemicals

a. Cleaner Production

Cleaner production technologies (or environmentally sound technologies, as they are now referred to), include technologies which employ resource use efficiency to reduce waste and recover materials for reuse. The uptake of these technologies by the private sector has been limited (MET, 2012), in spite of the immense benefits to industry that are associated with the use of these technologies. Generally, there is a lack of awareness of environmentally sound technologies, and there is also no policy framework to encourage the adoption of these technologies.

At one time, the Ministry of Environment, Forestry and Tourism implemented a Cleaner Production (CP) Programme from January 2005 to December 2007, with financial assistance from the Danish International Development Agency (DANIDA)16. The objectives of the programme were:

- To raise awareness about CP opportunities (energy, water and raw material savings, waste minimization and occupational health and safety) and options within the Namibian industries and services, including the participatory development of a national CP strategy; accomplishment of relevant study tours, match-making and experience exchanges between factories; and development and dissemination of relevant information on CP.
- To enhance the regulatory functions concerning CP, i.e., to develop relevant regulations and procedures within concerned authorities to be better able to promote and facilitate CP. Emphasis was put on the promotion of self-regulatory mechanisms within industries and services.
- To apply at least ten CP demonstration projects in Namibia within the two and a half- year implementation period; and

[16] http://www.aaltonenconsulting.fi/fi/referenssit/cleaner+production+in+namibia+2005-2007/

- To build capacity at all levels (authorities, industries and services, NCCI, and training providers) to implement the national CP strategy.

The programme was implemented in close partnership with other stakeholders such as the Namibian Chamber of Commerce and Industry, the City of Windhoek, the Department of Water Affairs, and the Ministry of Industry and Trade, among others.

A series of workshops held at the start of the initiative in March to May 2005, indicated that a number of businesses had already started applying the basis techniques of cleaner production to some degree. However, most businesses were not keeping track of their savings on raw materials, water, energy and waste disposal (Mwiya, 2005)17

Under the project, best available technology practices were developed for water, energy and waste management in the fish processing, meat processing, and tourism and hospitality industries. The project failed to continue due to lack of sustainability. The absence of mechanisms to ensure project sustainability after the termination of the project resulted in the intervention failing to achieve much after project termination.

b. Eco-Certification

Eco-certification is a system where labelling is used to certify that products will have been produced using environmentally sustainable processes. This is being used in Namibia for a number of products, namely fish and fish products; meat and meat products; horticulture; and leather (Ndlukula and du Plessis, 2009)18. This is a voluntary system which is driven by the need for producers to meet certain export market requirements.

2.2.2.4 Reasons for ineffectiveness of non-regulatory mechanisms for chemicals management

a. <u>Insufficient application of non-mandatory mechanisms for improved environmental/ chemicals management</u>

There is not enough uptakes of non-legal mechanisms of improved environmental management, such as cleaner production and ISO 14001 Environmental Management Systems. Given the fact that industrial expansion is taking place at an unprecedented level in Namibia (MET, 2012), it is imperative that such mechanisms be aggressively promoted and utilised, in order to ensure that the Namibia's industrial growth does not negatively affect the environment.

b. <u>Lack of project sustainability after project termination</u>

There is a general lack of mechanisms to ensure sustainability once projects terminate. An example of this is the cleaner production project that ran from 2005 to 2007. This weakness results in projects failing to achieve the desired impact, even if the immediate project output will have been achieved.

2.2.3 Relevant international agreements and their obligations

In addition to the local legislation for chemicals management, a number of international instruments are also in place. Namibia has signed and ratified some of these instruments and taken on board some of the provisions into local legislation. There are also a number of important international instruments that Namibia has not signed. These international instruments and Namibia's status regarding each of them, are described below:

a. Vienna Convention for the Protection of the Ozone Layer, 1985

The objectives of the Convention are for Parties to promote cooperation by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer. The Vienna Convention does not require countries to take concrete actions to control ozone depleting substances. ***Namibia acceded on 20 September 1993.***

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17 http://www.namibian.com.na/indexx.php?archive_id=14586&page_type=archive_story_detail&page=5757

18 Available on: http://ir.polytechnic.edu.na/bitstream/10628/159/1/Ndhlukula.%20Green%20labelling.pdf

b. Montreal Protocol on Substances that Deplete the Ozone Layer, 1987

The objective of this international protocol is to reduce the production and consumption of ozone depleting substances in order to reduce their abundance in the atmosphere, and thereby protect the earth's ozone layer. Namibia acceded on **20 September 1993.**

- **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Adopted at the Fourth Meeting of the Parties at Copenhagen on 25 November 1992**
  Namibia ratified on 28 March 2003 and accepted on 28 July 2003.

- **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Adopted by the Ninth Meeting of the Parties at Montreal on 17 September 1997**
  Namibia ratified on 19 April 2006 and accepted on 1 October 2007.

- **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Beijing, 3 December 1999 (Entered into force internationally on 25 February 2002)**
  Namibia ratified on 19 April 2006 and accepted on 01 October 2007.

c. United Nations Framework Convention on Climate Change, 1992

The objective of the treaty is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The treaty itself sets no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. ***Namibia signed in June 1992 and ratified in May 1995.***

d. Kyoto Protocol to the UN Framework Convention on Climate Change, 1997

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. ***Namibia acceded on 4 September 2003.***

e. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989

The aims and provisions of this Convention are to reduce hazardous waste generation and promote environmentally sound management of hazardous waste, wherever the place of disposal; restrict transboundary movements of hazardous waste except for purposes of environmentally sound management; and provide a regulatory system applying to cases where transboundary movements are permissible. ***Namibia acceded on 15 May 1995.***

f. Rotterdam Convention on Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998

The objective of this Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties. ***Namibia signed on 11 September 1998 ratified on 24 June 2005.***

g. Stockholm Convention on Persistent Organic Pollutants (POPs), 2001

The aim of this Convention is to protect human health and the environment from Persistent Organic Pollutants. ***Namibia acceded on 24 June 2005.***

h. Minamata Convention on Mercury, 2013

The objective of this Convention is to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. ***Namibia acceded to the Convention on 06 September 2017.***

i. Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Waste in Africa, 1991

This is a Convention for African nations that prohibits the import into Africa of any hazardous waste (including radioactive waste). It was negotiated by 12 nations of the then OAU and its promulgation came about after the failure of the Basel Convention to prohibit trade of hazardous waste to less developed countries (LDCs), and from the realization that many developed nations were exporting toxic wastes to Africa. ***Namibia has not signed this Convention.***

j. ILO Convention 170 (Chemicals Convention) on Safety in the use of Chemicals at Work, 1990

This Convention is aimed at protecting workers from the dangers associated with chemicals in the workplace. ***Namibia has not ratified this Convention.***

k. ILO Convention 174 on Prevention of Major Industrial Accidents, 1993

The aim of this Convention is to prevent major accidents involving hazardous substances and to limit the consequences of such accidents. ***Namibia has not ratified this Convention.***

l. Globally Harmonised System (GHS) of Classification and Labelling of Chemicals

The GHS is a system which addresses classification of chemicals by types of hazards and proposes harmonized hazard communication elements, including labels and safety data sheets. It aims to ensure that information on physical hazards and toxicity from chemicals is made available in order to enhance the protection of human health and the environment during the handling, transport and use of these chemicals. SADC has adopted the GHS, but Namibia has not yet adopted it.

2.2.3.1 Involvement with international and regional organisations

Namibia works with several international and regional organisations in order to implement some of its international obligations. The organisations also assist the country in improved management of chemicals. Table 4 shows some of the international and regional organisations that Namibia works closely with.

Table 4: Cooperation and involvement with international and regional organisations

International Organisation/ Programme/Body	National Focal Point (Lead Ministry/Agency	Related National Activities
UNEP	Ministry of Environment, Forestry and Tourism	Implementation of several MEAs
WHO	Ministry of Health and Social Services	Malaria control
FAO	Ministry of Agriculture, Water and Land Reform	Promotion of safe use of agrochemicals
UNDP	Ministry of International Relations and Cooperation	Implementation of several MEAs
Africa Institute	Ministry of Environment, Forestry and Tourism	Environmentally sound management of hazardous waste
Southern African Power Pool (SAPP)	Ministry of Mines and Energy	Environmentally sustainable regional electricity supply

2.2.3.2 Reasons for gaps in implementation of chemicals related MEAs

a. Insufficient institutional framework for implementation of certain MEAs

While strides have been made to ensure implementation of some MEAs, such as the setting up of the Ozone Office in the Ministry of Industry and Trade, efforts at implementation of other MEAs are sadly lacking. An example is the Rotterdam Convention, which requires that parties circulate Decision Guidance Documents for chemicals listed under the Convention (to the local stakeholders) and prepare import responses for each chemical. The institutional framework for ensuring this is not in place; hence Namibia cannot implement most of its obligations under this Convention.

b. Lack of participation in international conventions pertaining to safety of workers in the chemicals industry

The chemicals industry is a fairly dangerous place to work in, unless strict health and safety standards for workers are adhered to. Although Namibia has local legislation which deals with issues of workers' safety, its failure to ratify the ILO Conventions relating to the safety of workers in the chemicals industry implies that it does not view this industry as requiring special attention. The Namibian Government has already ratified at least 11 of the ILO Conventions, but not the ones that deal with the protection of workers in the chemicals industry. While it may be argued that the chemicals industry is still fairly small, Namibia's current high industrial growth rate would require the Government to urgently put in place measures to ensure that protection of workers in the chemical industry is in line with international standards.

2.2.4 Roles and responsibilities of organizations and stakeholders involved in environmental and chemicals management

2.2.4.1 Ministries, agencies, and other governmental institutions managing chemicals

As there are so many pieces of legislation for the management of chemicals, there are also many government entities which are involved in one way or another in the management of chemicals. Table 5 summarises the key Government Ministries and departments which are mandated to deal with environmental and / or chemicals management.

Table 5: Government ministries involved in environmental management and / or chemicals management

Government Ministry	Mandated Role with regards to environmental / chemicals management
Ministry of Environment, Forestry and Tourism (MEFT)	Its mission is to maintain and rehabilitate essential ecological processes and life-support systems to conserve biological diversity and to ensure that the utilization of natural resources is sustainable for the benefit of all Namibians Its objectives include: • To control standards on environmental pollution; • To conduct and promote environmental education, extension and awareness programmes, in partnership with other ministries and organizations.
MEFT - Department of Environmental Affairs	The mandate of this Department includes promoting sustainable development; improving environmental awareness; encouraging democratic environmental planning and management; and facilitating Namibia's participation in regional and global environmental issues, programmes and treaties. It serves as the focal point to many of the environmental conventions that Namibia is party to, such as the UN Conventions on Biodiversity, Climate Change, Desertification and the Basel and Stockholm Conventions.
Environmental Investment Fund of Namibia Board	The Board is responsible for managing the Environmental Investment Fund of Namibia.

Ministry of Agriculture, Water and Land Reform (MAWLR) – Directorate of Agricultural Production, Extension and Engineering Services	The mandate of this Directorate is to • Provide agricultural extension in the form of communication, advisory and training services, • Improve the legal environment in order to improve farming production. This Directorate also houses the Pesticides Registration.
MAWLR - Directorate of Research and Training	This Directorate seeks to: • Support the non-formal training of farmers and farm labourers • Improve the management of research plans, programmes and projects at all levels, and implement research agendas and priorities in line with the needs and demands of farmers; and • Facilitate access to information and appropriate technology for all stakeholders and customers.
MAWLR – Directorate of Veterinary Services	The mandate of this Directorate is to maintain and promote animal health, production and reproduction, and to assure safe and orderly marketing of animals and animal products through animal disease control, import control, veterinary surveillance, epidemiology and extension, diagnostic services and veterinary public health services.
Ministry of Health and Social Services	The functions of this Ministry include: • Overseeing the prevention of the pollution of the atmosphere through enforcing the Atmospheric Pollution Prevention Act • Promoting integrated waste management through enforcement of the Public and Environmental Health Act • Ensuring protection of consumers from harmful chemicals in food and other consumer products through the enforcement of the Foodstuffs, Cosmetics and Disinfectants Ordinance 18 of 1979 • Ensuring the health and safety of workers through enforcement of the Regulations Relating to the Health and Safety of Employees at Work of 1997
Office of the Prime Minister	This Office is responsible for overseeing the management of national disasters (these include severe pollution incidents), through enforcement of the Disaster Risk Management Act of 2012.
Ministry of Mines and Energy – Directorate of Mines	The functions of this Directorate include: • Proactively developing and implementing environmental policies to minimise the impact of the exploitation of Namibia's mineral resources • Promoting, monitoring and ensuring safe and healthy conditions for mining industry employees and the public. • Promoting and providing assistance to the small-scale mining sector.
Ministry of Mines and Energy – Energy Directorate	The functions of the Energy Directorate are: • To ensure the provision of sufficient, reliable and equitable energy supplies for Namibia • To ensure that Namibia moves towards the sustainable use of natural resources for energy production and consumption as far as economically possible. The Directorate enforces the compliance of legal requirements of energy legislation and regulations and research new and renewable sources of energy. Its functions include: • Regulating the Petroleum Exploration and Production Industry • Depot fire-fighting and security • Petroleum product import and export control • Rural electrification • The administration of the Solar Electrification Revolving Fund • Bringing electricity to a larger proportion of the population (to more than the 40% of the country's population which currently has electricity) • Promoting the use of new and renewable energy sources such as wind and solar

Ministry of Works and Transport	This Ministry is responsible for • The protection of the sea from pollution by oil and other harmful substances which could be discharged from ships, and also • Ensuring that chemicals and other hazardous substances are transported safely through enforcement of • The Marine Pollution ((Prevention of Pollution from Ships) Act and associated regulations, a. The Prevention and Combating of Pollution of the Sea by Oil Act b. The Namibia Ports Authority Amendment Act of 2000, and c. The Road Traffic and Transport Regulations of 2001
Ministry of Industry and Trade	This Ministry: • Oversees the control of dumping of substances at sea through the enforcement of the Dumping at Sea Control Act, which prohibits dumping of specified substances at sea • Controls all imports and exports • Is responsible for ensuring that EPZ enterprises do not adversely affect the environment
All Local Authorities (these fall under the Ministry of Urban and Rural Development)	The local authorities are responsible for the management of both solid and liquid waste within the local authority jurisdiction.
Ministry of Labour, Industrial Relations and Employment Creation	This Ministry is responsible for the protection of workers through enforcement of the Labour Act and its associated regulations.
Ministry of Fisheries and Marine Resources	This Ministry is responsible for the protection of the aquatic environment (both sea and inland) where fishing takes place.
Namibia Revenue Authority	This department facilitates and controls the movement of all goods involved in international trade hence it has an important role to play in collecting and managing data on chemicals imports.
Namibia Standards Institution (a parastatal under the Ministry of Industry and Trade)	NSI's functions include: • Promoting the use of standards and quality assurance and control in industry, commerce and public sector • Providing conformity assessment services • Certification of systems, product and personnel systems • Inspecting and testing of products and materials.
National Planning Commission	The functions of the NPC are: To spearhead the identification of Namibia's socio-economic development priorities • To formulate short-term, medium-term and long-term national development plans in consultation with regional councils • To develop monitoring and evaluation mechanisms to ensure effective implementation of the national development plans;
Namibia Statistics Agency	The Agency is mandated to collect, produce, analyse and disseminate official and other statistics in Namibia. Statistics which may be collected include natural resources and environmental statistics.
National Commission on Research, Science and Technology	This is responsible for the promotion, co-ordination and development of research, science and technology (RST) in Namibia.
Namibia institute of Pathology (NIP)	This is a state-owned entity with the objective of providing medical laboratory services to both state and private health facilities.

2.2.4.1.1 Challenges affecting government departments in implementing sound management of chemicals

Having many Ministries that are involved (or have potential roles to play) in the management of chemicals, should make chemicals management in Namibia successful. However, the lack of a coordinated approach compromises the effectives of the Ministries' mandates in chemicals management. There is often overlap, which results in lack of clarity of who is supposed to do what. It is important that the functions of the Ministries pertaining to chemicals management be harmonised.

While lack of coordination has been identified as a key challenge in hindering effective implementation of legislation and key ministerial mandates, it is necessary for the process of improving this coordination to be spearheaded by one ministry. The lead ministry for environmental management, the Ministry of Environment, Forestry and Tourism, therefore, needs to take a leading role in improving coordination with other ministries involved in chemicals management.

2.2.4.1.2 Other resources (skills and physical infrastructure) required by government ministries for improved chemicals management

Although the various Government Ministries have different mandates to play in environmental / chemicals management, often they are not able to carry out their individual mandates successfully. This is due, in several cases, to lack of resources of one form or another – whether technical or human. An assessment of some of the resources (in terms of skills and physical infrastructure) which prevent the different ministries from achieving their objectives was conducted, and the results are shown in Table 6. The list is not exhaustive, but it captures some of the more glaring gaps in terms of skills and physical infrastructure that have been identified.

Table 6: Resources needed for improved chemicals management

Ministry Concerned	Resources Needed for Improved Chemicals Management
Ministry of Environment, Forestry and Tourism	Dedicated unit on chemicals management (with adequately trained staff) Training on sound chemicals management
Ministry of Health and Social Services	Capacity building on: monitoring for pesticide exposure, monitoring for workplace exposure to chemicals, and generally monitoring the impacts of chemicals and POPs on human health Capacity building on environmentally sound management of health care wastes and DDT waste through Training Setting up proper physical infrastructure for health care waste management (proper incinerators)
Ministry of Agriculture, Water and Land Reform	Capacity building on conducting inventories of POPs pesticides Constructing and operating proper storage facilities for pesticides in all other regions besides Okahandja Capacitating the laboratories to enable sufficient and appropriate analysis for chemicals management e.g. conducting pesticide residue analysis, identifying unknown chemicals, monitoring for POPs in the environment
Ministry of Labour, Industrial Relations and Employment Creation	Training on appropriate safety and health practices in chemicals management
Ministry of Urban and Rural Development	Training on hazardous waste management among the local authorities Construction of proper hazardous waste management facilities in the rest of the local authorities (so far only two out of 28 local authorities have proper hazardous waste management facilities)

Ministry of Industry and Trade	Training on the importance of utilising voluntary, environmentally sound technologies among commercial and industrial enterprises, in order to ensure that products compete favourably on the international market Capacity building on sound environmental management of hazardous waste Training on non-regulatory mechanisms to promote environmentally responsible industries Training on improved border control for monitoring movement of chemicals
Ministry of Finance	Advocacy on the importance and mechanisms of providing incentives for sound environmental management
Ministry of Home Affairs, Immigration, Safety and Security	Training on implications of poor enforcement of chemicals-related legislation
Ministry of Justice	Training on implications of poor enforcement of chemicals-related legislation
Ministry of International Relations and Cooperation	Training on implications of participation (or lack thereof) in MEAs

2.2.4.2 Relevant activities of industry, public interest groups, professional bodies, and the research sector

a. Industrial Sector

The industrial sector in Namibia has a number of umbrella organisations which represent the interests of their members and also promote (or have the potential to promote) sustainable development practices by their members. These include the Namibian Chamber of Mines, Namibia Uranium Association, the Namibian Chamber of Commerce and Industry, the Namibia Manufacturers' Association as well as CropLife.

i) Namibia Chamber of Mines

The Namibian Chamber of Mines is an associate member of the International Council for Mining and Metals (ICMM), which is focused on improving the sustainable development performance of mining companies19. ICMM's development framework consists of 10 principles which include integrating sustainable development considerations within corporate decision-making processes, implementing risk management strategies based on valid data and sound science, seeking continual improvement of companies' health and safety performance, seeking continual improvement of companies' environmental performance, and facilitating and encouraging responsible product design, use, re-use, recycling and disposal of members' products. The Chamber of Mines aims to, among other things, uphold mining practice in Namibia to the highest standards, observe international conventions and ensure positive development of Namibia's reputation as a mining nation.

ii) Namibia Uranium Association (NUA)

Closely related to the Namibia Chamber of Mines is the Namibia Uranium Association which represents the uranium industry exclusively. Its membership includes all the Namibian uranium mining operations and most of Namibia's leading exploration companies and associated contractors. The Association promotes the industry's adherence to strong sustainable development practices. To this end, the NUA has produced the Health, Environment, Radiation Safety and Security (HERSS) Standards, as well as the HERSS Guidelines and Toolkit.

iii) CropLife Namibia

This is membership-based organisation whose members are distributors of pesticides and agrochemicals. The main activities of the association include:

- Representing members in liaison with Government, Registration Authorities and NGOs
- Managing the Safe Use Initiative
- Managing the awareness of illegal and banned products

[19] http://www.chamberofmines.org.na/index.php?id=238

- Developing training capacity in the country
- Managing the Pest Control training initiative, e.g. conducting the Pest Management Practitioners Training Course

iv) Namibia Manufacturers Association

The Namibia Manufacturers Association (NMA) holds annual awards for its members. In 2013, the Association held the inaugural awards ceremony, where companies which had excelled were given awards in recognition of their excellence. Of the seven categories that were rewarded, one of the categories was for "The NMA Most Environmentally Friendly Manufacturer". Such awards act as incentives to industry and will promote environmentally responsible manufacturing practices.

v) Recycle Namibia Forum (RNF)

This is a grouping made up of several companies working together with the City of Windhoek, to promote and facilitate recycling. It was launched in 2011, following informal and small-scale recycling activities that had been carried out by several companies, which then decided to come together as a forum (MET, 2012). This forum offers opportunities for knowledge exchange, as well as formalizing and increasing recycling in Namibia. The RNF is working on awareness raising and public education, and also advocating for more corporate organisations to join. It has at least 35 full members who include NamiGreen (who are exclusively into e-waste recycling), Rent-A-Drum, Zero Waste Store Namibia, Green Planet, Namibian Uranium Association, B2Gold Namibia and Planaria Recycling, just to name a few.

b. The research sector

Namibia has a number of research institutes which conduct environmental research. Key among these are the Gobabeb Research and Training Institute (GRTI), and the Etosha Ecological Institute.

i) Ecological Research Organisations

The Gobabeb Research and Training Institute is a joint Venture between MEFT and the Desert Research Foundation of Namibia (DRFN). It conducts research in a wide variety of fields including climate, ecology and desert conservation and restoration20. Attached to the GRTI is the Namib Ecological Restoration and Monitoring Unit (NERMU), whose objectives include ensuring close monitoring of changing environmental conditions and planning for the eventual restoration of mining impacted ecosystems. The Etosha Ecological Institute manages research within the Etosha National Park.

ii) Tertiary Education Institutions

The two main tertiary institutions are the University of Namibia (UNAM) and the Namibia University of Science and Technology (NUST). They have conducted limited scientific and industrial research in the past, but the levels of research have increased in recent years. UNAM now has a Zero Emissions Research Initiative (ZERI) and a Multi-Disciplinary Research Centre which are fully operational, while a Regional Centre of Expertise on Sustainable Development is under consideration. NUST now houses a Renewable Energy and Energy Efficiency Institute (REEEI), as well as an Integrated Land Management Institute (ILMI).
While these institutions conduct a lot of critical environmental research, the research does not include chemicals management and chemicals in the environment.

iii) National Commission on Research, Science and Technology

This is a Governmental Institution, but it has been mentioned in this section as it is important in the research sector. While it has been shown that there is very little going on in the area of chemicals research, it is hoped that the National Commission on Research, Science and Technology (NCRST) will be able to promote such research.

[20] http://www.gobabebtrc.org/index.php/about-us

The NCRST was established by the Research, Science and Technology Act of 2004, with the purpose of coordinating and facilitating the development of research, science and technology.

c. Non-Governmental Organisations

Information on the work of NGOs is given in Section 2.3.12.

d. Opportunities for the industrial, research and NGO sectors to play improved roles in chemicals management

Industry Input

There are a number of industrial associations which are conducting various programmes aimed at improved environmental management. While these should be applauded, greater strides towards sustainable environmental management in general, and improved chemicals management in particular, would be made if industry could come together to form an organisation specifically aimed at promoting sustainable environmental practices by industry. In other countries where such organisations exist and operate, marked improvements in sustainable environmental management by industry have been noted.

The concept of Public Private Partnerships (PPP) needs to be encouraged and further promoted. There are vast opportunities for PPPs, particularly in the sphere of sustainable waste management, which would contribute significantly to improved chemicals management in Namibia. Industry should thus be encouraged to consider these opportunities, including through being offered incentives.

Research Sector Input

The tertiary education institutions have the potential to carry out research on chemicals management. Their capacity however needs to be strengthened through partnerships and technology transfer, since they are still in the early stages of development.

2.3 Assessment of POPs issues in Namibia

2.3.1 Assessment of POPs Pesticides (Annex A, Part I)

2.3.1.1 Production

There has never been any manufacture of pesticides (whether POPs or non-POPs pesticides) in Namibia. All pesticides used in Namibia are imported.

2.3.1.2 Import

In Namibia pesticides are imported under permit issued by the Ministry of Agriculture, Water and Land Reform. This is a new and welcome development, as the regulations that enabled this were only passed in December 2020. This system will allow for records to be generated which will make it easier to capture important data required for chemicals management.

During the NIP update process, import data obtained from the Customs Department showed that POPs pesticides have been imported into Namibia in recent years. Quantities imported are shown in Table 7.

Table 7 Quantities of POPs pesticides imported into Namibia in recent years

	Quantity Imported (kg)/ Year				
Pesticide (and HS Code)	**2014**	**2015**	**2016**	**2017**	**2018**
Endosulfan (29203000)					1,601
Chlordecone (29147010)		2,000			
Endrin (29109010)	13		112		
Lindane (29038110)	10,557				
MireX (29038910)		1			
Pentachlorophenol (29081100)	550				2
Pentachlorobenze (29039300)				121	
Hexachlorobenzene (29039290)	1,808				

The continued importation of POPs pesticides into the country is a cause for concern, particularly the importation of 1,601 tonnes of endosulfan nine years after it was listed in the Stockholm Convention. It is, however, hoped that with the coming in of the new pesticides' regulations in 2020, import controls will be tighter, and this problem will be effectively addressed.

2.3.1.3 Export

Namibia has previously exported 208 tonnes of the obsolete pesticide benzene hexachloride (BHC) or lindane, which was identified during the 1998 GTZ funded obsolete pesticides inventory. The BHC was shipped off to the UK for environmentally sound management through incineration. This was done in a collaborative effort between the Government of Namibia, the Government of South Africa, the German Government (through GTZ), and CropLife South Africa.

2.3.1.4 Use

a. Agricultural uses

POPs pesticides are all banned in Namibia and are therefore not used. Historically, though, dieldrin was used for tsetse fly control through annual ground spraying between 1960 and 1985 (Bishi et al, 2013)21. DDT was also used extensively for agriculture from 1946 (UWC, 2001)22, but this use was discontinued after the realisation of the harmful effects of DDT in the 1960s.

Other non-POPs pesticides are used both by the general public (farmers) and also by the Government. The pesticides are available commercially.

Government Usage

The Government uses pesticides on a fairly large scale for spraying against pests that pose a national hazard, such as outbreaks of locust (Brown Locust, Red Locust and African Migratory Locust) and Army Worm (Shiyelekeni, 2000). The Ministry of Agriculture, Water and Land Reform, which is responsible for these control operations that are normally carried out in communal areas, therefore needs to keep emergency stocks of the relevant pesticides.

Storage of Pesticides in Government Stores

The Ministry has a major pesticide store at Okahandja which was built to international standards in order to avoid environmental contamination. Examples of pesticides kept at the store include Deltamethrin, Chlorpyriphos and Trimethrin.

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21 Available on: http://www.google.com.na/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0CCwQFjAC&url=http%3A%2F%2Fwww.au-ibar.org%2Fcomponent%2Fjdownloads%2Ffinish%2F93%2F1702&ei=vAhjVNO_CoqzaY63gJgE&usg=AFQjCNFHTTZ64l0Mbkyw7e119L1wA02JKQ&bvm=bv.79189006,d.d2s

22 Available on http://www.botany.uwc.ac.za/envfacts/facts/farming.htm

There are other much smaller pesticide stores throughout the country where emergency pesticide stocks are stored. These include the one at Bukalo Agricultural Development Centre in Zambezi Region, Tses in Keetmanshop, Salem Agricultural Development Centre in Rundu, Kavango Region, as well as at Gelap-Ost Research Station. These smaller stores are not built to international standards, and in most cases were converted from other uses to become temporary pesticide stores.

b. Other illegal uses - indiscriminate use of pesticides for poisoning animals

Deliberate poisoning of animals using pesticides often occurs in Namibia and throughout other parts of Africa. Namibia has been identified as one of Africa's poisoning hotspots (Santangeli et al, 2016), with the vulture population being endangered because of this scourge.

2.3.1.4 Stockpiles and wastes

The Government of Namibia has conducted at least three inventories of obsolete pesticides, the results of which are given below:

2.3.1.4.1 Government of Namibia Inventory 2019

The Government of Namibia conducted an inventory of obsolete pesticides in 2019, as part of the process of updating the NIP. In that inventory, a total of 69 pesticides stores was visited for data collection. These included MAWLR stores, MHSS stores, Agra facilities, Green Scheme facilities, as well as private farming estates.

The inventory identified 150 different pesticides, weighing 347.8 tonnes. Among the pesticides were two POPs pesticides, namely obsolete DDT weighing 1.49 tonnes, and 20 litres of endosulfan. The presence of such large quantities of obsolete pesticides, in often poor storage sites, poses a risk of exposure for the populace and for the environment. It will be necessary for the Government to facilitate the environmentally sound management of these obsolete pesticides.

Again, the presence of significant amounts of POPs pesticides presents risk of exposure to these chemicals, and strengthens the need to conduct ESM of the obsolete pesticides. The inventory also identified a large number of unidentified pesticides which could very well have been POPs, hence it is important that all obsolete pesticides be disposed of, as these potential POPs could have contaminated other non-POPs pesticides.

Government of Namibia / DANIDA Inventory 2002 -2003
Between 2002 and 2003, the Government of Namibia participated in a regional project, in which it undertook an inventory of obsolete pesticide stocks in Namibia. The project was supported by the Danish International Development Agency (DANIDA). The inventory only looked at obsolete pesticide stocks held by Government and excluded the individual farmers and the private sector. This inventory indicated that there were about 50 tonnes of obsolete pesticides (excluding contaminated associated materials). This figure is likely to be a gross underestimation of obsolete pesticide stocks in Namibia, as it excluded the private players (who are expected to hold huge stocks), and it also excluded contaminated associated materials (which should be included in a proper obsolete pesticides inventory, as these materials will also need to be managed appropriately).

2.3.1.4.2 Government of Namibia / GTZ Inventory 1998

In 1998, the Government of Namibia, in collaboration with GTZ, conducted an obsolete pesticides inventory in the southern part of the country and identified 208 tonnes of BHC, which had been purchased for locust control. The BHC was shipped to the UK, where it was destroyed.

2.3.1.5 Issues of concern pertaining to pesticides management in Namibia

The assessment identified a number of issues which are a cause of concern regarding pesticides management in Namibia. These need to be addressed as a matter of urgency, and include:

a. <u>Inappropriate storage of pesticides (both usable and obsolete)</u>

MAWLR has pesticide stores in most regions in the country. Only one site, the Okahandja store, was constructed and is managed according to internationally acceptable standards. Elsewhere, storage of pesticides is carried out in an

environmentally unsustainable manner, as the other Government pesticide stores throughout the rest of the country are more or less makeshift stores which are not constructed or managed in line with internationally acceptable standards. In these stores, there is generally poor management of the pesticide stocks, there is little or no monitoring, and the stores are manned by untrained staff. These conditions put the surrounding environment and human population at risk of exposure. The Government needs to be proactive in constructing proper pesticide storage sites.

b. Poor management of pesticide waste

The management of pesticide waste, particularly empty containers, poses a huge challenge for Namibia. Companies and individuals are often saddled with empty chemical / pesticide containers and do not know how to properly manage / dispose of them. These empty containers often end up being improperly disposed of or being re-used (especially by individual farmers). The Government should implement programmes for the management of empty containers, such as awareness raising introduction of incentives for the return of containers.

c. Lack of alternatives to pesticides

The agricultural sector continues to rely heavily on pesticides, without concentrating much on seeking to use alternatives. Although some programmes such as the Urban and Peri-Urban Horticulture Initiative promote the use of Integrated Production and Protection Management techniques, these efforts need to be intensified in order to move away from total reliance on pesticides and shift towards Integrated Pest Management (IPM). The National Agriculture Policy of 2015, which promotes the use of IPM approaches, should thus be implemented fully.

2.3.2 Assessment of PCBs (Annex A, Part II)

2.3.2.1 Production

No PCBs production has ever happened in Namibia.

2.3.2.2 Import for environmental sound management

As Namibia has no hazardous waste destruction facility in place, no imports for environmentally sound management of PCB containing equipment have ever taken place at national level.

2.3.2.3 Export for environmental sound management

No PCBs have been exported out of Namibia for the purpose of environmentally sound management. However, at the time of compiling this Updated NIP, the paperwork for exporting three PCB contaminated transformers (which had been identified under the current regional PCB project) was being prepared.

2.3.2.4 Use

Namibia is participating in the regional project to dispose of PCB oils contained in transformers and dispose of capacitors containing PCB in Southern Africa. The project, being funded by the Global Environment Facility, implemented by UNEP and executed by Africa Institute commenced in 2016 and was supposed to run until 2021, but it is still ongoing. One of the reasons which led to the establishment of the project is the Stockholm Convention requirement for all PCB-contaminated transformers to be removed from service by 2025, and for PCB oils and contaminated transformers to undergo environmentally sound management by 2028. The project was therefore established to assist countries to reach these goals.

Under the project, Namibia conducted inventories of PCBs in order to identify PCB-containing equipment, so the PCB oils in transformers, and the PCB capacitors could be collected and disposed of in an environmentally sound manner.

In Namibia, the electricity sector is dominated by the state-owned NamPower, which owns all the country's generation and transmission facilities, as well as some distribution facilities in the rural areas of central and southern Namibia. The bulk of the distribution of electricity is undertaken by the regional electricity distribution companies (REDs) and certain local authorities such as the City of Windhoek, Keetmanshop, Mariental and other smaller towns especially in the south of the country. Currently there are three operational REDs:

a. NORED: Nored is operating in the far northern part of Namibia and covers the area from Opuwo in the North-West to Katima Mulilo in the North-East.
b. Cenored (Central northern RED): Cenored in operating in the Central Northern part of the country and covers areas for Okahandja which is their most southern town to Kamanjab Central North-West town to Grootfontein which is the central North-East town of Cenored to Tsumeb which is their Central North town.
c. Erongored. Erongored is operating mainly in the coastal towns excluding the transmission of electricity to the respective mines at the coast. The Mines are supplied with electricity by NamPower and have their own distribution stations for distributing of electricity to the different plants within their mining operations. The following towns not close to the coastal areas are also under the operations of Erongored: Usakos, Karibib, Omaruru and Uis.

Ownership of transformers and related electrical equipment is therefore divided between NamPower, these REDs, the said local authorities and some of the older, larger mines, which have their own transformers.

The inventory focused on equipment owned by NamPower, City of Windhoek, and the three REDs. The inventory excluded the different town councils and municipalities that are responsible for the purchasing, operating and maintenance of their own equipment in the southern part of the country, where no REDs have been established.

The inventory quantified the number of pieces of equipment at each of the participating entities, and also collected samples for PCB analysis, as shown in Table 7.

Table 8: Equipment inventory in Namibia

Entity	Number in inventory	Number of Oil samples taken
NamPower	747	376
Erongored	167	23
Cenored	127	87
NORED	62	39
City of Windhoek	302	220
Total	1405	745

From the oil samples that were tested for PCB-contamination, 11 transformers were found to be contaminated of which five are decommissioned and six are still in service. Three of the five decommissioned transformers are ready to be shipped for disposal and paperwork for their movement is being processed.

2.3.2.5 Stockpiles and wastes

The on-going regional PCB project has identified PCB-contaminated transformers, which are described in the preceding section. The PCB project also noted that decommissioned transformers are often stored under conditions which pose risk of environmental exposure, as described in the following sections.

2.3.2.6 Issues of concern pertaining to PCBs

A number of issues of concern were raised by the company that conducted the inventory, however, which will need to be addressed.

a. Sale of old untested transformers

Some of the entities are selling off old, pre-1990 transformers as scrap before they have been tested for PCBs. There is need to advise (even using regulatory means such as the Stockholm Convention) that no pre-1990 equipment should be sold until it has been tested for PCB and found to be PCB-free.

b. Need for markings on suspected and confirmed PCB-containing equipment

There is need to put markings on all equipment that is suspected to contain PCBs, and also put different markings on all equipment that has been identified as being PCB-contaminated.

c. Need for inclusion of all electricity distributors on the inventory

The current inventory only focused on five entities that generate / transmit / distribute electricity (and excluded those in the southern part of the country. These excluded entities will also need to be included in the inventory.

The 2014 Namibia NIP also identified some issues of concern pertaining to PCBs management, which still subsist, and still need to be addressed, as follows:

d. Lack of Information on PCB Status of Transformers

There is insufficient knowledge among transformer owners on the PCB-status of their transformers, since some of the transformers have not been tested, and results of some of the tested transformers have not been released. If the PCB-status of a transformer is unknown, that transformer should be treated as possibly PCB-contaminated, in line with the Precautionary Principle. This means that transformers owners are saddled with decommissioned transformers which should be treated as though they were PCB-contaminated. It is imperative that the inventory process be expedited and completed soon, so that window available for disposal under the current project for disposing of PCBs from the Southern African region can be utilised.

e. Poor Storage of Decommissioned Transformers

It was noted that some decommissioned transformers are stored under very poor conditions. Examples of these include the scrapped and out-of-use transformers that belong to NamPower and are stored at Brakwater. Only 35% of the equipment was stored on impermeable surface (cement), while the remainder was placed on bare soil. This manner of storage greatly increases the risk of environmental contamination, especially given the fact that several transformers were found to be leaking. Transformer owners therefore need to improve their storage facilities for decommissioned and non-working transformers, and the Ministry of Environment, Forestry and Tourism should ensure that this is done.

f. Management of Transformers without Oil

In many cases, decommissioned transformers will have had the oil removed from them and will have been kept to be sold to the public as scrap. The Ministry of Environment, Forestry and Tourism prohibits the sale of these transformers to the public, because of the argument that the drained transformers will always have residual oil in the coils, and this residual oil could be PCB-contaminated. This residual oil cannot be removed for testing hence the owners of such transformers are burdened with this waste which they cannot get rid of.

g. Management of PCB-contaminated transformers

Although detailed national PCB inventories have not yet been completed, some transformers have been tested and found to be PCB-contaminated. The owners of these transformers cannot dispose of them, but at the same time, the transformers are taking up valuable space at the companies' premises. The owners of these transformers are thus facing a dilemma of what to do with the transformers. This calls for full participation in the regional project for disposing of PCBs from the Southern African region, so that the transformers can be disposed of.

h. Lack of Awareness of Dangers of PCBs among Policy Makers

Many of the problems faced by transformer owners arise because there are very few Government policies and programmes for improved PCB management. This is as a result of policy makers being unaware of the dangers associated with PCBs, and therefore failing to put in place appropriate policies and programmes. Raising awareness on the dangers of PCBs among policy makers would be one of the fundamental first steps towards improving the management of PCBs in Namibia.

i. Lack of PCB Specific Legislation and Policies

Although some legislation exists for hazardous chemicals management, there is no legislation for the management of PCBs, hence there is no legal compulsion for transformer owners to make concerted efforts to manage their PCBs.

2.3.3 Assessment of POP-PBDEs (Annex A, Part IV and Part V), HBB (Annex A, Part I) and HBCD (Annex A, Part I and Part VII)

An inventory of POP-Polybrominated diphenyl ethers (POP-PBDEs) was conducted in Namibia in 2021, under the NIP Update Project. The purpose of the inventory was to quantify the amounts of POP-PBDEs in Namibia and identify the major issues of concern pertaining to the management of POP-PBDEs.

The inventory focused on quantifying the POP-PBDEs amounts from three sources, namely Electronic and Electrical Equipment / Waste Electronic and Electrical Equipment (EEE/WEEE); the transport sector; and other sources (textiles, furniture, construction materials and carpets). The inventory process was to be conducted at the Tier 1 (preliminary) and Tier 2 (detailed inventory) levels according to the "Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on POPs (draft)" (UNEP, 2021). The inventory was carried out by a multi-stakeholder inventory task team, which had been trained by an international expert.

2.3.3.1 Production

Namibia has never produced POP-PBDEs, HBB or HBCD.

2.3.3.2 Import

Namibia has never imported POP-PBDEs or HBCD as such but is importing potential articles containing it. The total amount pf POP-PBDEs imports should be calculated according to the equation below:

The amount of POP-PBDEs is calculated as follows (see also Figure 6-3):

$$M_{POP\text{-}PBDE;imported\ EEE(j)} = M_{EEE(j);imported} \times f_{EEE(j);second\text{-}hand} \times f_{Polymer} \times (C_{\sum hexa/heptaBDE;Polymer} \text{ and } C_{decaBDE;Polymer})$$

Where:

- $M_{c\text{-}octaBDE;imported\ EEE(j)}$ is the amount of POP-PBDE in imported second-hand EEE(j) in [kg]
- $M_{EEE(j);imported}$ is the amount of imported (new + second-hand) EEE(*j*) in one year [in tonnes] see section 6.3.
- $f_{EEE(j);second\text{-}hand}$ is the share of second-hand EEE(j) among the imports in [weight-%] see Table 23
- $f_{Polymer}$ is the total polymer fraction in EEE(j) in [weight-%] see section 6.3.2 and Table 29
- $C_{POP\text{-}PBDE;Polymer}$ is the content of the ∑hexa/heptaBDE and decaBDE in the total polymer fraction of EEE(j) in [kg/ tonnes] see Table 29

However, total imports could not be calculated for Namibia due to the absence of data on percentage of second hand EEE among the imports.

2.3.3.3 Export

Data on exports of POP-PBDE chemicals and POP-PBDE-containing articles could not be obtained, although any exports are expected to be insignificant since Namibia is a net importer of both EEE and vehicles.

2.3.3.4 Use

2.3.3.4.1 POP-PBDEs from the EEE/WEEE Sector

a. Preliminary Inventory (Tier I level)

The greatest amount of commercial Octabromodiphenyl ether (c-octaBDE), which comprises the POPs hexabromodiphenyl ether and heptabromodiphenyl ether, is found in casings from cathode ray tubes (CRT) computer and TV monitors produced before 2005 (UNEP, 2021). These were therefore the key fractions to be addressed by the POP-PBDEs inventories.

In order to calculate the POP-PBDEs content in CRT casings, the following equation is used:

MPBDE(i) = [Number of CRTs/capitaRegion] x population x 25 kg x 0.3 x [0.47- 1.37 kg of hexa/hepaBDE /tonne and 3.2 to 4.4 kg decaBDE/tonne]

Where

- MPBDE(i) is the amount of POP-PBDEs (i) in [kg] (in Polymer (k) of electrical and electronic equipment (EEE) (j))
- Number of CRTs/capitaRegion estimated for Namibia
- Population is the national population of Namibia;
- 25 kg is the estimated average weight of a CRT monitor, either TV or PC monitor;
- 0.3 is the polymer content of CRT casings: 30% (estimated average);
- 0.00047 to 0.00137 is the range of c-OctaBDE content: 0.47-1.37 kg/tonne for these polymers used in CRT casings.

The number of CRTs per capita was not calculated, as no studies have been done to determine this. An estimate was therefore obtained from the UNEP Toolkit, for countries where CRT/capita values have been calculated (UNEP, 2021). In the Toolkit, CRT/capita values have been calculated for five countries from Asia / Africa, namely Benin, Cote d'Ivoire, Colombia, Ghana and Nigeria. The CRT/capita value for Namibia was estimated by taking the value of the country with the most comparable GDP for the inventory year, 2018, which was Benin. Table 9 shows the CRT / capita values for the five countries, as well as the GDPs.

Table 9: GDPs and CRT/capita values for selected countries

Name of Country	CRT/capita (2010)	GDP current prices USD (2018)[23]
Namibia	--	13,682,062,249
Benin	0.08	14,262,407,012
Colombia	0.30	334,198,000,000
Cote d'Ivoire	0.15	58,011,466,451
Ghana	0.19	67,299,280,679
Nigeria	0.17	397,190,000,000

As the GDP for Namibia was closest to that for Benin, the CRT/capita value for Benin of 0.08 was also used for Namibia.

The Namibia population for 2018 was 2,448,300 persons24.

The equation for calculating POP-PBDEs content in CRT casings in use was thus applied to Namibia, as shown below:
Mhexa/heptaBDE (i) (CRTs) = [0.08] x 2,448,300 x 25 kg x 0.3 x [0.00047 to 0.00137]
= 690.42 to 2012.50 kg
= 0.69 to 2.01 tonnes

The **0.69 to 2.01 tonnes of c-OctaBDEs** contained in **1468.9 tonnes of CRT plastic casings** in use which will need to be managed in the future.

b. Detailed Inventory (Tier II level)

The information shown above is for the preliminary inventory of POP-PBDEs in EEE, and the inventory team intended to use the information to prepare a detailed inventory, in order to calculate the total amount of POP-PBDEs in Namibia. The total amount of PBDEs in EEE was to be calculated as follows:

MPBDE(i) = MEEE(j)x fPolymer(k)x CPBDE(i);Polymer(k)

Where:

- MPBDE(i) is the amount of POP-PBDEs(i) in [kg]
  (in Polymer (k) of electrical and electronic equipment (EEE) (j))
- MEEE(j) is the amount of EEE (j) in [in tonnes] (imported, stockpiled or entering the waste stream)

23 Available on URL: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

24 Available on URL: https://data.worldbank.org/indicator/SP.POP.TOTL

- fPolymer is the total polymer fraction in [weight-%]
- CPBDE(i);Polymer is the content of the POP-PBDEs(i) in the total polymer fraction in [kg/tonne]

Data on fPolymer (i.e. the total polymer fraction in [weight-%]), and CPBDE(i);Polymer (i.e. the content of the POP-PBDEs(i) in the total polymer fraction in [kg/tonne]) were readily available from studies and calculations that have been done elsewhere, and are as shown in Tables 10, 11 and 12 below:

Table 10: Total polymer fractions in the relevant EEE/WEEE in Europe

Category/Article	Total polymer fraction fPolymer[in % by weight]		
	Minimum	Maximum	Mean
ICT equipment without monitors	26%	58%	42%
Consumer equipment without monitors	21%	26%	24%
CRT monitors	13%	38%	30%
CRT-TVs	15%	38%	30%

(Source: UNEP, 2021)

Table 11: c-OctaBDE content in total (mixed) polymers fractions of different WEEE in Europe (concentration ranges in European WEEE Forum countries

Article	c-OctaBDE content in total polymer fractions in [kg/ metric tonne] (COctaBDE;Polymer))		
	Minimum	Maximum	Mean
ICT equipment w/o monitors	0.05	0.4	0.225
CRT monitors	0.14	10.6	2.54
Consumer equipment w/o monitors (1 composite sample)	-	-	0.15
TV CRT monitors	0.05	3.54	0.87

(Source: UNEP, 2021)

Table 12 POP-PBDE (hexa/heptaBDE and decaBDE) content in total (mixed) polymer fractions of different WEEE in Europe

	Category/Article	∑hexa/heptaBDE in plastic fractions [kg/tonne]* ($C_{hexa/heptaBDE;Polymer}$)			decaBDE in plastic fractions [kg/ tonne] ($C_{decaBDE;Polymer}$)		
		Minimum	Maximum	Mean	Minimum	Maximum	Mean
1	Cooling/freezing appliances; washing machines			**<0.05**			**<0.05**
1	Heating appliances			**<0.05**			**0.8**
2	Small household appliances				<0.1	0.5	**0.17**
3	ICT equipm. w/o monitors	0.027	0.22	**0.12**	0.5	1.4	**0.8**
3	CRT monitor casings	0.08	5.7	**1.37**	0.5	7.8	**3.2**
4	Consumer equipment w/o monitors (1 composite sample)	-	-	**0.08**	0.7	0.9	**0.8**
4	TV CRT monitor casings	0.03	1.9	**0.47**	0.8	7.8	**4.4**
4	Flat screens TVs (LCD)	0.008	0.010	**0.009**	1.2	4.3	**2.75**

* RoHS limit for c-octaBDE is 1000 mg/kg or 1 kg/t. The Basel provisional low POPs contents for PBDEs are 1000 mg/kg (1 kg/t) or 500 mg/kg (0.5 kg/t) or 50 mg/kg (0.050 kg/t) (UNEP 2019).

Source: Waeger et al (2010); Hennebert & Filella (2018)

Since fPolymer(k)and CPBDE(i);Polymer(k) were readily available from literature, the data that would need to be collected for the detailed inventory for Namibia would be data on MEEE(j) (i.e. the amount of EEE (j) in [in tonnes]: imported, stockpiled or entering the waste stream). This data was to be obtained by collecting data on:

- Imports of new and second-hand EEE;
- EEE stocks (EEE in use or stored);
- EEE entering the waste stream.

Data on imports of EEE into Namibia was obtained from the Namibia Statistics Agency, but it did not specify whether the imports were brand new or second hand. Data on EEE stocks (in use or stored), and EEE entering the waste stream was to be collected through the use of questionnaires. Questionnaires were therefore prepared for households, institutions and corporates but the return rate was low that the data could not be used.

Data on EEE entering the waste stream was obtained from the Draft WEEE Policy, which indicated that in 2019, Namibia produced 16,000 tonnes of e-waste (Republic of Namibia, 2020). This information, however, did not specify the percentage of that e-waste which was attributed to CRTs, hence could not be used further to develop a more detailed inventory. The Electrical and Electronic Equipment (EEE) Producers Landscape Report – Namibia, of 2021 showed that there are two formal e-waste recycling companies in Namibia. One of the companies reported on quantities of e-waste collected, indicating that it collected 20 tonnes of e-waste in 2018.

While the amount of e-waste collected for recycling is a small percentage of the total amount generated, it is encouraging to note that efforts are being made to manage the e-waste generated in Namibia in an environmentally sound manner. The development of a WEEE policy by the Government is also highly commendable, as it shows that Government has recognised the need to manage e-waste sustainably for the protection of human health and the environment and has taken steps to ensure the sound management of e-waste. The Government is therefore encouraged to ensure that the WEEE Policy is finalized and approved, and relevant steps are taken to implement the Policy.

2.3.3.4.2 POP-PBDEs from the Transport Sector

Commercial-Pentabromodiphenyl ether (c-PentaBDE) was mostly used in polyurethane (PUR) foam (90 – 95%) which was partly used for automotive and upholstery applications (UNEP, 2021). Production of c-PentaBDE occurred between 1970 and 2004, and it is estimated that approximately 100,000 tonnes of c-PentaBDE have been produced in history. Cars, trucks and buses contain the largest volume of POP-PBDEs. The inventory was therefore meant to concentrate on these vehicles, focusing on those that were manufactured between 1975 and 2004.

However, only a portion of the cars produced between 1975 and 2005 worldwide have been treated with c-PentaBDE. It is estimated that about 37% of the production (approximately 37,000 tonnes) has been used in the transport sector (UNEP, 2010a, 2010b). The use of c-PentaBDE also depended on the area where the vehicles were produced, with approximately 90% of c-Penta-BDE having been applied to vehicles produced in the United States/North America (UNEP, 2010a, 2010b). In collecting inventory data for POP-PBDEs in vehicles, it was therefore necessary to collect information on the year of manufacture, and the region of manufacture.

The only inventory data that could be obtained was from the Namibia Statistics Agency indicating the number of vehicles imported into Namibia per year, and this data showed whether the vehicles were private vehicles, trucks or buses. Data on the year of manufacture or the region of manufacture could not be obtained. As a result, it was not possible to calculate the expected quantity of PentaBDEs from vehicles in Namibia.

Although the quantities of PentaBDEs in vehicles could not be calculated during the inventory, information from various sources, including legislation, gives an indication of possible trends in PentaBDE quantities. Government Gazette 3334 of 2004 prohibited the importation of vehicles older than 5 years old and also of left-hand vehicles, (Republic of Namibia, 2004). This means that from 2004, vehicles manufactured before 1999 were no longer allowed to be imported into Namibia. This would also have implied that as from 2004, importation of USA manufactured vehicles into Namibia would have been reduced, since USA-manufactured vehicles are predominantly left-hand vehicles. Government Gazette No. 5293 of 2013 further amended this regulation and prohibited the importation of vehicles older than 8 years (Republic of Namibia 2013). This means that the introduction of the PentaBDE into Namibia would have been significantly reduced from 2004.

Data available on UN Comtrade database25, however, indicated that exports of vehicles from the USA have continued since 2004, with imports of light passenger vehicles peaking from 2007 to 2009, and imports of vehicles for transporting goods peaking from 2013 to 2014. Available information has also revealed that in spite of the ban on older vehicles, they have continued to come into the country as late as 202126. It is therefore necessary to strengthen the enforcement of the legislation which is already in place for prohibiting the importation of potentially POP-PBDE containing vehicles.

Data on management of end-of-life vehicles in Namibia was not available. The Road Traffic and Transport Act of 1999 (which became operational in 2001), requires that once a vehicle becomes unroadworthy, it should be deregistered. However, this Act is silent on how the deregistered vehicles should be managed. The vehicles are normally scrapped, as the scrap metal industry in Namibia is vibrant, but little attention is paid to the polymer fraction which contains POP-PBDEs. There is need to put in place a regulatory framework for managing end of life vehicles, so that the POP-PBDEs from this sector can be managed.

2.3.3.4.3 HBCD from Construction Sector

Data on whether HBCD is used in the construction industry in Namibia could not readily be obtained during the inventory. Data that was obtained was on the disposal of construction / demolition waste. Of the nine local authorities that responded to the inventory, three indicated that construction waste is disposed of in borrow pits to fill /rehabilitate them; four indicated that the waste is disposed of as ordinary waste at the municipal disposal site; one indicated that the waste is disposed of on a separate section of the municipal disposal site so that it can be collected for reuse as necessary, and one did not indicate how the waste is disposed of. If HBCD is indeed being used or has been used as an insulation material in buildings, the waste disposal sites and reclaimed borrow pits could therefore be considered potential hotspots of this POP-PBDE.

2.3.3.4.4 HBCD from Textiles and Furniture

Data on the usage of HBCD in textiles and furniture was not readily obtainable during the inventory. While the local industry is not likely to have used HBCD for the textiles and furniture produced, furniture imported from UK in the past might contain HBCD.

2.3.3.5 Stockpiles and wastes

Specific data on stockpiles and wastes of articles on POP-PBDEs could not be obtained. For EEE, the only data that was available was the amount of EEE that entered the waste stream in 2019, which was given as 16,000 tonnes. The total amount of e-waste which has been produced over the years could not be ascertained. It was however gathered that much of e-waste is kept in the original premises or disposed of in the ordinary municipal disposal sites, hence these sites are expected to be potential hotspots of POP-PBDE contamination. Similarly, data on end-of-life vehicle management could not be obtained, as there is no formal mechanism for collecting this data.

2.3.3.6 Issues of concern pertaining to POP-PBDEs, HBB and HBCD

The inventory of POP-PBDEs in EEE e-waste was able to get data at the Tier I level and could not get data for the in-depth and detailed inventory because budgetary constraints did not allow for the inventory team members to conduct face to face interviews with all possible respondents. It would therefore be necessary to conduct a full scale, in-depth EEE and e-waste inventory, in order to calculate the actual amounts of POP-PBDEs in EEE and e-waste in Namibia. The presence of formal e-waste recycling in Namibia, and the preparation of the e-waste policy in Namibia are positive developments, and efforts should be made to ensure that the Policy is implemented, and eventually made into law.

For the transport sector, the lack of statistical data on vehicles imports and use (by manufacturing year) has not allowed for estimation of c-pentaBDE in vehicles, thus needs to be addressed during the NIP implementation. Still, the existence of legislation prohibiting the importation of old cars is an important factor contributing to environmentall

25 Available on URL: https://comtrade.un.org/data/

26 Available on URL: https://www.namibian.com.na/6216328/archive-read/Importing-cars-older-than-eight-years-prohibited

sound management of POP-PBDEs from the transport sector. It is just necessary to strengthen enforcement of this legislation, and also develop a regulatory framework for the environmentally sound management of end-of-life vehicles in Namibia, in order to ensure that PentaBDE from this sector does not contaminate the environment and put the population at risk of exposure.

2.3.4 Assessment with respect to DDT (Annex B, Part II)

2.3.4.1 Production

No DDT production happens in Namibia.

Import
The quantity of DDT imported into Namibia for the years 2015 – 2017 is shown in Table 13. The current supplier is Hindustan Insecticides Limited (HIL) of India.

Table 13: Quantities of DDT Imported in Recent Years

Year	Quantity of DDT Imported (kg)
2015	70,000
2016	67,000
2017	0

2.3.4.3 Export

No DDT has been exported from Namibia.

2.3.4.4 Use

All the POPs pesticides which were originally listed in the Stockholm Convention have been banned in Namibia, with the exception of DDT, which can only be used for malaria vector control. DDT has been used for malaria control in Namibia since 1965. Spraying was interrupted during the war of independence, which resulted in serious malaria epidemics (UNEP, 2001)27. Spraying was resumed after independence, and only the Ministry of Health and Social Services has the sole mandate for using DDT, under strictly controlled conditions.

2.3.4.4.4.1 Malaria Occurrence in Namibia

Malaria is a major public health threat in Namibia, with 69.8% of the population living in areas where there is risk of malaria transmission (MHSS, 2014). Of the 14 regions in the country, nine are considered to be malaria endemic (with 23 of out of 34 districts being considered malaria endemic). Malaria endemicity is relatively higher in the north-eastern part of the country, decreasing towards the northwest and the south of the country.

2.3.4.4.2 Methods for Controlling Malaria in Namibia

The Government uses a number of methods for dealing with malaria. The primary vector control intervention is Indoor Residual Spraying (IRS) using DDT 75% WP and Deltamethrin 250 WG. The annual spraying cycle is conducted once a year between September and December. For quality control, bioassay testing is conducted annually to monitor the correct application rate of IRS.

In addition to IRS, other methods used to fight malaria include the use of long-lasting insecticide-treated nets (LLINs) which are distributed widely, early diagnosis and treatment and targeted winter larviciding. These form part of the Integrated Vector Management (IVM). A demonstration larviciding project is currently being implemented in five malarious districts selected from 4 regions namely Omusati, Oshikoto, Ohangwena and Kavango East. The project aims to strengthen national capacity for the implementation and scaling up of evidence-based, innovative, diversified and environmentally sound malaria vector control interventions as an additional vector control intervention to achieve malaria elimination by 2022 (WHO, 2021)28. This project also aims to increase the involvement of the community in

27 Available on: http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/POPs/FULL%20PROJECTS%20Folder%20-%20POPs/Regional%20-%20DDT%20Africa%20-%20UNEP/3-7-02%20PDF-B%20DDT%20Africa%20UNEP%20Project.doc

28 Available on URL : https://www.afro.who.int/news/namibia-aiming-eliminate-malaria-through-eco-friendly-preventive-strategies

malaria mosquito control interventions. The Health Ministry is conducting larviciding using the pesticide Temiphos, while the Afro II project is conducting a demonstration larvicing project using Bti.

The Health Ministry has also been distributing LLINs to malaria endemic areas. Universal coverage was done in 2014 where 800,000 LLINs with a four year life span were distributed, but this has been changed to targeted distribution with a total of 24,110 LLINs being distributed in 2018 to cross border traders, and 175,000 LLINs being distributed to population not protected by IRS.

Quantities of DDT Used in Recent Years (2015 – 2017)
As IRS is the major intervention in malaria vector control, quite a lot of DDT has been used for the programme over the years, as shown in Table 14 which gives quantities of DDT imported and used for the years 2015 – 2017, as well as the population at risk.

Table 14: Quantities of DDT Imported and Used in Recent Years

Year	Quantity of DDT Imported (kg)	Quantity of DDT Used (kg)	Population at risk
2015	70,000	67,609	589,901
2016	67,000	34,208	386,759
2017	0	22,929	485,730

Over the three years from 2015 – 2017, there was a decline in the quantity of DDT used, although the number of people at risk did not decline so significantly.

2.3.4.4.4 Mechanisms for Ensuring Safety in DDT Usage

In order to ensure that DDT is used safely, there is awareness raising among communities and households on safety issues pertaining to DDT use. There are also training facilities on insecticide use for disease vector control in the country. There is also testing for vector resistance in the country's entomology laboratory. This laboratory is not yet internationally recognised, though.

2.3.4.5 Stockpiles and wastes

The DDT waste consists of cartons and plastic sachets. The plastic sachets are the ones that contain the actual DDT. The plastic sachets are destroyed in hospital incinerators, while the cartons are burned using improvised trench incineration in the field. In addition to DDT waste, obsolete DDT stocks are also present in the country. Namibia does not have the requisite technology to destroy these stocks in an environmentally sound manner. Currently, the obsolete DDT stocks are stored in the regional/district stores temporarily while waiting to be transported to Okahandja collection point (as this is the only central collection point in the country). It is expected that these stocks will remain at Okahandja until they can be transported to other countries which have the appropriate incineration facilities (MHSS, 2014).

2.3.4.6 Issues of concern pertaining to DDT

a. Continued use of DDT

The fact that DDT continues to be used in public health, despite the known adverse effects, is a cause for concern. There is need to intensify Integrated Vector Management (IVM) technologies in order to reduce reliance on DDT. It is also necessary to conduct research into suitable alternatives, in order to ensure that the use of DDT is eventually eliminated.

b. No system for monitoring exposure to DDT

Currently there is no monitoring of exposure to DDT. The failure to monitor exposure leaves those who come into contact with it in danger of continued exposure, if it should happen that they are being exposed due to proximity. There is need to conduct monitoring for those who conduct the spraying of DDT, as well as the communities where the DDT is sprayed.

c. Improper management of DDT waste

The methods that are currently used to manage the DDT waste (burning the cartons in open trenches and incinerating the plastic sachets in the hospital incinerators) are not environmentally friendly. Burning of waste in the open or in incinerators which do not reach the required temperatures of above 800oC, results in the production of dioxins and furans, which are among the most potent carcinogens known to man. The Ministry of Health and Social Services needs to investigate more environmentally friendly methods of managing the DDT waste.

2.3.5 Assessment of PFOS, its salts and PFOSF (Annex B, Part III)

An inventory of PFOS and related chemicals29 was conducted in Namibia in 2021, under the NIP Update project. The purpose of the inventory was to quantify the amounts of PFOS and related chemicals in Namibia and identify the major issues of concern pertaining to management of PFOS and related chemicals.

The inventory was carried out by a multi-stakeholder inventory task team, which had been trained on how to conduct the inventory by an international expert. The inventory was conducted according to the guidance document: *"Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants"*, developed by UNEP (UNEP, 2015).

The inventory team agreed that the possible, significant sources of PFOS and related chemicals in Namibia were the fire-fighting foams, aviation hydraulic fluids, and the leather industry.

Questionnaires for collecting data were prepared and sent electronically to local authorities, airports, mines, chemical companies, agrochemical companies, paint manufacturers, pulp and paper companies, and electroplating companies. In some cases, team members visited the respective companies to conduct face-to-face interviews. In other cases, data was collected through telephonic interviews.

2.3.5.1 Production

Namibia has never produced PFOS, its salts and PFOSF.

2.3.5.2 Import

Namibia imports PFOS, its salts and PFOSF and also imports potential articles containing it. Data on recent imports was obtained from the Customs Department, and was searched by HS code. The data is shown in Table 15.

Table 15 Quantities of PFOS and its salts imported from 2014 - 2018

Chemical	Quantity imported (kg)/year				
	2014	2015	2016	2017	2018
29043100:-- Perfluorooctane sulphonic acid				2,400	16,580
29043200:-- Ammonium perfluorooctane sulphonate				48	3,000
29043400:-- Potassium perfluorooctane sulphonate				1	
29043500:-- Other salts of perfluorooctane sulphonic acid				150	2,245
29159010:--Other Perfluorooctane sulfonyl acid (PFOs)	998	8,040	5,400	2,982	13,000

2.3.5.3 Export

There have been no exports of PFOS from Namibia.

2.3.5.4 Use

The only use for which PFOS data could be obtained was for fire-fighting foam (FFF), and it was obtained from the mines and the local authorities' fire departments.

29 In this report normally only PFOS is mentioned, which however stands for "PFOS and related substances".

With regard to quantities of fire-fighting foams in stock and used over the years, six local authorities (Windhoek, Walvis Bay, Okahandja, Henties, Mariental and Oranjemund) provided data on the types of FFFs used, which include RLF4, AFFF6%, AFFF3%, and Fire Ade 2000R. Six mines (B2 Gold Otjikoto Mine, Namdeb Diamond, Langer Heinrich Uranium, Navachab Gold Mine Karibib, Rossing Uranium, and Swakop Uranium) also reported using FFF, namely AFFF1%, AFFF3% and AFFF 6%.

The foams in stock at all the mines and local authorities were imported between 2017 and 2021. Although the major producers of fire-fighting foams stopped adding PFOS in 2003, the possibility of these recently purchased fire-fighting foams having PFOS could not be completely ruled out, considering that many of the MSDSs of these foams did not implicitly state that they do not contain PFOS. Again, some of the MSDSs listed contents which did not include any fluorine containing compounds but stated that hazardous decomposition products include fluorinated oxides. Due to this lack of clarity in the MSDSs, the decision was made to assume that the firefighting foams may contain PFOS, even though they were purchased recently.

Major fire events at the mines and local authorities were reported from 2001 to 2021, and hence it is possible that PFOS-containing fire-fighting foams could have been used to extinguish these fires.

Table 16 shows the different types and amount of FFF held in stock and the year of purchase. It also shows the amount of fire-fighting foam used over the years for actual fire events, and for training drills.

Table 16: Quantities of fire-fighting foam and PFOS in stock and used in Namibia

Name of company	Description of Fire-fighting foam	Quantities in stock (in litres)		PFOS Content	PFOS quantity (in kg)	Quantities of FFF used over the years in actual fire events (kg)	Amount of PFOS used in actual fire events (kg)	Quantities of FFF used annually for training (kg)	Amount of PFOS used annually for training (kg)
				Approximate values					
			Year Imported	(mg PFOS/ kg article or preparation					
PFOS-containing fire-fighting foams									
Mines									
B2 Gold, Otjikoto Mine	AFFF 3% (FSD/ AFFF/5274-20)	40	2020	5000-15000	0.2 - 0.6	100 (in 2016)	0.5 - 1.5	50	0.3 - 0.8
Namdeb Diamond	AFFF 6%	475		5000-15000	2.4 - 7.1			25	0.1 - 0.4
			2018						
Langer Heinrich Uranium	AFFF 6% (FSD/ AFFF/5274-20)	200		5000-15000	1.0 - 3.0			50 (in 2019)	0.3 - 0.8
			2019						
Navachab Gold Mine, Karibib	AFFF 6% (F106371 CIK)	3000		5000-15000	15 - 45	1600 (in 2015 and 2020)	8.0 - 24	100	0.5 - 1.5
			2020						
Rossing Uranium	AFFF 6% (F106371C1K)	22000		5000-15000	110 - 330	2300 (in 2005)	11.5 - 34.5	100	0.5 - 1.5
			2019						
Swakop Uranium	AFFF 1%	4,000	2021	5000-15000	20 - 60			2000	10.0 - 30.0
Swakop Uranium	AFFF 6%			5000-15000		50 (in 2015)	0.25 - 0.75	80	0.4 - 1.2
Local Authorities				5000-15000					
Henties Municipality	RLF 4	25	2016	5000 - 15000	0.1 - 0.4				
Mariental Municipality	RLF4 / AFFF	50	2017	5000 - 15000	0.3 - 0.8	200 (2001 - 2021)	1.0 - 3.0		
Nkurenkuru Town Council	N/A								
Oranjemund Town Council	AFFF 6%	325	2016	5000 - 15000	1.6 - 4.9				
	AFFF 3%	175	2013	5000 - 15000	0.9 - 2.6			50	0.3 - 0.8

Name of company	Description of Fire-fighting foam	Quantities in stock (in litres)		PFOS Content	PFOS quantity (in kg)	Quantities of FFF used over the years in actual fire events (kg)	Amount of PFOS used in actual fire events (kg)	Quantities of FFF used annually for training (kg)	Amount of PFOS used annually for training (kg)
				Approximate values					
			Year Imported	(mg PFOS/ kg article or preparation					
Omuthiya Municipality	N/A								
Otjiwarongo Municipality	N/A								
Walvis Bay	RLF 4	950	not given	5000 - 15000	4.8 - 14.2	625	3.1 - 9.4	125	0.6 - 1.8
Total					181.4-544.2		30.3 - 90.8		14.2 - 42.4

Table 15 shows moderate usage of PFOS. However, this is expected to be an underestimate of the total amount of PFOS stocks available, and also the amount of PFOS used over the years, considering that only eight of the 37 urban local authorities in Namibia provided responses for the inventory. The anticipated large volumes of fire-fighting foams (possibly containing PFOS) that are in stock and that have been applied to the environment in extinguishing fires, are a cause of concern, as there is a risk of exposure for the environment and the public, with potential adverse effects on both human health and the environment.

A number of other sources of PFOS and related chemicals had been expected, but data on these possible sources could not be obtained. These expected sources include aviation hydraulic fluids and the leather industry.

2.3.5.5 Stockpiles and wastes

Information on PFOS, its salts and PFOSF stockpiles is presented in Table 15 above. PFOS related waste is being deposited on the landfills, and in some cases, is being left to dry up and evaporate. There is also no testing for PFOS in areas where it has been applied, which opens up potential exposure for members of the public.

2.3.5.6 Issues of concern pertaining to PFOS, its salts and PFOSF

The inventory showed that the major and significant source of PFOS and related chemicals in Namibia are the fire-fighting foams, although this information is not too conclusive considering that some expected sources of information did not provide responses to the questionnaires. The inventory also showed that wastes containing PFOS and related chemicals are not managed in an environmentally sound manner. The following recommendations are therefore proposed:

iv. There is a need to test current fire-fighting foams for PFOS content, because there is an assumption that recently purchased / manufactured fire-fighting foams will be free of PFOS, but the MSDSs that were provided were not very clear on the actual status. Such a situation can therefore provide inaccurate information regarding the levels and use of PFOS-containing fire-fighting foams in Namibia.

v. The wastes from the fire-fighting foams should be managed in an environmentally sound manner by being treated as hazardous waste.

vi. There is need to monitor the environment where PFOS-containing fire-fighting foams have been applied, in order to check for contamination in particular in respect to ground water contamination and drinking water contamination.

vii. There is also a need to monitor groundwater close to waste disposal sites, as this is known to be a common source of PFOS contamination, with the PFOS having leached out from various wastes (particularly household) containing PFOS.

viii. There is need to improve the PFOS inventory and make it as detailed and thorough as possible, so as to get an accurate account of the level of PFOS contamination in Namibia.

2.3.6 Assessment of releases of unintentional produced chemicals (Annex C)

Unintentionally produced Persistent Organic Pollutants (U-POPs) are produced as a result of combustion and other processes involving elevated temperatures, as well as during certain processes which involve the use of chlorinated substances. They are usually emitted from burning and incineration; use of biomass and fossil fuels for energy; metal processing; use of chlorine-containing chemicals; waste disposal; and sewage treatment.

Releases of U-POPs are estimated using the Toolkit for the Identification and Quantification of Releases of Dioxins, furans and other Unintentional POPs developed by UNEP (UNEP, 2013). The UNEP Toolkit divides the processes giving rise to U-POPs releases into 10 main source categories and further divides each main source category into sub-categories. Each source category releases U-POPs to any of six vectors, namely air, water, land, product, residues and bottom ash (bottom ash only receives U-POPs in the case of the main source category 'incineration').

2.3.6.1 Sources of U-POPs in Namibia

An inventory of U-POPs emissions for Namibia was carried out in 2021 to determine the amounts of U-POPs released from the different sources, using the UNEP Toolkit. Those sources of U-POPs which are present in Namibia, and the vectors to which they release PCDD / PCDF are shown in Table 17.

Table 17 Sources of U-POPs present in Namibia

	Main Category	Sub Category	Potential Release Route					
			Air	Water	Land	Product	Residue	Bottom Ash
1	Waste Incineration	c. Medical waste incineration	X	(x)			X	X
		g. Animal carcasses burning	X				X	
2	Ferrous and non-ferrous metal production	a. Iron ore sintering	X				X	
		d. Copper production	X	x			X	
		f. Lead production	X				X	
		g. Zinc production	X				X	
		k. Shredders	X				X	
		i. Thermal wire reclamation and e-waste recycling	X	(x)	x		X	
3	Heat and Power Generation	a. Fossil fuel power plants	X				X	
		b. Biomass power plants	X				X	
		c. Landfill, biogas combustion	X				X	
		d. Household heating and cooking (biomass)	X		(x)		X	
4	Production of Mineral Products	a. Cement production	X				X	
		c. Brick production	X				X	
		f. Asphalt mixing	X		x		X	
		g. Oil shale processing	X				X	
5	Transport	a. 4-stroke engines	X					
		b. 2-stroke engines	X					
		c. Diesel engines	X				(x)	
		d. Heavy oil-fired engines	X				(x)	
6	Open Burning Processes	a. Biomass burning	X	(x)	x		(x)	
		b. Waste burning and accidental fires	X	(x)	x		(x)	
7	Production and Use of Chemical and Consumer Goods	d. Chlorinated aromatic chemicals	x	x	(x)	X	X	
		h. Leather refining		x		x	X	
8	Miscellaneous	a. Drying of biomass	x			x	X	
		b. Crematoria	x				X	
		c. Smoke houses	x			x	X	
		d. Dry cleaning		x		x	X	

		e. Tobacco smoking	x				X	
9	Disposal and Landfills	a. Landfills, waste dumps and landfill mining		x	X			
		b. Sewage and sewage treatment	(X)	x	x	x	X	
		c. Open water dumping		x	x			
		d. Composting			X	x		
		e. Waste oil treatment (non-thermal)	X	x	x	x	X	
10	Identification of Hotspots	b. Production sites of chlorinated organics						
		c. Application sites of PCDD / PCDF containing pesticides and chemicals						
		d. Timber manufacture and treatment sites						
		e. Textile and leather factories						
		f. Use of PCBs						
		h. Waste incinerators						
		i. Metal industries						
		j. Fire accidents						
		k. Dredging of sediments and contaminated floodplains						
		l. Other dumps / landfills of wastes from source groups 1-9						
		m. Kaolin or ball clay sites						

2.3.6.2 U-POPs emissions estimates in Namibia (2021)

A summary of U-POPs releases by source category is shown in Table 18.

Table 18: Summary of U-POPs emissions estimates in Namibia for 2021

	Source Groups	Annual Releases (g TEQ/a)				
Group		**Air**	**Water**	**Land**	**Product**	**Residue**
1	Waste Incineration	6.8	0.0	0.0	0.0	11.0
2	Ferrous and Non-Ferrous Metal Production	0.0	0.0	0.0	0.0	0.0
3	Heat and Power Generation	0.3	0.0	0.0	0.0	0.0
4	Production of Mineral Products	0.0	0.0	0.0	0.0	0.0
5	Transportation	0.0	0.0	0.0	0.0	0.0
6	Open Burning Processes	4.5	0.0	0.6	0.0	0.0
7	Production of Chemicals and Consumer Goods	0.0	0.0	0.0	0.0	0.0
8	Miscellaneous	0.2	0.0	0.0	0.0	0.2
9	Disposal	0.0	0.1	0.0	0.0	21.4
10	Identification of Potential Hot-Spots				0.0	0.0
1-10	Total	11.9	0.1	0.6	0.0	32.7
	Grand Total	45				

2.3.6.3 Comparison of U-POPs emission trends

Since the first U-POPs inventory had previously been carried out in 2014 during the development of Namibia's initial NIP, there was a need to compare the results from the 2014 inventory with the current 2021 inventory, to see if there were any significant changes in emissions. It was possible to compare the two inventories because the 2014 emissions had already been calculated using the 2013 Toolkit. The results for the two inventories are summarised in Table 19. The unit of measurement used is grams of toxic equivalent per annum (g TEQ/annum), which is a measure of the amount of PCDD/PCDF released from the particular processes.

Table 19: Comparison of U-POPs emission trends in Namibia (2014 vs. 2021)

Category	Subcategory / Source	Emission for 2014 Inventory in g TEQ/a	Source Emission as Percentage of total emission for 2014 inventory	Emission for 2021 Inventory in g TEQ/a	Source emission as percentage of total emission for 2021 inventory
Waste Incineration	Medical waste burning	174.03	99.878903	17.810	39.683
	Animal Carcass Burning	0.00039	0.000000	Data not available	-
Ferrous and Non-ferrous metal production	Copper production	Corresponding data not available	-	0.023	0.0507
	Zinc production	Data not available	-	0.009	0.020
Heat and Power generation	Fossil Fuel Power Plants	0.047	0.026974	0.002	0.004
	Landfill, biogas combustion	data not available	-	0	0.000
	Household Heating and Cooking with Biomass	data not available	-	0.348	0.775
Production of mineral products	Cement Production	0.03	0.017218	0.031	0.069
Transportation	4-Stroke Petrol Engines	0.009	0.005165	0.008	0.018
	Diesel Engines	0.013	0.007461	0.032	0.071
Open Burning Processes	Biomass Burning	Data not available	-	1.751	3.901
	Waste Burning and Accidental Fires	0.101	0.057966	3.377	7.529
Production and Use of Chemicals and Consumer Goods		Data not available	-	0.001	0.003
Miscellaneous	Crematoria	Data not available	-	0.001	0.003
	Tobacco Smoking	Data not available	-	0.00042	0.001
Disposal	Landfills and waste dumps	Data not available	-	3.478	7.749
	Sewage / Sewage treatment	0.011	0.006313	18.0072	40.123
Total		**174.24**	**100.00**	**44.88**	**100.00**

Comparison of the results of the two inventories shows that emissions were reduced for the 2021 inventory, as compared to the 2014 inventory. This is most likely due to improved data collection and should not be taken as an indicator that systems have improved.

An analysis of the 2021 inventory results shows that the most significant sources of U-POPs emissions are as shown in Table 20, with sewage treatment and medical waste incineration contributing approximately 40% each of all total emissions. Waste disposal, waste burning and accidental fires, as well as biomass burning also contribute significantly. It is therefore critical to focus on addressing these most significant sources first in order to reduce U-POPs emissions and thus protect the Namibian population. However, it is also critical to keep in mind that there were quite significant gaps in data availability, hence these figures may not give the most accurate picture. It will also be important to keep in mind the sources listed at the bottom of this page, which are present in Namibia, but for which data could not be obtained. Therefore, although this inventory does not give the exact status of sources of U-POPs emissions in Namibia, it does give an important indication of the status quo.

Table 20: Percentage Contributions of Most Significant U-POPs Sources

Sub Category	Total releases from Subcategory (g TEQ/a)	Percentage Contribution
9b. Sewage and sewage treatment	18.0072	40.1231
1c. Medical waste incineration	17.8099	39.6835
9a. Landfills, waste dumps and landfill mining	3.4777	7.7489
6b. Waste burning and accidental fires	3.3790	7.5289
6a. Biomass burning	1.7505	3.9005
3d. Household heating and cooking (biomass)	0.3478	0.7748
5c. Diesel engines	0.0321	0.0714
4a. Cement production	0.0309	0.0688
2d. Copper production	0.0228	0.0507
2g. Zinc production	0.0090	0.0201
5a. 4-stroke engines	0.0082	0.0184
3a. Fossil fuel power plants	0.0018	0.0040
8b. Crematoria	0.0013	0.0029
7d. Chlorinated aromatic chemicals	0.0012	0.0027
8e. Tobacco smoking	0.0004	0.0009
3c. Landfill, biogas combustion	0.0001	0.0003
Total	44.8799	100.0000

Sources of U-POPs which are present in Namibia but for which data was not obtained

1g. Animal carcasses burning
2a. Iron ore sintering
2f. Lead production
2k. Shredders
2i. Thermal wire reclamation and e-waste recycling
3b. Biomass power plants
4c. Brick production
4f. Asphalt mixing
4g. Oil shale processing
5b. 2-stroke engines
5d. Heavy oil-fired engines
7h. Leather refining
8a. Drying of biomass
8c. Smoke houses
8d. Dry cleaning
9c. Open water dumping
9d. Composting
9e. Waste oil treatment

2.3.6.3 Analysis of U-POPs Emissions by Sector

2.3.6.3.1 Main Category 1 – Waste Incineration

Subcategory - Medical Waste Incineration

For the 2021 inventory, information on the amount of hospital waste that is incinerated was obtained (through a questionnaire) from City of Windhoek, which has an incinerator for covering all the health care waste produced from the different health care facilities in Windhoek. Data showed that 12,000 tonnes of hospital waste are incinerated annually at this incinerator, which uses controlled batch process and has good air pollution control systems (APCS).

More data was also obtained for health care waste incinerated in Swakopmund, Usakos and Walvis Bay, from the Namibia Integrated Health Care Waste Management Plan, which gave the amount of waste that was incinerated in these three towns in 2009 as 124.54 tonnes (Republic of Namibia, 2011). According to the document, the amount of waste was expected to increase by 2.5 % per annum, meaning that in 2018, 155.6 tonnes of health care waste would be expected to be incinerated. This amount of waste was expected to be incinerated using a controlled batch process with minimal air pollution control systems, since the majority of incinerators in Namibia are in this state (Republic of Namibia, 2011). The total emission from medical waste incineration was thus calculated to be **18 g TEQ/a,** with 7 g TEQ/a into air and 11 g TEQ/a into residue.

This value is probably much lower than the actual value because besides Windhoek, data was only obtained for three other towns, hence it is expected that the actual value would have been much higher if data for all of Namibia had been obtained. Since the four towns for which data was supplied represent 20.65 % of the total urban population30, it can be assumed that the actual emissions could be at least 85 g TEQ/a. The majority of the waste recorded in this inventory was incinerated at the Windhoek Incinerator which has good pollution abatement in place (and therefore uses low emission factors). Since many of the incinerators in the country are generally not of an acceptable standard (Republic of Namibia, 2011) it means that if the wastes that are incinerated in these other facilities were to be included in the inventory, they would be using much higher emission factors, and the actual emissions would be much higher than even the suggested 85 g TEQ/a.

It is therefore imperative that the Government promote the construction and use of acceptable incinerators at its health care centres, in order to protect its population from the PCDD/PCDF emissions produced from this sector. This needs to be included in legislation.

Subcategory - Destruction of animal carcasses
This activity occurs in Namibia, but data could not be obtained for the 2021 inventory.

2.3.6.3.2 Main Category 2 – Ferrous and Non- Ferrous Metal Production

Subcategory - Iron Ore Sintering

This activity occurs in Namibia, but no data could be obtained on it for the 2021 inventory.

Subcategory - Copper Production

Copper production takes place in Namibia. Data for the 2021 inventory was obtained, through a questionnaire, from Tsumeb Copper Smelter, which is owned by Dundee Precious Metals. The Smelter processed 219,252 tonnes of copper concentrate and produced 45,423 tonnes of blister copper in 2017. The activity rate was taken to be the amount of blister copper produced (45,423 tonnes), and the emission factor selected was for pure primary copper smelters with no secondary feed. The PCDD/PCDF emission was thus calculated to be **0.023 g TEQ/a** into water, which is a low figure.

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30 Data on populations of different towns as a percentage of the national and urban population, is given in Annex 1. This allows one to extrapolate where appropriate, so as to estimate national emissions.

Subcategory - Lead production

While lead processing does take place in Namibia, it only involves production of lead concentrate, which is then exported outside the country for refining. Since the activity rate should be the amount of pure lead produced by refining, emissions could not be calculated as there is no production of pure lead.

Subcategory - Zinc Production

Zinc production takes place in Namibia. Data that was used for calculating emissions from this process was the amount of zinc produced from concentrates at Skorpion Zinc Mine in 2018, which was given as 90,000 tonnes31. The emission factor used was for 'zinc melting and primary zinc production', which is 0.1. The total emission of PCDD/PCDF from this process was thus calculated to be **0.009 g TEQ/a** into air, which is also very low.

Subcategory - Shredders

This activity is practised in Namibia, but data could not be obtained.

Subcategory - Thermal Wire Reclamation

This activity is also practised in Namibia, but data could not be obtained.

2.3.6.3.3 Main Category 3 – Power Generation and Heating

Subcategory - Fossil Fuel Power Plants

(i) Coal-fired Power Plants

Namibia has one coal fired power plant for electricity production, i.e. Van Eck Power station owned by Nampower. The power plant has an installed capacity of 120 MW and mostly acts as a stand-by power plant due to its ageing infrastructure and the high cost of coal (Nampower, 2018). For the 2021 inventory, data was collected from the Nampower 2018 annual report32 which showed that in 2018, the plant generated 21 GWh. This translates to 75.6 TJ/a, and the emissions from this activity were calculated to be **0.001 g TEQ/a** into air and residue, which is very low.

(ii) Heavy Fuel Oil-Fired Power Plants

Namibia has two power plants which use heavy fuel oil to generate electricity. These two plants, namely Anaxis and Paratus are both in Walvis Bay and they have installed capacities of 22.5 MW and 24 MW respectively. Both these plants act as stand-by emergency power stations. Data for the 2021 inventory was obtained from the Nampower 2018 report which showed that in 2018, Anaxis generated 0.15 GWh of energy, which translates to 0.54 TJ/a, and emissions were calculated to be **0 g TEQ/**a into air.

Subcategory - Biomass Power Plants

Biomass power plants are found in Namibia, but data on their energy production could not be obtained for the inventory.

Subcategory - Landfill, biogas combustion

City of Windhoek produces biogas from its sewage treatment plant, and for the 2021 inventory, it indicated that 830,000m3 of biogas were produced. Using the conversion factor of 22 MJ of energy for 1m3 of biogas (IRENA,2016), this translates to 18 TJ/a. The emission factor for this process is 8, from the Toolkit, and calculating the emissions gave a value of **0 g TEQ/a** into air.

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[31] Data available on: https://www.vedanta-zincinternational.com/component/jdownloads/send/22-2018/111-skorpion-zinc-a-jewel-in-the-desert

[32] Data available on URL https://www.nampower.com.na/public/docs/annual-reports/Nampower%202018%20Annual%20Report%2028.01.19-view.pdf

Subcategory - Household heating and cooking

(i) Virgin wood / biomass fired stoves

The use of wood fuel for household heating and cooking is common in Namibia, and data on this activity was obtained from the Fourth National Communication to the United Nations Framework Convention on Climate Change – NC4 (Republic of Namibia, 2020). The report indicated that 255,351 tonnes of wood were used for this purpose in 2015 (which was the most recent year available). This figure was said to be an estimate, since the actual quantities of wood used were not easily obtainable. Using the conversion factor of 1 tonne of wood giving 0.013503 TJ (UNEP, 2013), the total energy production for this activity was calculated to be 3,448 TJ/a. The emissions from this activity were calculated to be **0.345 g TEQ/**a into air.

(ii) Charcoal fired stoves

Namibia produces a lot of charcoal but uses only a small amount. Data on the amount of charcoal used in Namibia was obtained from the Growth Strategy for the Namibian Wood Charcoal Industry and Associated Value Chains (MITSMED, 2016), which indicated that in 2014, Namibia used 1,000 tonnes of charcoal. This report has made the assumption that all that charcoal was used for household heating and cooking. Using the conversion factor of 1 tonne of charcoal producing 0.0295 TJ33, the total energy production was calculated to be 29.5 TJ/a for the 2021 inventory. The emissions for this activity were calculated to be 0.003 g TEQ/a into air.

The total emissions for household heating and cooking were calculated to be **0.349 g TEQ/a** into air.

The emissions from household heating and cooking using biomass were fairly significant, which is a cause for concern as a significant part of the population use this type of fuel. Use of biomass also produces the cancer-causing polycyclic aromatic hydrocarbons (PAHs). The Government needs to ensure that those currently relying on this type of fuel are provided with cleaner sources of energy.

2.3.6.3.4 Main Category 4 – Mineral Production

Subcategory - Cement Production

Data on this activity for the 2021 inventory was obtained from Ohorongo Cement, which is Namibia's biggest cement producer. It indicated that it produces 617,975 tonnes of cement per annum. Since it is a modern plant using the dry process, an emission factor of 0.05 µg TEQ/t to air (for class 4 type systems) was used. The emissions from this activity were calculated to be **0.031 g TEQ/a** into air.

The emissions from cement production were quite low, which is commendable and is due to the fact that the cement plant is using modern production methods. It is recommended that any new cement plants which may want to set up in Namibia, be required to also use modern production methods.

Subcategory - Brick production

This activity takes place in Namibia, but production data could not be obtained.

Subcategory - Asphalt mixing

This activity takes place in Namibia, but data on it could not be obtained for the inventory.

Subcategory - Oil shale processing

This activity takes place in Namibia, but data on it could also not be obtained for the inventory.

2.3.6.3.5 Main Category 5 – Transport

This category has four subcategories, i.e. 4-stroke petrol engines, 2-stroke petrol engines, diesel engines, and heavy oil fired engines. Data for this category was obtained on the quantities of petrol and diesel imported into the country, which were provided by the Namibia Statistics Agency.

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33 Available on URL https://mdgs.un.org/unsd/energy/balance/2013/05.pdf

Subcategory – Emission from 4-Stroke Engine:

The data for this subcategory was the amount of petrol imported into Namibia. Since it was not possible to determine the percentage used for 4-stroke engines and that used for 2-stroke engines, this report allocated all the petrol imported to 4-stroke engines because the greater percentage of vehicles use 4-stroke engines as opposed to 2-stroke engines.

Namibia uses unleaded fuel only, as the use of leaded fuel was prohibited more than 10 years ago. It could not be ascertained, however, whether the vehicles have catalysts or not. It was therefore assumed that half the petrol was used for vehicles with catalysts, while the other was used in vehicles without catalysts.

For the 2021 inventory, the activity data was the amount of petrol imported into the country in 2018, which was 163,360 tonnes. This was divided into 2, to give 81,680 tonnes for that using catalysts and the same amount for that which does not catalysts. The emissions were calculated to be **0.008 g TEQ/a** into air.

The emissions from the use of petrol in 4-stroke engines were quite low, which can be attributed to the fact the petrol being used in the country is all unleaded, which is commendable.

Subcategory – Emission from 2-stroke engines

These engines are used in Namibia on vehicles and machinery such as off-road motorcycles, scooters and chain saws. Since the percentage of petrol they use is much lower than that used for 4-stroke engines, it was thus assumed to be insignificant, and all the petrol used in Namibia was allocated to 4-stroke engines.

Subcategory – Emission from Diesel Engines

Data on diesel engines was obtained from the amount of regular diesel and biodiesel imported into Namibia. For the 2021 inventory, 301,446 tonnes of regular diesel, and 27,336 tonnes of biodiesel were imported into Namibia in the year 2018. The emissions were calculated to be **0.032 g TEQ/a** into air, a figure which was low.

Subcategory – Emissions from Heavy Oil-fired Engines

These types of engines are present in Namibia, but data on the amount of heavy oil used could not be obtained.

2.3.6.3.6 Main Category 6 – Uncontrolled Combustion / Open Burning Processes

Subcategory – Biomass Burning

Data for the 2021 inventory for this subcategory was provided by the Ministry of Environment, Forestry and Tourism, who indicated that 1,122,144 hectares of grassland were burnt in 2018. This was converted to tonnes using the conversion factor 2.4 tonnes of dry matter of fuel consumed per hectare for late dry season savannah woodlands (IPCC, 2006), giving a total of 2,693,138.4 tonnes of grassland. The emissions from this sector were calculated to be **1.751 g TEQ/a** with 1.347 g TEQ into air and 0.404 g TEQ into land.

The emissions from biomass burning were quite high, and this is a cause for concern because ordinary people from all walks of life, particularly those living in rural areas, are exposed to these PCDD/PCDF emissions. There is need to ensure that the frequency and extent of these fires is reduced. This will simultaneously address other environmental challenges such as greenhouse gas emissions.

Subcategory – Waste Burning and Accidental Fires

This category is divided into five classes, namely (i) fires at waste dumps; (ii) accidental fires in houses and factories; (iii) open burning of domestic waste; (iv) accidental fires in vehicles; and (v) open burning of wood (construction / demolition). Data was obtained from the local authorities, with a total of nine local authorities providing data.

(i) Fires at waste dumps

There is a significant amount of burning that takes place at municipal dumpsites. Some of the fires are accidental, while for others, the burning is planned and carried out by the local authority. Of the nine local authorities that provided data for the inventory, two of them indicated that the burning is planned and controlled.

It was not easy to calculate the exact amount of waste burned in these fires at the dumpsites, hence estimates were made. Since the local authorities provided data on the amount of waste deposited at the dumpsite annually, as well as the percentage of the dumpsite burned at any one time, this percentage of the dumpsite burned was multiplied by the total amount of waste burned, to give an estimate of the amount of waste burned at the landfill. The frequency of fires at the dumpsite ranged from daily to monthly.

These figures for the 2021 inventory gave a total of 10,028 tonnes of waste burned at the dumpsites. The emissions from this activity were calculated to be **3.108 g TEQ/a** with 3.008 g TEQ/a into air and 0.100 g TEQ/a into land.

(ii) Accidental fires in houses

For the 2021 inventory, accidental fires were recorded in a total of 326 houses and factories. (It was assumed that the fires were small and burned at least 100 kg in each unit). This is from the nine local authorities that provided data, representing 22 per cent of the total Namibian population (or 52% of the urban Namibian population). The local authorities are Windhoek, Walvis Bay, Otjiwarongo, Okahandja, Mariental, Henties Bay, Oranjemund, Omuthiya and Nkurenkuru. The emissions from this activity were calculated to be **0.260 g TEQ/a** in air and land.

(iii) Open Burning of Domestic Waste

For the 2021 inventory, data on the amount of domestic waste burned in the open was only obtained from one local authority, Nkurenkuru, which indicated that 10 tonnes are burned annually. However, at least one other local authority mentioned that burning of household waste is common, but it was not quantified. The emissions from this activity were calculated to be **0 g TEQ/a** in air and land.

(i) Accidental fires in vehicles

Data on the number of accidental fires in vehicles was obtained from nine local authorities for the 2021 inventory, indicating that accidental fires were recorded in 78 vehicles. The emissions from this activity were calculated to be **0.009 g TEQ/a** with 0.008 g TEQ/a into air and 0.001 g TEQ/a into land.

The total emissions from accidental fires and waste burning were thus calculated to be **3.377 g TEQ/a.**

For the 2021 inventory, the total emissions from waste burning and accidental fires were high, mostly as a result of fires at waste dumps. Given the fact that a number of local authorities actually conduct controlled burning on their dumpsites, this means that awareness of sustainable waste management practices in some of the local authorities is low. There is need to conduct an intensive education and awareness campaign on sustainable waste management among the local authorities, and also provide resources for installing the relevant infrastructure for sustainable waste management.

Accidental fires in houses and factories also caused significant emissions of U-POPs for the 2021 inventory. There is need to improve fire safety and awareness measures among the public so as to prevent fires in the homes and business premises, including factories.

It is important to keep in mind that these emissions are most likely to be an underestimate of the actual emissions, since only 9 urban local authorities (out of a total of 49 urban local authorities in Namibia) submitted data. However, these nine have a combined population representing 52% of the total urban population (or 22 percent of the total national population). Extrapolating the findings to cover the urban population would double the emissions, which reiterates the need to improve waste management systems in Namibia.

The data collection for the 2021 inventory fell short, though, and there is need to improve data collection mechanisms in order for the Government to be able to identify the issues of concern regarding environmental protection, and also monitor the effectiveness of any interventions meant to address the issues of concern.

2.3.6.3.7 Main Category 7 – Production and Use of Chemicals and Consumer Goods

Subcategory - Chlorinated Aromatic Chemicals (per tonne product)

This activity takes place in Namibia, through application of pesticides such as 2,4 D and p-chloranil. Data for the inventory was obtained from the Ministry of Industry and Trade, on import data for the pesticide 2,4 D and its

derivatives. The data indicated that for the year 2018, 7.02 tonnes of the pesticide and / or derivatives were imported into Namibia. In order to select the emission factor for calculating releases from this sector, the class 2 (Mid-Range Technologies) was selected, as Namibia is a middle-income country, and it is expected that technologies for this activity will be mid-range – not low or high end. The releases for this sector for the 2021 were thus calculated to be **0 g TEQ/a** into water and residue.

Emissions for the sector were low for the inventory year. However, there might need to relook at this sector, as the import volumes for the inventory year were almost 20 % of the import volumes for the previous year (2017). There is therefore a need to monitor these imports, as they seem to fluctuate and the emissions of U-POPs from this sector could vary greatly and increase significantly from one year to the next. Whether this is found to be the case or not, though, there is need to address the use of 2,4 D and promote the use of safer alternatives.

Subcategory - Leather Plants

Leather treatment does take place in Namibia, but data on the quantities of leather treated could not be obtained.

2.3.6.3.8 Main Category 8 – Miscellaneous

Subcategory – Drying of biomass
This activity takes place in Namibia, but data could not be obtained.

Subcategory – Crematoria

Cremation takes place in Namibia, with Windhoek being the only city with a crematorium. Data for the 2021 inventory was therefore obtained from Windhoek using a questionnaire, and it indicated that in 2018, a total of 444 bodies were cremated. The crematorium has optimal pollution control, hence the emission factor of 0.4 was used to calculate emissions. The emissions were calculated to be **0.001 g TEQ/a** with 0 g TEQ/a into water and 001 g TEQ/a into residue, which was a very low figure.

Subcategory - Smoke houses

This activity occurs in Namibia, but data could not be obtained during the inventory.

Subcategory – Dry cleaning

Dry cleaning is a common activity in Namibia. Information on this activity, for the 2021 inventory, was only obtained from two dry cleaners, both of which do not keep records of quantities of distillation residue disposed of (which is the main activity data required to calculate PCDD/PCDF emissions from dry cleaning).

The PCDD/PCFD are released into the residue, hence the management of the residue will determine the ultimate fate of the PCDD/PCDF. One of the dry cleaners mentioned that the residue is disposed of into the drain (thus into the municipal sewage system), while the other mentioned that the residue is collected by a recycling company. Information on what the recycling company does with the residue could not be obtained, but it will be important to get this information so as to prevent spreading the PCDD/PCDF wider afield.

The dry cleaners mentioned that 95% of the textiles they handle are normal textiles. It can be assumed that that since only a small percentage of the textiles (5%) handled are heavy, PCP-treated textiles, then the residue will not contain much PCDD/PCDF.

One of the dry cleaners uses perchloroethylene, which the other uses Natural IV (containing sodium carbonate, (ethylene dintrilo) tetrasodium S, potassium carbonate, confidential ingredient, and sodium bisulfate). Although the solvent does not determine the amount of PCDD/PCDF emissions, the use of perchloroethylene contributes to groundwater pollution, and needs to be addressed.

Subcategory – Tobacco Smoking

Data on this activity for the 2021 inventory was obtained from import data supplied by the Namibia Statistics Agency. The data showed that for the year 2018, a total of 2,397 kg of cigars (representing 1,198,500 cigars); as well as 2,112,351 kg of cigarettes, representing (2,112,351,000 cigarettes) were imported into Namibia. The emissions from smoking these units were calculated to be **0.00042 g TEQ/a,** (with 0.00021 g TEQ/a into air and 0.00021 g TEQ/a into residue) a figure which was very low and negligible.

2.3.6.3.9 Main Category 9 – Disposal / Landfill

Subcategory - Landfills, Waste Dumps and Landfill Mining

Data on waste disposal practices was obtained from nine local authorities through the use of questionnaires. The questionnaire was meant to pick whether the wastes were mixed (non-hazardous and hazardous together) or they were separate. Of the nine local authorities, two disposed of their wastes separately, while seven mixed both hazardous and non-hazardous waste. It was noted that a total of 164,000 tonnes of non-hazardous waste, 51,752 tonnes of mixed waste, and 7,200 tonnes of hazardous waste were disposed of in Namibia at the different disposal sites. The emissions from the different types of waste disposed of were 0.828 g TEQ/a for domestic (non-hazardous waste); 2.614 g TEQ/a for mixed wastes; and 0.036 g TEQ/a for hazardous waste. The total emissions from waste disposal were thus calculated to be **3.478 g TEQ/a** with 0.070 g TEQ/a into water and 3.408 g TEQ/a in residue.

The releases of PCDD/PCDF from waste disposal were quite high, mainly due to fact that there is mixed disposal of hazardous and domestic waste at most of the local authorities. If these wastes can be disposed of separately, as shown for Windhoek, this would reduce the U-POPs releases. The Government is therefore encouraged to improve waste management in the local authorities, and establish infrastructure that will enable the separate disposal, and appropriate treatment of hazardous waste.

Subcategory - Sewage / Sewage treatment

There are four main types of sewage treatment systems that apply to Namibia, namely:

i. Urban and industrial inputs without sludge removal
ii. Urban and industrial inputs with sludge removal
iii. Domestic inputs without sludge removal
iv. Domestic inputs with sludge removal

Data for the 2021 inventory was obtained from nine local authorities. Some of these local authorities do not record data on the volumes of sewage treated or the amount of sludge removed, but they provided information on their other sewage treatment practices.

Three local authorities do not treat the sewage, and of those three, one removes any dried sludge as necessary and disposes of it at the municipal dumpsite when completely dry. Of the six that treat sewage, one does not remove sludge, two use it as fertilizer, two just store it, and one is stockpiling while awaiting granulation so that it can be used as fertiliser.

Four local authorities provided data on the amount of sewage that was treated, and of those four, only two provided data on the amount of sludge removed. The total amount of sewage treated at the different treatment plants was 10.937 billion litres for urban industrial inputs with sludge removal (and 80 tonnes of sludge removed under that system), as well as 8.5 billion litres for domestic inputs with sludge removal (and 4.5 million tonnes of sludge removed under that system). Total emissions of PCDD/PCDF for the 2021 inventory were calculated to be 18 g TEQ/a into residue.

Sewage treatment was thus noted to be the biggest source of PCDD/PCDF emissions in Namibia, and this is due to the large quantity of sewage that is treated, and sludge that is removed. While it may not be possible to reduce the sewage that is treated or the sludge that is removed, the emissions can be managed by ensuring that the sludge is managed sustainably, possibly through incineration.

It is worthy to note that this value is an underestimation of the actual emissions, since only 9 local authorities responded to the questionnaires, and more than half of those nine did not provide the relevant numerical data to enable calculation of emissions. It is necessary to capacitate the local authorities in record keeping, and also to ensure that respondents always provide the data necessary to promote sustainable environmental management.

Subcategory - Open water dumping

This activity is carried out in Namibia, but data could not be obtained during the inventory.

Subcategory - Composting

This activity is carried out in Namibia, but production data could also not be obtained during the inventory.

Subcategory - Waste Oil Treatment

This activity is carried out in Namibia, but data could not be obtained during the inventory.

2.3.6.3.10 Main Category 10 –Identification of Hot Spots

Subcategory - Application sites of PCDD/PCDF containing pesticides and chemicals

PCDD/PCDF containing pesticides such as 2,4 D are widely used in Namibia, hence all sites where they are used are expected to be hotspots.

Subcategory - Timber manufacture and treatment sites

Commercial timber production occurs in Namibia, hence it is expected that the areas where the timber is treated will be hotspots of PCDD/PCDF emissions.

Subcategory - Textile and leather factories

The leather industry is vibrant in Namibia, and areas adjacent to leather treatment facilities are likely to be PCDD/PCDF emission hotspots.

Subcategory Use of PCB

The electricity provision sector in Namibia comprises the main power utility Nampower, as well as three Regional Electricity Distributors (REDs), namely NORED, Cenored and Erongored, and also the City of Windhoek. These entities own a large number of electrical equipment such as transformers, and capacitors. A PCB inventory has been done, testing about half of the equipment that is owned by these organizations (745 out of 1,405). While most of the samples tested negative, the fact that the rest of the equipment has not been tested (and also local authorities in the north of the country who manage their own equipment were not included in the inventory), means that areas where this electrical equipment is kept could be hotspots of PCB contamination.

Subcategory - Waste incinerators

Incineration is the main method of disposing of health care waste, and most health care facilities have some form of incinerators. For Windhoek, the local authority has built an incinerator to cater for all the health care waste produced in the city. The areas close to these incinerators are expected to be hotspots of U-POPs. This is especially so because a lot of the incinerators do not have good air pollution abatement technologies.

Subcategory - Metal industries

Metal industries producing zinc, lead and copper emit U-POPs in their operations, hence they are expected to be hotspots of U-POPs emissions.

Subcategory - Fire accidents

Burning is one of the major sources of U-POPs, as was seen from the emissions calculated from 'Open Burning Process'. It therefore follows that any areas where there have been fires are hotspots of U-POPs contamination, and this is a significant source.

Subcategory - Dumps of wastes / residues from Groups 1 – 9

The sources of U-POPs identified in this report all give rise to wastes, which, in many cases, are not managed as hazardous waste. Some are disposed of on the municipal disposal sites, while others are dumped in the environment. All these disposal sites are thus expected to be hotspots of U-POPs emissions.

2.3.6.4 Recommendations for reducing U-POPs emissions

From the findings of the inventory, the following recommendations are made:

a. There is need to promote the construction and use of efficient incinerators, to reduce the emissions from the incineration of health care waste.
b. The Government needs to promote and ensure the use of clean energy sources, especially for the rural population who rely to a great extent on wood for their cooking and heating needs. The PCDD/PCDF emissions from the use of wood fuel were fairly significant, and use of wood fuel also releases carcinogenic polycyclic aromatic hydrocarbons (PAHs), hence a significant percentage of the Namibian population is being exposed to these chemicals.
c. There is need for the Government to strengthen fire management and prevention systems, in order to reduce the frequency and extent of wild grass fires, as the emissions of PCDD / PCDF from grassland fires were significantly high.
d. There is need to improve waste management in the local authorities through
   (i) intensive education and awareness on sustainable waste management practices for the local authorities, as some of them practice environmentally unsustainable waste management methods such as deliberate burning of waste at landfills
   (ii) Provide financial resource for building facilities that will enable separate disposal, and appropriate treatment, of hazardous waste.
e. There is need to improve fire safety and awareness measures among members of the public, in order to reduce the frequency and extent of accidental fires on premises and in vehicles.
f. There is need to introduce and promote Best Available Techniques / Best Environmental Practices (BAT / BEP) in all the sources of U-POPs that are present in Namibia, so as to reduce the emissions from the different sources.
g. The action plans to be developed in the NIP need to take into account the recommendations made, so as to ensure the inventory contributes meaningfully to protecting the people of Namibia from the U-POPs

2.3.6.5 Lessons learned and recommendations for improved U-POPs inventorying

A number of lessons were learned in conducting this inventory, which, if adopted, should improve the process of conducting and / or updating U-POPs inventories. These include:

(a) There is need to improve data collection for inventories required for improved chemicals and environmental management. This can be done by:
i. Identifying all the data requirements required for inventories of POPs, mercury and greenhouse gases.
ii. Requiring the custodians of that data to submit the data to the Environment Ministry on an annual basis – this requirement can be included in environmental legislation, possibly through a Statutory Instrument.
iii. The submitted data should be a housed in a database which can be accessed readily when needed.
iv. The above method will enable inventories to be updated regularly without added cost.
(b) There is need to conduct inventories of contaminated sites.
An inventory of contaminated sites will contribute to the process of identifying sources of U-POPs, identifying populations at risk, and ultimately developing appropriate interventions more effectively and efficiently.

Applying the recommendations listed herein should reduce emissions of U-POPs, and also improve the U-POPs inventory process, enabling it to be done in a cost-effective manner.

2.3.7 Information on the state of knowledge on stockpiles, contaminated sites and wastes, identification, likely numbers, relevant regulations, guidance, remediation measures, and data on releases from sites

2.3.7.1 Stockpiles

Information on POPs related stockpiles is presented, where available, on above sections on individual POPs or POPs groups.

2.3.7.2 Wastes

There has never been a formal inventory of contaminated sites in Namibia, although certain sites are known /

suspected to be contaminated. These include all waste disposal sites and the surrounding areas, since the majority of disposal sites are not lined, and there is mixing of hazardous and non-hazardous wastes at the municipal disposal sites (except for Windhoek which has a separate waste disposal facility), so that most of the municipal disposal wastes end up with hazardous waste. Other contaminated sites are those that have been contaminated by certain POPs such as PCBs at transformer storage sites; PFOS and related chemicals at sites where fire-fighting foams have been used; timber treatment sites; industrial sites where metal processing occurs; and areas where pesticides are used intensively.

The presence of such sites which are known or suspected to be contaminated. results in high risk of exposure for the public, either through contamination of groundwater, or through uptake of contaminants by plants resulting in contaminants entering the food chain. It is this imperative that such sites be identified, documented and prioritized for remediation according to agreed criteria, so that appropriate interventions for remediating can be conducted aptly.

2.3.8 Summary of future production, use, and releases of POPs – requirements for exemptions

It is expected that DDT will continue to be used for malaria vector control, and PFOS will continue to be used in fire-fighting foams and aviation hydraulic fluids. These two uses will thus continue to apply for exemptions in the foreseeable future.

2.3.9 Existing programmes for monitoring releases and environmental and human health impacts, including findings

Currently there are no programmes for monitoring releases as well as environmental and human health impacts. It would be necessary to embark on such programmes as described in Section 2.3.15.

2.3.10 Current level of information, awareness, and education among target groups; existing systems to communicate such information to the various groups

Awareness and understanding of chemicals management issues among members of the public is low in Namibia, just like in many other countries in Africa. Awareness of POPs issues is much lower.

2.3.10.1 Public awareness

Although awareness on chemicals management is low in Namibia, with awareness on POPs issues being even lower, the Government has introduced policies and strategies aimed at increasing awareness on chemicals and hazardous wastes, focusing on issues such as e-waste, solid waste management, fire management and agricultural practices. These policies and strategies, while not directly aimed at POPs, address issues and processes which give rise to POPs emissions and releases, such as solid waste management, e-waste management, fire management, and pesticide management. Their implementation can therefore contribute significantly to improved management of POPs.

a. Awareness on POP-PBDEs

POP-PBDEs in Namibia are commonly found in electronic waste and in the plastic fraction of vehicle interiors. Awareness on the dangers associated with e-waste is low, and the Government recently developed the National Policy on Management of Waste electrical and Electronic Equipment (WEEE) in 2020 in order to, among other things, address this low level of awareness.

The goal of the policy is to ensure the efficient, equitable and sustainable management of WEEE that is safe for the environment, protects human health and propels a circular economy in Namibia. One of the policy objectives is to deliver knowledge, capacity building and awareness of WEEE, and as part of the process of achieving this objective, a Communication and Outreach Plan was developed in 2021 with the intention to provide consumers with knowledge and awareness on the proper disposal of e-waste. This will provide a mechanism for educating the public on the environmentally sound management of e-waste, so as to protect human health and the environment from POP-PBDEs which are present in e-waste.

b. Awareness on sound waste management practices

Poor waste management, including generation and disposal of unsustainably high volumes of waste; as well as waste burning, are some of the activities that produce significant quantities of U-POPs. Poor waste management in Namibia is quite rampant (except for bigger cities such as Windhoek and Walvis Bay). Much of the unsustainable waste management practices is due to lack of awareness of sustainable waste management (Republic of Namibia, 2018).

In order to improve waste management in Namibia, the Government developed the National Solid Waste Management Strategy in 2018. One of the objectives of Strategy is to instil a widespread culture of waste minimization and recycling which should lead to improved waste management, and therefore reduced emissions of U-POPs. In order to achieve this, the Strategy calls for awareness campaigns on waste minimization and recycling to be carried out.

c. Awareness on wildfire management techniques

Uncontrolled wildfires, including in Namibia's protected areas, contribute to environmental emissions of U-POPs. The Government is addressing this vice and in 2016 developed the Fire Management Strategy to contribute to this. The Strategy calls for fire management awareness and education programmes in order to inform relevant stakeholders (park staff, residents, tour operators, visitors and neighbours) about the hazards of wildfires and the use of prevention measures against wildfires.

d. Awareness of proper pesticides usage

Some of the more commonly used chemicals in Namibia are pesticides, which are used by farmers and by ordinary members of the public to manage household and garden pests. Unfortunately knowledge on proper pesticide usage is low and needs to be improved. Although the MAWLR conducts awareness raising for farmers through its Directorate for Extension, these efforts need to be intensified. The Namibia Agriculture Policy of 2015 states that the Government will provide agriculture extension services in the form of communication, advisory and training to all producers, and promote the use of Integrated Pest Management (IPM) approaches. The implementation of this Policy will provide a platform for awareness raising on proper pesticide usage, but this will need to be deliberately pursued.

It is unfortunate that there is no deliberate legislation aimed at raising awareness for the public on chemicals management. The principal act for environmental management, the Environmental Management Act does not specifically talk about the need for raising awareness or educating the public on environmental management. The only awareness raising that it refers to is the provision for the Minister to introduce legislation or make regulations for education, training, awareness raising and capacity building under MEAs.

2.3.10.2 Workers awareness

2.3.10.2.1 Legislative requirements for worker awareness and training

Awareness of chemicals management among workers is much better than among the public, as there is a legislative requirement for the workers to be educated in chemical safety. The Regulations Relating to the Health and Safety of Employees at Work, require employers to regularly prepare and review written policies and programmes on the protection of the health and safety of workers. The programmes to be prepared should include issues of health and safety awareness and training.

The Regulations also mention the need to ensure that workers dealing with asbestos and lead are well informed about the dangers of the substances and are trained in the handling of the substances prior to commencement of employment and periodically thereafter. The training should include, *inter alia*, the contents of the regulations, the potential dangers to health of exposure, the risks associated with exposure, the proper use, maintenance and limitations of safety equipment, and precautions to be taken to protect oneself including use of PPCE.

2.3.10.2.2 Training and awareness raising for workers

There are several organisations that provide training, education and awareness-raising for workers in chemical safety. These include:

- Division of Occupational Health and Safety of the Ministry of Labour, Industrial Relations and Employment Creation which provides technical support for all parties concerned in OHS, educational materials for campaigns and promotions, as well as provides information regarding the OHS regulations.

- NOSA Namibia – this is an accredited training provider which provides training on, among other things, SHE implementation, Hazard Identification and Response, Continuous Risk Assessment, Safety Management Training Course (SAMTRAC), Workplace Risk Assessment Course, OHS Act and Regulations.
- Namibia Employers Federation (NEF) offers targeted awareness training in issues including Chemical Safety and Correct Use of PPE, as well as external training on Hazard Identification and Risk Assessment and Introduction to Occupational Health and Safety, among other courses.
- CropLife offers workers in the pesticide industry, training on sound pesticide management.
- The list is certainly not exhaustive, but simply mentions a few of the organisations providing training on chemical safety for workers.

2.3.11 Mechanism to report under Article 15 on measures taken to implement the provisions of the Convention and for information exchange with other Parties to the Convention

Currently there are no written-down mechanisms to report under Article 15. The required data is sought when the reporting period approaches. It is however proposed to establish mechanisms to ensure that the requisite information is regularly collected so that it can just be compiled and submitted once the report is required.

2.3.12 Relevant activities of non-governmental stakeholders

There are more than 20 NGOs that are involved in environmental management in Namibia34. Most of the NGOs focus on biodiversity, climate change, individual species conservation and research, as well as Community Based Natural Resources Management (CBNRM). The number of NGOs whose activities involve promoting sustainable chemicals management, is much smaller.

One of the more active NGOs which plays an important role in sustainable chemicals management, is the Namibia Organic Association (NOA). This is a membership-based organisation that coordinates and promotes organic agricultural development, networking and marketing in Namibia. The organisation developed and owns the NOA Organic Standard, and the Namibian Organic Mark. The standard provides guidance for growing agricultural produce without the use of many conventional agrochemicals. It only allows the use of a few specified chemicals (NOA, 2010). It also promotes the ecologically sound management of agricultural waste. Since organically grown products are being advocated for in today's society, the presence of such an organisation in the country will contribute to a reduction in the usage of agrochemicals, and promotion of Integrated Pest Management strategies.

Besides environmental NGOs, there are other NGOs such as health related and those dealing with women and children's rights, whose activities can contribute to improved POPs management especially among women and other vulnerable groups. NGOs such as Young Feminists' Movement (YFEM) and Women's Solidarity Namibia promote women's rights and access to health care. They can contribute to raising awareness on gender dimensions of POPs exposure and how to protect oneself. The NGO Shack Dwellers Federation of Namibia can intensify training among their members on measures for preventing and / reducing fires in the shacks.

2.3.13 Overview of technical infrastructure for POPs assessment measurement, analysis, alternatives and prevention measures, research and development – linkage to international programmes and projects

Namibia's laboratory infrastructure was assessed for its capacity to analyse chemicals in general and POPs in particular. The laboratories were divided into two categories – the environmental / analytical laboratories, as well as the public health laboratories. The assessment of laboratory infrastructure was conducted during the development of the initial NIP in 2014, and on assessing them during the current NIP, it was noted there has been little change since then.

2.3.13.1 Environmental / Analytical Laboratories

Four laboratories were assessed for a number of parameters, in order to get an idea of the technical capacity of the Namibian laboratory system to undertake the various types of analyses for chemicals management. These were the Analytical Services Agricultural Laboratory under Ministry of Agriculture, Water and Land Reform; the Materials Testing Institute of the Namibia University of Science and Technology, the Analytical Laboratory at the University of Namibia, as well as the Geochemistry Laboratory of the Ministry of Mines and Energy.

[34] http://travelnewsnamibia.com/archives/conservation-magazine/the-importance-of-ngos-in-conservation/#.U7UA10Cl2_I

The parameters that were assessed included:

- The scope of analyses carried out by the laboratory;
- The clientele serviced;
- The status of ISO 17025 Certification;
- The presence of good laboratory practices (GLP);
- The use of internationally recognised protocols; and
- The availability of programmes for cooperation with other laboratories.

The findings are shown below:

Scope of Analyses

Two of the laboratories carry out analyses to determine quality of chemicals, conduct residue analysis, identify unknown chemicals, monitor chemical contamination in water, monitor chemical contamination in the soil, monitor for workplace exposure to chemicals, and monitor for POPs in the environment. The other two do not conduct such a wide range of analyses – one specialises in analysing geological materials, while the other specialises in other chemical, biological and physical analysis services, detecting GMO presence in food and feed and developing appropriate technologies for new products.

Clientele

Three of laboratories conduct analyses for their own needs, as well as for external clients. This means that they can be utilised to conduct analyses. The fourth one is currently only conducting analyses for its own programmes, but expects to start offering services to external clients in 2015.

ISO 17025 Certification

None of the laboratories are certified to the ISO 17025 Standard, but two are at various stages in the process of getting certification. The other two are not yet in the process of seeking certification.

Good Laboratory Practices (GLP)

Only one of the laboratories has certified GLP. The other three do not have.

Use of Internationally Recognised Protocols

Three of the laboratories use a variety of internationally recognised protocols, including SANS, ASTM, BS, and the use of Certified Reference Materials. The fourth one does not.

Programmes for Cooperation

Three of the laboratories have some form of cooperation with either local or international laboratories, e.g. training of industrial personnel or other laboratory personnel, and rendering assistance to other laboratories for any disputes or quality control. The other one does not.

2.3.13.1.1 Weaknesses in the Analytical Laboratory Infrastructure

Although only four laboratories responded to the assessment, it was revealed during consultations with other stakeholders (who often need to get their samples analysed for different parameters, and thus act as clients for the local environmental laboratories), that some of the laboratories in Namibia had often produced inaccurate results for certain analyses. These clients had therefore stopped sending samples for analysis to local laboratories, and were now using South African laboratories. This implies that the capacity of Namibian laboratories to conduct environmental and chemical analysis is inadequate. There is thus need to build capacity in the Namibian laboratory system, both in terms of equipment and skills

2.3.13.2 Public Health Laboratories

The public health laboratories have an extremely important role to play in chemicals management, as they will be able to test for pesticide exposure, test for workplace exposure to other chemicals, and also test for presence of POPs in humans. If these analyses can be carried out, and the results be made available to policy makers, this would provide the most effective impetus for compelling policy makers to come up with policies and legislation that would adequately protect human health and the environment from POPs and other harmful chemicals.

Namibia has 58 clinical laboratories spread throughout the country, 38 of which are operated by the Namibia Institute of Pathology. The Namibia Institute of Pathology is an autonomous government agency which is mandated with providing laboratory services for the private and public sector on a commercial basis. The remaining 20 clinical laboratories are shared by six main laboratory chains, namely Path Care, Clinpath, CPC, Oshana, High Care, and Maxi Med.

The public health laboratory sector suffers from a lack of skilled laboratory staff (MHSS, 2012b). The distribution of skilled personnel is skewed towards the urban areas. In order to overcome this shortage, programmes have been embarked upon to train laboratory personnel in-country at The Namibia University of Science and Technology for Medical Laboratory Technologists and the National Health Training Centre for the laboratory technicians.

2.3.14 Overview of technical infrastructure for POPs management and destruction

Namibia does not have technical infrastructure for the destruction of POPs. Currently any identified POPs requiring destruction are shipped to suitable disposal facilities abroad. So far, paperwork for three PCB-contaminated transformers is being prepared for the contaminated oil to be shipped abroad for disposal. Previously 208 tonnes of BHC were shipped off to Europe for destruction, following their identification and quantification in the 1998 GTZ-sponsored obsolete pesticides inventory.

In terms of infrastructure for the management of sources of POPs releases, there exists some infrastructure for the management of hazardous waste in some of the local authorities, namely Windhoek and Walvis Bay. These two local authorities have facilities for managing hazardous waste, and also have properly engineered landfills which ensure that the releases of U-POPs from municipal wate disposal are minimised. The rest of the local authorities do not have facilities for the management of hazardous waste.

2.3.15 Identification of impacted populations or environments, estimated scale and magnitude of threats to public health and environmental quality, and social implications for workers and local communities

Information on studies that have been conducted to assess the impacts of POPs on the Namibian population and environment is very scanty. Data was only obtained for one study in which blubber from fur seals (Arctocephalus pusillus pusillus) in Cape Cross, Namibia was analysed for toxaphene, dieldrin, chlordane, DDTs and HCHs (Vetter et al, 1999). DDT and its metabolites were detected in all the samples with varying concentrations and p,p'-DDT recording 80% dominance of the total DDT burden. Toxaphene and dieldrin were detected in significant concentrations in all the samples analysed with concentration ranges of 10–97 µg/kg and 4–36 µg/kg respectively, while chlordane ranged from 3 to159 µg/kg. In view of the findings, it was concluded that consuming fish from Cape Cross in Namibia may pose serious health risk since DDT and its metabolites were found in concentrations above the FAO stipulated limits (FAO, 1983).

The lack of information on impacted populations and environments in Namibia is a cause for concern that needs to be addressed, especially given the fact Namibia does have POPs in the form of PCBs, POP-PBDEs in e-waste and from the transport sector, PFOS, DDT which is used for malaria control, and U-POPs which are released from various processes. Also, various POPs pesticides were historically used for agriculture and tsetse control. As a result, it is likely that areas where POPs were used or are currently being used or disposed of are contaminated.

It is necessary to identify sites which are contaminated by POPs and other hazardous chemicals, then develop and implement environmental monitoring and remediation problems. In addition, there will be need to identify populations that are at risk of exposure to POPs, and also develop and implement health monitoring programmes to identify and assist those that have been impacted. Populations at risk include those

- living in areas where DDT is sprayed for malaria control
- living in areas where POPs pesticides were historically sprayed for agriculture, malaria control, or tsetse control
- living close to suspected POPs-contaminated sites
- living close to waste disposal sites
- living close to transformer and PCB storage areas
- living in intensive agriculture areas
- living close to industrial areas
- living in the vicinity of hazardous waste disposal sites
- who work with pesticides
- who work with electrical transformers
- who spray DDT under the Indoor Residual Spraying (IRS) programme for malaria control
- who work in industries where Unintentional POPs are produced
- who work with hazardous chemicals and wastes
- who have worked for pesticide companies

All these populations need to be included in a POPs monitoring programme so that they can be trained on how to reduce exposure, and also tested to determine whether they have been impacted so that appropriate measures for managing the impacts can be implemented.

2.3.16 Details of any relevant system for the assessment and listing of new chemicals

There is a registration system for assessing and registering new pesticides, through the Amendment Regulations on Registration of Fertilizers, Farm Feeds, Sterilising Plants And Agricultural Remedies of 2020. There is also a system, under the Foodstuffs, Cosmetics and Disinfectants Ordinance 18 of 1979, for assessing and analysing new foodstuffs, cosmetics and disinfectants to be imported or sold, but the depth of assessment is not as comprehensive as that for pesticides. There is no system for assessing any other chemicals besides the ones mentioned above. There is need to put in place a system for assessing new chemicals to be imported or produced, so that any potential adverse effects can be identified and necessary mitigation measures be put in place.

2.3.17 Details of any relevant system for the assessment and regulation of chemicals already in the market

A regulatory system for assessing and regulating chemicals in the system exists specifically for pesticides, but not specifically for other chemicals. There is need to put in place such a system for other chemicals such as industrial and other hazardous chemicals, as well as cosmetics.

2.4 NIP Implementation status

Namibia acceded to the Stockholm Convention in June 2005. It prepared its initial NIP in 2014, and has conducted a number of activities as part of the process of implementing the NIP. The activities are shown in Table 21, which shows the issues identified in the initial NIP, the objectives that were set, and progress in implemented the objective.

Table 21 Progress in implementation of the 2014 NIP

	Issue Identified	Objectives for Addressing Issue	Comment on Progress
General Chemicals Management Issues			
1.	Lack of Awareness of Chemicals Management Issues	To develop and implement a communications strategy for chemicals management issues in two years **(Article 10)**	An E-waste policy was drafted in 2020, and it has an accompanying Communication and Outreach Plan that was prepared in 2021 for raising awareness on e-waste management
2.	Lack of Coordinated Approach to Chemicals Management Issues	To develop and implement mechanisms for coordinating chemicals management issues in two years **(Article 3)**	Not yet implemented
3.	Poor Legal and Administrative Infrastructure for Chemicals Management	To improve the legal and administrative infrastructure for chemicals management, including establishing a Chemicals Management Unit in the Ministry of Environment and Tourism, in one year **(Article 3)**	New laws have been passed / operationalised such as i. Amendment to the pesticide regulations has been passed and is now operational ii. Public and Environmental Health Act has been passed and operationalised
4.	Poor Enforcement of Existing Laws	To improve enforcement of existing environmental and chemicals-related legislation in one year **(Article 3)**	Not yet implemented
5.	Ineffective Systems for Chemicals Data Management	To develop a chemicals information management strategy in one year **(Article 10)**	Not yet implemented
6.	Lack of Project Sustainability after Project Termination	To develop mechanisms for ensuring project sustainability in one year **(Article 3)**	Not yet implemented
7.	Insufficient Application of Non-Mandatory Mechanisms for Improved Environmental / Chemicals Management	To develop a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management in two years **(Article 3)**	Not yet implemented
8.	Lack of Research in Chemicals Management Issues	To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least one research institution every two years **(Article 11)**	Not yet done formally
9.	Inadequate Technical Infrastructure for Chemicals Management	To capacitate at least 25 percent of the Namibia analytical laboratories with requisite equipment and skilled manpower in three years **(Article 11)**	Data on any capacitation of labs since the first NIP in 2014, could not be obtained during the NIP Update process
Pesticides			
1.	Ineffective Legislation for Pesticide Management	To finalise the proposed new pesticides legislation in one year **(Article 3)**	Pesticides regulations were amended and amendments are now in force. The new Pesticides Act is still under development

2.	Lack of Awareness of Proper Pesticide Management Practices	To develop and implement an awareness raising programme for proper pesticide management in two years, drawing from the Chemicals Communications Strategy mentioned under Category A **(Article 10)**	Not yet implemented
3.	Lack of Knowledge on Exact Quantities and Locations of Obsolete Pesticides	To conduct a detailed, national obsolete pesticides inventory in 18 months **(Article 6)**	An inventory was done, but the final report is yet to be produced
4.	Poor Management of Obsolete Pesticides and Pesticide Waste	To implement environmentally sound management of obsolete pesticides and pesticide waste in three years **(Article 6)**	Not yet implemented
5.	Lack of Alternatives of Pesticides, Including DDT	To build national capacity for Integrated Pest Management in three years **(Article 3)**	Not yet implemented
DDT			
1.	Continued Use of DDT for Malaria Vector Control	To implement Integrated Vector Management programmes for malaria control in order to reduce reliance on DDT in five years **(Article 3)**	There is winter larviciding being conducted by the Health Ministry and the Afro II project. The Health Ministry is also distributing LLINs to targeted populations.
PCBs			
1.	Inadequate Knowledge of PCB-status in the country	To conduct a detailed, national PCB inventory in 18 months **(Article 6)**	Inventory has been embarked upon, but not yet complete
2.	Lack of Awareness of PCB Management Issues	To develop and implement an awareness raising programme for PCBs in two years, drawing from the Chemicals Communications Strategy mentioned under Category A **(Article 10)**	Awareness raising has been conducted under the regional PCB disposal project, but not through a formal programme
3.	Poor Management of Decommissioned and Non-Working Transformers	To implement environmentally sound management of decommissioned, non-working and PCB-contaminated transformers in five years(Article 6)	Process is depended upon completion of the inventory
4.	Inadequate Legislation for PCBs Management	To develop PCB-specific legislation in two years **(Article 3)**	Not yet implemented
U-POPs			
1.	Need for Improved Medical Waste Management	To install state-of-the-art incinerators in at least 20% of the hospitals in five years **(Article 5)**	Partly - An incinerator has been established in Windhoek for managing all the healthcare waste produced in Windhoek
2.	Poor Management of Hazardous Waste	To improve hazardous waste management in at least 10 local authorities in five years **(Article 5**)	Not yet implemented
3.	Poor Management of Contaminated Land	To conduct a detailed inventory of contaminated land in Namibia, and initiate site clean-up on at least two areas in three years **(Article 5)**	Not yet implemented

4.	Need for Improved Fire Prevention Measures in Homes	To reduce the incidences of fires in homes by at least 20% annually over a three-year period **(Article 5)**	Not yet implemented
5.	Poor Waste Management	To improve waste management in Namibia in three years **(Article 5)**	In progress – National Solid Waste Management Strategy has been developed
6.	Lack of Application of for Best Available Techniques / Best Environmental Practices (BAT / BEP) among industries	To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of dioxin / furan emissions in three years **(Article 5)**	Data on any new programmes conducted since the first NIP in 2014, could not be obtained during the NIP Update process.
E-waste			
1.	Lack of awareness of e-waste management	To develop and implement awareness raising programme on E-waste management in two years **(Article 10**)	Process has begun – E-waste policy has been drafted and is currently being reviewed by stakeholders
2.	Poor management of E-waste	To improve management of E-waste in one year **(Article 6)**	Process has begun through development of draft e-waste policy
3.	No Legal and Technical Infrastructure for Sound Management of E-Waste	To revise current appropriate legislation and include provisions for the sound management of E-waste in two years **(Article 3)**	Process has begun through development of draft e-waste policy
4.	Insufficient Data on E-Waste	To establish an E-waste monitoring programme in one year **(Article 6)**	Process has begun through development of draft e-waste policy

It is worthy to note that most of the activities that have been implemented (either fully or in part) were initiated under different government programmes aimed at improving chemicals and environmental management, and some of the funding was not sought from the usual sources that provide funding for chemicals MEAs (except for the PCBs project). The funding for a number of the projects was obtained from diverse sources, including the fiscus. These initiatives demonstrate the Government of Namibia's strong commitment to protecting its people and environment from the adverse effects of chemicals.

CHPTER 3 STRATEGIES AND ACTION PLANS ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN

3.1 Policy Statement

Namibia is a Party to the Stockholm Convention on Persistent Organic Pollutants, having acceded to it in June 2005. As a Party to the Convention, it must meet several obligations under the Convention, all aimed at reducing and ultimately eliminating the usage and / or production of POPs.

The preparation of the NIP and its subsequent update shows the Government's commitment to ensuring sound management of POPs in Namibia. The NIP will serve as a blueprint for the best strategy to follow in effectively addressing issues of POPs, since it identifies the key POPs issues which need to be addressed, and also comes up with specific action plans for addressing the key issues through consultative stakeholder driven processes.

3.2 Implementation strategy

The process of updating the NIP involved conducting POPs inventories and infrastructure assessments (legal, institutional and technical infrastructure). From the inventories and infrastructure assessments, issues of concern were identified and prioritized. Since objectives and action plans had been developed in the initial NIP, these were reviewed and re-crafted under the NIP update process, in order to take into account the newly identified issues, as well as the original objectives which had already been achieved, either fully on in part.

The NIP will be implemented by various stakeholders, but most of the projects will be coordinated by the Ministry of Environment, Forestry and Tourism, with guidance from the POPs National Coordinating Committee (NCC). The projects that are to be implemented as part of the NIP will require funding, which is to be sought from both national and international donors.

While some of the projects will require substantial funding, there are several low-hanging fruits that can be taken advantage of and commence implementation even before additional funding is obtained. These include activities that already fall under the mandates of different Ministries, and simply need to be brought to the attention of the relevant stakeholders. MEFT, together with POPs National Coordinating Committee, needs to identify these and start working on them. It is envisaged that implementation will begin in January 2023.

The idea of the low hanging fruit is further strengthened by the fact that a number of the activities that are required in order to reduce the production and / or use of POPs are already catered for in other national programmes. This serves as an assurance that activities which will result in POPs reduction can commence, even before funds for the specific NIP implementation process are secured. Also, the fact that a number of these national programmes are already underway and are being sponsored by Government, demonstrates the high level of commitment that the Government of Namibia has towards ensuring the reduction of POPs.

MEFT and the NCC will need to undertake Monitoring and Evaluation (M and E) of the NIP implementation to determine the level of achievement of the set objectives and measure the impact of the activities.

3.3 Action plans, including respective activities and strategies

The specific action plans are shown in the following sections 3.3.1 to 3.3.17.

3.3.1 Activity: Institutional and regulatory strengthening measures

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To develop and implement mechanisms for coordinating chemicals management issues in two years (Article 3)	Identify key stakeholders in chemicals management issues and their mandated roles	Document outlining key stakeholder in chemicals management	2 weeks	MEFT		-
	Set up inter-ministerial committee for chemicals management, being initially chaired by MEFT and Office of the Prime Minister	Functional inter-ministerial committee with defined ToR	3 months	MEFT and Office of the Prime Minister	80,000	5,000
	Identify areas of overlap as well as issues for chemicals management which have been overlooked administratively (to feed into the legislative review process)	Document outlining areas of overlap and areas which have been overlooked	2 months	MEFT and the inter-ministerial committee	80,000	5,000
	Prepare and implement a strategy for ensuring that chemicals issues are well coordinated with no overlap and no management issues overlooked	Strategy in place	2 months	MEFT and the inter-ministerial committee	1,200,000	75,000
	Establish a forum where stakeholders in chemicals management regularly meet to discuss pertinent and topical issues	Forum in place with defined ToR	3 months	MEFT and the inter-ministerial committee	80,000	5,000
	Conduct regular meetings of forum	Reports of forum meetings	Ongoing	MEFT and the inter-ministerial committee	800,000	50,000
	Sub total				**2,240,000**	**140,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 2: To strengthen regulatory framework for chemicals management in five years (Article 3)	Harmonise chemicals legislation to come up with framework legislation for chemicals management which will address management of chemicals and hazardous wastes, including POPs	New framework legislation on chemicals management in place	4 years	MEFT, inter-ministerial committee on chemicals management and Ministry of Justice	4,000,000	250,000
	Revise existing environmental legislation to, inter alia, make penalties for environmental crimes more deterrent	Revised Acts and new Regulations in place	4 years	MEFT, inter-ministerial committee on chemicals management and Ministry of Justice	2,400,000	150,000
	Ensure the inclusion of mechanisms (during the legislative development process) for ensuring prompt operationalization of each Act	Document detailing how the legislative development process will ensure speedy enactment and operationalization of new legislation	6 months	MEFT, inter-ministerial committee on chemicals management and Ministry of Justice	80,000	5,000
	Build capacity in relevant ministries for enforcing and implementing legislation	Training reports of training sessions for building capacity Reports showing improved enforcement for specified laws	1.5 years	MEFT	1,600,000	100,000
	Raise awareness among policy makers on the importance of local and international chemicals legislation, including implications of not ratifying international legislations	Reports on awareness raising sessions held	1 year	MEFT	800,000	50,000
	Advocate for the signing and ratification of ILO Conventions pertaining to safety of workers in the chemicals industry	ILO Conventions pertaining to safety of workers in the chemicals industry signed and ratified	2 years	MEFT, Ministry of Labour, Ministry of Health	800,000	50,000
	Sub total				**9,680,000**	**605,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 3: To develop and implement a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management in two years (Article 3)	Conduct a baseline survey of the extent of the use of non-mandatory mechanisms for sound chemicals/ environmental management	Report on usage of non-mandatory mechanisms for sound chemicals management	6 months	MEFT and inter-ministerial committee on chemicals management	560,000	35,000
	Define policy objectives	Policy objectives defined and documented	1 month	MEFT and inter-ministerial committee on chemicals management	80,000	5,000
	Conduct policy development process	Draft policy in place	6 months	MEFT and inter-ministerial committee on chemicals management	2,400,000	150,000
	Adopt the policy	Policy adopted and final policy launched	3 months	MEFT and inter-ministerial committee on chemicals management	160,000	10,000
	Disseminate and communicate the policy	Reports on policy dissemination process	6 months	MEFT and inter-ministerial committee on chemicals management	800,000	50,000
	Implement the policy	Increased usage of non-regulatory mechanism	ongoing	MEFT	3,200,000	200,000
	Sub total				**7,200,000**	**450,000**
Objective 4: To strengthen administrative capacity for chemicals management in two years (Article 3)	Establish a Chemicals Management Unit in the Ministry of Environment and Tourism, which will be responsible for implementing the Chemicals-related MEAs	Chemicals Management Unit in place	2 years	MEFT, Ministry of Finance	160,000	10,000
	Sub total				**160,000**	**10,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 5: To finalise development of new pesticides legislation in three years (Article 3)	Advocate for finalization of new law	Minutes of meetings held,	1.5 years	Ministry of Agriculture, Ministry of Justice	480,000	30,000
	Advocate for enactment of new law	New law enacted	1 year			-
	Sub total				**480,000**	**30,000**
Objective 6: To develop PCB-specific legislation in two years(Article 3)	Draft PCB legislation, drawing from the legal review carried out under the regional PCB project	Draft legislation in place	1 year	MEFT, NamPower	800,000	50,000
	Advocate for enactment / passing of legislation	Legislation enacted	1 year	MEFT, NamPower	80,000	5,000
	Sub total				**880,000**	**55,000**
Objective 7: To revise policy framework to include promotion of clean energy for heating and cooking and reduced reliance on wood (Article 5)	Raise awareness among policy makers on the dangers associated with wood as an energy source for cooking and heating	Reports on awareness raising sessions	Five years	MEFT,	480,000	30,000
	Advocate for the National Energy Policy to promote the use of cleaner energy sources for domestic heating and cooking	National Energy Policy revised to promote use of clean energy sources		MEFT, Ministry of Mines and Energy (Energy Directorate)	1,120,000	70,000
	Sub total				**1,600,000**	**100,000**
Objective 8: To finalise the draft e-waste policy in one year (Article 3)	Expediate the process of reviewing the draft E-waste policy	E-waste policy finalised and launched	1 year		480,000	30,000

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 9: Strengthen the legislative framework for e-waste management in three years	Develop e-waste regulations, as required by the draft e-waste policy	E-waste regulations developed and enacted, under Environmental Management Act	3 years	MEFT, Ministry of Information and Communication Technology,	1,600,000	100,000
	Sub total				**2,080,000**	**130,000**
Objectives	**Activities**	**Key performance indicators**	**Time Frame**	**Implementers**	**Resources / Needs**	
Objective 9: To strengthen the legal framework for management of old and end-of-life vehicles in three years (Article 3)	Develop and implement mechanisms for enforcing legislation prohibiting imports of old vehicles	Reports showing reduction in the number of old vehicles imported	1 year	Ministry of Works and Transport, Ministry of Justice, NAMRA, MEFT	800,000	50,000
	Develop new legislation for end-of-life vehicles in two years, addressing aspects such as environmentally sound disposal	Legislation enacted	3 years	Ministry of Works and Transport, Ministry of Justice, MEFT	1,600,000	100,000
	Sub-total				**2,400,000**	**150,000**
Total for 3.3.1					**26,720,000**	**1,670,000**

3.3.2 Activity: Measures to reduce or eliminate releases from intentional production and use

Measures to reduce and eliminate releases from intentional production include promotion of alternatives, phase out processes and awareness raising, and have been catered for under the action plans for the specific POPs.

3.3.3 Activity: Production, import and export, use, stockpiles, and wastes of Annex A POPs pesticides (Annex A, Part I chemicals)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To build national capacity for Integrated Pest Management in two years	Prepare training programme, identification of target group, preparation of training materials and training schedules	Training programme in pace and documented	6 months	Ministry of Agriculture	800,000	50,000
	Conduct training on IPM	Training reports Reduction in use of pesticides	1.5 years	Ministry of Agriculture	2,400,000	150,000
Total for 3.3.3	**Sub-total**				**3,200,000**	**200,000**

3.3.4 Activity: Production, import and export, use, identification, labelling, removal, storage, and disposal of PCBs and equipment containing PCBs (Annex A, Part II chemicals)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
Objective 1: To participate fully in regional PCB disposal project, ensuring all required actions are conducted within the stipulated time (Article 6)	Prepare annual national workplan for participating in the regional PCB project	Annual work plan in place	2 months	MEFT, NamPower, REDs, Committee overseeing the PCB project		Catered for under the SADC regional PCBs disposal project
	Implement all actions according to the workplan	Progress reports indicating that all actions have been implemented according to work plan ESM of PCB oils and PCB capacitors	According to remaining duration of PCB project	MEFT, NamPower, REDs, Committee overseeing the PCB project		Catered for under the SADC regional PCBs disposal project

3.3.5 Activity: Production, import and export, use, stockpiles, and wastes of hexaBDE and heptaBDE (Annex A, Part IV chemicals) and tetraBDE and pentaBDE (Annex A, Part V chemicals) (and HBB, where applicable (Annex A, Part I chemicals))

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: Reduce releases of POP-PBDEs from improper disposal of e-waste	Implement the finalized e-waste policy fully, focussing on establishing financial mechanism for economically viable e-waste management, raising awareness on e-waste management, developing infrastructure for e-waste management, developing technical guidelines and standards for e-waste management	Increase in the amount of e-waste collected for correct recycling Reduction in the quantities of e-waste disposed of incorrectly Reduction in the quantity of e-waste stored in homes and at business premises Increase in understanding of proper e-waste management practices	2.5 years and ongoing	Ministry of Information and Communication Technology, MEFT	42,400,000	2,650,000
Objective 2: Reduce imports of vehicles likely to contain tetraBDE and pentaBDE, i.e. those manufactured before 2004 and in the relevant regions	Strengthen enforcement of regulations prohibiting importation of vehicle older than 8 years through training enforcement personnel strengthening surveillance and monitoring systems	Reduction in imports of pre-2004 vehicles	2 years	Ministry of Works and Transport	1,600,000	100,000
Objectives and activities for inventories of POP-PBDEs are covered under 3.3.10						
Total for 3.3.5					**44,000,000**	**2,750,000**

3.3.6 Activity: Production, import and export, use, stockpiles, and wastes of DDT (Annex B, Part II chemicals) if used in the country

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To implement Integrated Vector Management programmes for malaria control in order to reduce reliance on DDT in five years (Article 3)	Design and develop IVM programme	IVM programme developed and documented	6 months	Ministry of Health, MEFT	160,000	10,000
	Implement IVM programme	Reports on implementation of programme Reduction in use of DDT	2.5 years	Ministry of Health	2,400,000	150,000
Total for 3.3.6	**Sub-total**				**2,560,000**	**160,000**

3.3.7 Activity: Production, import and export, use, stockpiles, and wastes of PFOS, its salts and PFOSF (Annex B, Part III chemicals)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
Objective 1: To reduce releases of PFOS and related substances in Namibia in five years	Develop and implement PFOS phase-out plan	Observed reduction in quantities of PFOS, as noted in inventory updates	2 years	MEFT	4,800,000	300,000
Objectives and activities for PFOS inventories are covered under 3.3.10						
Total for 3.3.7	**Sub total**				**4,800,000**	**300,000**

3.3.8 Activity: Register for specific exemptions and the continuing need for exemptions (Article 4)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
Objective: To register for relevant specific exemptions with the SC Secretariat	Notify Stockholm Convention Secretariat of the need for a specific exemption for continued DDT usage	SC website showing Namibia listed on the register of specific exemptions for DDT	6 months	MEFT, Ministry of Health and Social Services		
	Notify Stockholm Convention Secretariat of the need for a specific exemption for continued use of any PFOS-containing fire-fighting foams which are already in the country	SC website showing Namibia listed on the register of specific exemptions for PFOS-containing fire-fighting foams	6 months	MEFT, Ministry of Industry and Trade		

3.3.9 Action plan: Measures to reduce releases from unintentional production (Article 5)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: Conduct detailed U-POPs inventory	Conduct a comprehensive inventory of U-POPs	Inventory report	1 year	MEFT	640,000	40,000
	Sub total				**640,000**	**40,000**
Objective 2: To install state-of-the-art incinerators in at least 20% of the hospitals in five years	Conduct a detailed assessment of hospital and private incinerators, focussing on: State of the incinerator and how it is operated Quantities of waste that are burned Proximity of incinerator to settlement	Assessment report, including prioritization of incinerators to be upgraded	6 months	MEFT, Ministry of Health	80,000	5,000
	Prioritize incinerators to be upgraded taking into account the criteria in 1. above					
	Upgrade the top 25% of the hospital incinerators to become state-of-the-art by implementing BAT/BEP	25% of assessed hospital incinerators upgraded to become state-of-the-art	4.5 years	MEFT, Ministry of Health	64,000,000	4,000,000
	Sub-total				**64,080,000**	**4,005,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 3: To improve waste management in Namibia in three years	Implement the National Waste Management Strategy, focusing on strengthening the institutional, organizational and legal framework for solid waste management; instilling a culture of waste minimization and expanding recycling systems; enforcing improvements in municipal waste disposal standards; implementing feasible options for hazardous waste management; and implementing formalized solid waste collection and management systems	Improved waste management (as given by agreed indicators)	3 years	MEFT	32,000,000	2,000,000
	Sub total				**32,000,000**	**2,000,000**
Objective 4: To promote environmentally sound sewage treatment facilities in at least five new local authorities in five years)	Conduct awareness raising among local authorities on environmentally sound sewage treatment	Reports on awareness raising sessions held	1 year	MEFT, Ministry of Urban and Rural Development	480,000	30,000
	Develop environmentally sound sewage treatment facilities in at least 3 local authorities in 5 years	3 local authorities with newly improved sewage treatment facilities	4 years	MEFT, Ministry of Urban and Rural Development	32,000,000	2,000,000
	Sub-total				32,480,000	2,030,000
Objective 5: To reduce incidences of uncontrolled veld fires by at least 5% annually over a three year period	Strengthen implementation of the National Fire Strategy for Protected Areas	Reports showing enhanced Strategy implementation Reduction in hectarage burned by veld fires	3 years	MEFT	2,400,000	150,000
	Sub-total				**2,400,000**	**150,000**
Objective 6: To reduce the incidences of fires in homes by at least 20% annually over a three-year period	Develop training material for fire prevention in homes	Training materials in place	6 months	Ministry of Urban and Rural Development, local authorities, MEFT	640,000	40,000

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
	Train communities whose homes are at highest risk of fire, on fire prevention strategies	Reduction in number of houses burnt Reduction in percentage of factory burnt	2.5 years		1,280,000	80,000
	Sub total				**1,920,000**	**120,000**
Objective 7: To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of dioxin / furan emissions in four years	Design training materials for training on BAT / BEP applications	Training materials in place	6 months	MEFT, Ministry of Industry and Trade	480,000	30,000
	Conduct training on BAT / BEP for those industries which are potential sources of dioxin / furan emission	Training reports	1 year		1,600,000	100,000
	Introduce incentives for companies applying BAT / BEP	Incentives documented	1.5 years		1,600,000	100,000
	Monitor the uptake / implementation of BAT / BEP by companies	Reports showing improved implementation of BAT/BEP	1 year		320,000	20,000
	Sub-total					**250,000**
Total for 3.3.9					**137,520,000**	**8,595,000**

3.3.10 Activity: Identification and management of stockpiles, waste and articles in use, including release reduction and appropriate measures for handling and disposal (Article 6)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To finalize the national obsolete pesticides inventory in 1 year	Prepare inventory report	Inventory report in place	6 months	MEFT, Ministry of Agriculture, Consultant	80,000	5,000
	Train relevant personnel on capture and management of inventory data	Training report	2 months	MEFT, Ministry of Agriculture	160,000	10,000
	Capture data and maintain database	Functional database	4 months	MEFT, Ministry of Agriculture	80,000	5,000
	Sub total				**320,000**	**20,000**
Objective 2: To implement environmentally sound management (ESM) of obsolete pesticides and pesticide waste in five years	Contract consultant to facilitate the process	Contract in place and signed	3 months	MEFT, Ministry of Agriculture	800,000	50,000
	Prepare disposal plan, identifying required resources	Disposal plan in place	1 month	MEFT, Ministry of Agriculture	33,600.000	2,100,000
	Source funding for the whole disposal process	Funding secured, MOU in place	1.5 years	MEFT, Ministry of Agriculture		
	Prepare paperwork for disposal process	Paperwork finalised	6 months	MEFT, Ministry of Agriculture		
	Conduct safeguarding of pesticide stocks	Pesticide stocks safeguarded	1 year	MEFT, Ministry of Agriculture		
	Transport stocks to temporary holding shelter while awaiting shipment	Pesticide stocks held in appropriate temporary shelter	6 months	MEFT, Ministry of Agriculture		
	Ship pesticides to appropriate disposal sites and conduct ESM	Reports showing successful ESM	1 year	MEFT, Ministry of Agriculture		
	Sub total				**34,400,000**	**2,150,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 3: To manage DDT waste in an environmentally sound manner in two years	Raise awareness among users of the hazardous nature of DDT waste	Reports on awareness raising sessions held	6 months	MEFT, Ministry of Health	320,000	20,000
	Include DDT waste in the obsolete pesticides inventory	Updated report of obsolete pesticides inventory, showing DDT waste (esp. packaging)	6 months and ongoing	MEFT	80,000	5,000
	Ensure safe storage of any DDT waste that accumulates after ESM of obsolete pesticides	DDT waste stored in appropriate and safeguarded manner	ongoing	Ministry of Health, MEFT	480,000	30,000
	Sub total				**880,000**	**55,000**
Objective 4: To conduct comprehensive POP-PBDEs inventory in EEE and e-waste inventory in one year	Conduct a comprehensive inventory of c-octaBDE in EEE and e-waste	Inventory report	1 year	MEFT	640,000	40,000
	Sub-total				**640,000**	**40,000**
Objective 5: To conduct comprehensive inventory of POP-PBDEs in vehicles and end of life vehicles in 6 months	Conduct inventory of c-pentaBDE in vehicles	Inventory report	6 months	MEFT, Ministry of Works and Transport	400,000	25,000
	Sub total				**400,000**	**25,000**
Objective 6: To conduct a detailed inventory of PFOS and related substances in Namibia	Conduct and regularly update inventory of PFOS and related substances for Namibia	Inventory report	1 year	MEFT	800,000	50,000
	Sub total				**800,000**	**50,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 7: Conduct environmentally sound management of PFOS waste	Manage the PFOS wastes in an environmentally sound manner	Reports showing improved management of PFOS waste	1.5 years	MEFT	32,000,000	2,000,000
	Ensure fire-fighting foam is tested for PFOS content	Reports showing lab analysis results of PFOS in fire-fighting foam	6 months	MEFT	480,000	30,000
	Sub total				**32,480,000**	**2,030,000**
Total for 3.3.10					**69,120,000**	**4,320,000**

3.3.11 Activity: Identification of contaminated sites (Annex A, B, and C Chemicals) and, where feasible, remediation in an environmentally sound manner

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To conduct a detailed inventory of contaminated land in Namibia, and initiate site clean-up on at least two areas in three years (Article 5	Conduct an inventory of contaminated sites in Namibia	Inventory report		MEFT	1,280,000	80,000
	Prioritize contaminated sites for remediation using agreed criteria and develop budget	Report on prioritized sites for remediation	1 year	MEFT	160,000	10,000
	Seek funding for remediation	Funding available – MOU with funder	3 months	MEFT	80,000	5,000
	Identify relevant companies to conduct remediation	Contracts with identified companies	1 year	MEFT	320,000	20,000
	Remediate contaminated sites	Report showing that remediated sites	3 months	MEFT with remediation companies	48,000,000	3,000,000
	Sub-total		**1.5 years**		**49,840,000**	**3,115,000**
Total for 3.3.11					**49,840,000**	**3,115,000**

3.3.12 Activity: Facilitating or undertaking information exchange and stakeholder involvement

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
Objective: To participate in the information exchange process under the SC annually	Compile the relevant information required for the information exchange process and submit to SC	Information submitted to SC and processed through the clearing house mechanism	Annually	MEFT		

3.3.13 Activity: Public and stakeholder awareness, information and education (Article 10)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To raise national awareness on POPs and chemicals management issues through developing and implementing a Chemicals communication strategy in two years (Article 10)	Define communication strategy objectives	Objectives developed	1 week	MEFT and different inter-ministerial committees on chemicals		-
	Conductor stakeholder analysis, including identification of target groups and partnerships	Stakeholder analysis report	1 week	MEFT and different inter-ministerial committees on chemicals		-
	Prepare key messages for the groups (affected communities, different industries, general public etc)	Key messages for different target group prepared	1 month	MEFT and different inter-ministerial committees on chemicals / Consultant	160,000	10,000
	Select appropriate methods and tools for raising awareness, looking at the areas of Communication, Public participation, Information exchange, Training, and Education	Appropriate tools for each target group identified and documented	1 week	MEFT and different inter-ministerial committees on chemicals		
	Develop Monitoring and Evaluation (M&E) mechanisms for the strategy	M&E system in pace and documented	2 weeks	MEFT and different inter-ministerial committees on chemicals		

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
	Identify funding sources for implementing the strategy	Funding partners identified, and MOUs prepared	6 months	MEFT and different inter-ministerial committees on chemicals		-
	Prepare a work plan for implementing the strategy	Workplan in place	2 weeks	MEFT and different inter-ministerial committees on chemicals		-
	Develop information, education and communication (IEC) materials	Awareness raising materials developed	2 months	MEFT and different inter-ministerial committees on chemicals	800,000	50,000
	Implement the communication strategy.	Periodic reports on implementation progress	Ongoing over one year	MEFT and different inter-ministerial committees on chemicals	1,536,000	96,000
	Sub total				**3,296,000**	**206,000**
Objective 2: To develop and implement an awareness raising programme for proper pesticide management in two years, drawing from the Chemicals Communications Strategy mentioned above	Adapt communications strategy to focus on pesticides management	Communication strategy for pesticides	6 months	Ministry of Agriculture, MEFT	32,000	2,000
	Implement pesticides awareness programme, including development of IEC materials	Reports on awareness raising programmes Improved understanding of pesticides management	1.5 years	Ministry of Agriculture, MEFT	1,280,000	80,000
	Sub total				**1,312,000**	**82,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 3: To develop and implement an awareness raising programme for PCBs in two years, drawing from the Chemicals Communications Strategy mentioned in Objective 1	Adapt communications strategy to focus on PCBs management	PCB-specific communication strategy	3 months	MEFT, NamPower, REDs	32,000	2,000
	Implement the PCBs awareness programme	Reports on implementation of awareness raising activities Increased awareness on sound PCBs management	2 years	MEFT, NamPower	6,400,000	40,000
	Sub total				**672,000**	**42,00035**
Objective 4: To develop and implement an awareness raising programme for PFOS in two years, drawing from the Chemicals Communications Strategy mentioned in Objective 1	Adapt communications strategy to focus on PFOS	PFOS-specific communication strategy	3 months	MEFT, Ministry of Urban and Rural Development, Ministry of Industry and Trade, Namibia Airports Company	32,000	2,000
	Implement the PFOS awareness programme	Reports on implementation of awareness raising activities Increased awareness of PFOS sound management	2 years	MEFT, Ministry of Urban and Rural Development, Ministry of Industry and Trade, Namibia Airports Company, local authorities, industry associations	3,200,000	20,000
	Sub total				**352,000**	**22,000**

[35] Budget for PCB awareness raising is lower than for pesticides awareness raising because some activities will already have been carried out under the rei

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	USD
Awareness raising activities for POP-PBDEs are covered under 3.3.5 – objective 1 for implementing e-waste policy						
Awareness raising activities for U-POPs are covered under 3.3.9						
Total for 3.3.13					**5,760,000**	**360,000**

3.3.14 Activity: Effectiveness evaluation (Article 16)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	USD
Objective 1: Evaluate the effectiveness of the SC in achieving its objective of protecting human health and the environment from POPs in Namibia every two years	Develop and implement monitoring programme to assess POPs management in Namibia, focusing on indicators such as reduction in releases of POPs and improvement in management of POPs	Evaluation report for Namibia SC showing the performance of the relevant indicators identified in the monitoring programme	Every two years	MEFT	480,000 every two years	30,000 every two years

3.3.15 Activity: Reporting (Article 15)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To develop a chemicals information management strategy in one year (Article 10)	Develop a chemicals information management strategy which details: Identification of different user needs, including data requirements for reporting to the SC Secretariat The different types of chemicals and POPs data to be collected The data collection tools to be used for collecting the different types of data The frequency of data collection Management of the data, including the databases to be developed and where they will be housed Mechanisms for disseminating the information, and ensuring its accessibility to different user groups	Chemicals Information Management Strategy in place	1 year	MEFT and inter-ministerial committee on chemicals management	640,000	40,000
	Sub total				**640,000**	**40,000**
Objective 2: Meet reporting obligations to the SC secretariat through submitting the required data in a timely manner	Capacitate MEFT staff on reporting on the SC	Training reports showing number of people trained and the content covered	1 month	MEFT, BRS Secretariat	160,000	10,000
	Compile the required statistics as obtained from the data collection processes in the Chemicals Information Management Strategy	Report completed	1 month	MEFT		
	Submit the report to SC secretariat in the required format	Report submitted to SC secretariat and uploaded to website	As required	MEFT		
	Sub total				**160,000**	**10,000**
Total for 3.3.15					**800,000**	**50,000**

3.3.16 Activity: Research, development and monitoring (Article 11)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	**USD**
Objective 1: To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least two research institution every two years	Strengthen science – policy interface	Document outlining mechanisms for strengthening science-policy interface	6 months	MEFT, Ministry of Higher Education	240,000	15,000
	Identify all possible research areas in chemicals management, including hazard and risk assessment (making use of NIP, Minamata Convention Initial Assessment (MIA) and reports to the chemicals conventions). Main areas should be - monitoring of POPs and other chemicals on human health and the environment, - impacts of POPs and other chemicals on human health and the environment, - economic costs of inaction	Document (which is regularly updated) outlining all the possible research areas on chemicals and hazardous wastes	6 months	MEFT and inter-ministerial committee on chemicals management, Ministry of Higher Education	160,000	10,000
	Hold discussions with each research institution, to discuss areas which the institution can research on, depending on the institution's research interests / strengths	Minutes of meetings held Reports from research and academic institutions indicating inclusion of chemicals issues on research priorities	1.5 years	MEFT, Ministry of Higher Education	480,000	30,000
	Source and avail funding for the research.	Relevant research projects carried out and information reports included in database created under Chemicals Information Management Strategy in Section 3.3.15	Ongoing	Research and academic institutions		TBA
	Sub total				**550,000**	**55,000**

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	USD
Objective 2. To capacitate at least 20 percent of the Namibia analytical laboratories with requisite equipment and skilled manpower in 3 years (Article 11)	Prioritize laboratories to be capacitated.	Document showing labs to be capacitated and specific capacity needs	6 months	MEFT, Ministry of Health, Ministry of Higher Education, Ministry of Agriculture, NCRSTT,	320,000	20,000
	Identify specific capacity needs.					
	Purchase lab equipment, chemicals and consumables	Laboratories capacitated - reports	2 years		64,000,000	4,000,000
	Conduct training / capacity building.	Training reports			1,120,000	40,000
	Ensure usage of new equipment for POPs and chemicals monitoring	Increase in available analytical data on POPs and other chemicals	Ongoing			
	Sub Total				64,960,000	4,060,000
Objective 3: To develop and implement system for monitoring DDT exposure in three years (Article 3)	Develop strategy for monitoring DDT exposure, including in spraymen, residents of areas where IRS is conducted, and areas where DDT was historically applied in the environment	Monitoring strategy documented	6 months	Ministry of Health, MEFT	160,000	10,000
	Implement DDT exposure monitoring strategy	Reports on monitoring results	2.5 years	Ministry of Health, MEFT	4,000,000	250,000
	Sub total				4,160,000	260,000
Objective 4: To assess the environmental impact of PFOS application	Conduct environmental monitoring of areas where PFOS has been applied, including groundwater close to waste disposal sites	Monitoring results	1.5 years	MEFT, Ministry of Higher Education	1,280,000	80,000
	Sub total				1,280,000	80,000
Total for 3.3.16					**71,280,000**	**4,455,000**

3.3.17 Activity: Technical and financial assistance (Articles 12 and 13)

Objectives	Activities	Key performance indicators	Time Frame	Implementers	Resources / Needs	
					NAD	USD
Objective: Strengthen capacity of relevant government ministry to access financing for POPs management projects	Capacitate staff within relevant Ministries to develop viable and sustainable projects for chemicals management	Training reports showing the number of people trained and the depth of content	1.5 years	MEFT	480,000	30,000
	Develop proposals for obtaining funding for POPs management projects	Viable project proposals which have received funding				
Total for 3.3.17					480,000	30,000

Grand total for all the specific action plans = U**SD 26,025,000 (or NAD 416,400,000** using an exchange rate of 1 USD : 16 NAD).

3.4 Prioritized POPs Issues and Objectives

Table 22 shows the objectives that were set for addressing the prioritised issues of concern, as described in greater detail in Section 3.2. The objectives were re-crafted (Sections 3.3.1 – 3.3.17) in order to respond to different components of the Stockholm Convention, but their focus was unchanged.

Table 22 Prioritized Issues and Objectives for Addressing them

	Issue Identified	Objective for Addressing Issue
General Chemicals Management Issues		
1.	Low levels of awareness on POPs and other chemicals and hazardous wastes	To raise national awareness on chemicals management issues through developing and implementing a Chemicals communication strategy in two years ***(Article 10)***
2.	Lack of Coordinated Approach to Chemicals Management Issues	To develop and implement mechanisms for coordinating chemicals management issues in two years, including setting up inter-ministerial committee for chemicals management, being initially by MEFT and Office of the Prime Minister ***(Article 3)***
3.	Poor Regulatory and Policy Framework for Chemicals Management	To strengthen regulatory framework for chemicals management ***(Article 3)***
4.		To develop and implement a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management in two years ***(Article 3)***
5.		To strengthen administrative capacity for chemicals management in two years (Article 3)
6.	Ineffective Systems for Chemicals Data Management	To develop a chemicals information management strategy in one year ***(Article 10)***
7.	Lack of Research in Chemicals Management Issues	To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least one research institution every two years ***(Article 11)***
8.	Inadequate Technical Infrastructure for Chemicals Management	To capacitate at least 20 percent of the Namibia analytical laboratories with requisite equipment and skilled manpower in three years ***(Article 11)***
Pesticides – Specific		
1.	Ineffective Legislation for Pesticide Management	To finalise development of pesticides legislation in three years ***(Article 3)***
2.	Lack of Awareness of Proper Pesticide Management Practices	To develop and implement an awareness raising programme for proper pesticide management in two years, drawing from the Chemicals Communications Strategy mentioned under Category A ***(Article 10)***
3.	Lack of Knowledge on Exact Quantities and Locations of Obsolete Pesticides	To finalize the national obsolete pesticides inventory in 1 year ***(Article 6)***
4.	Poor Management of Obsolete Pesticides and Pesticide Waste	To implement environmentally sound management of obsolete pesticides and pesticide waste in five years ***(Article 6)***
5.	Lack of Alternatives of Pesticides, Including DDT	To build national capacity for Integrated Pest Management in two years ***(Article 3)***

DDT- Specific		
1.	Continued Use of DDT for Malaria Vector Control	To implement Integrated Vector Management programmes for malaria control in order to reduce reliance on DDT in five years ***(Article 3)***
2.		To develop and implement system for monitoring DDT exposure in three years ***(Article 3)***
3.		To manage DDT waste in an environmentally sound manner in two years ***(Article 3)***
PCBs – specific		
1.	Inadequate Knowledge of PCB-status and poor management of PCB equipment and other non-working transformers	To participate fully in regional PCB disposal project, ensuring all required actions are conducted within the stipulated time ***(Article 6)***
2.	Lack of Awareness of PCB Management Issues	To develop and implement an awareness raising programme for PCBs in two years, drawing from the Chemicals Communications Strategy mentioned under Category A ***(Article 10)***
3.	Inadequate Legislation for PCBs Management	To develop PCB-specific legislation in two years ***(Article 3***)
U-POPs – specific		
1.	Need for Improved Medical Waste Management	To install state-of-the-art incinerators in at least 20% of the hospitals in five years ***(Article 5)***
2.	Poor Waste Management	To improve waste management in Namibia in three years ***(Article 5)***
3.	Release of excessive U-POPs quantities from sewage treatment	To promote environmentally sound sewage treatment facilities in at least five new local authorities in five years ***(Article 5)***
4.	Uncontrolled veld fires	To reduce incidences of uncontrolled veld fires by at least 5% annually over a three-year period ***(Article 5)***
5.	Need for Improved Fire Prevention Measures in Homes	To reduce the incidences of fires in homes by at least 20% annually over a three-year period ***(Article 5)***
6.	Use of unclean energy sources for domestic heating and cooking	To reduce the population using unclean energy sources by at least 20 % over five years ***(Article 5)***
7.	Poor Management of Contaminated Land	To conduct a detailed inventory of contaminated sites in Namibia, and initiate site clean-up on at least two areas in three years ***(Article 5)***
8.	Lack of Application of for Best Available Techniques / Best Environmental Practices (BAT / BEP) among industries	To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of dioxin / furan emissions in four years ***(Article 5)***
POP – PBDEs		
1.	Poor management of E-waste due to lack of awareness, lack of data and absence of legal and technical infrastructure	To finalise and implement the draft e-waste policy in 3 years ***(Article 3)***
		To conduct comprehensive e-waste inventory in one year ***(Article 6)***
3.	Weak legislative framework for management of POP-BDEs from the transport sector	To strengthen the legal framework for management of old and end-of-life vehicles through enforcement of legislation prohibiting imports of old vehicles, and development of new legislation for end-of-life vehicles in three years ***(Article 3)***
		To conduct comprehensive inventory of pentaBDE in 6 months ***(Article 6***)

PFOS and related substances		
1.	Poor management of PFOS and related substances	To reduce releases of PFOS and related substances in five years ***(Article 3)***

REFERENCES

1. AgriViews (2006). Integrated Initiative in support of Urban and Peri-Urban Horticulture in Namibia in Agrinews March 2006

2. Bishi, A., Chitate, F. and Haindongo, N. (2013) Tsetse-Fly Eradication in the Zambezi Region of Namibia Using Sequential Aerosol Spray Technique

3. Central Bureau of Statistics, National Planning Commission (2003). Report on the Annual Agricultural Surveys 1996 – 2003.

4. Environmental Investment Fund of Namibia (2014). Draft Consultation Report on Hazardous Chemicals Imported into Namibia and Exported from Namibia and their Health Risk

5. FAO, 1983. Compilation of Legal Limits for Hazardous Substances in Fish and Fishery Product. Library.

6. GRN / Government of the Republic of Namibia (1997). National Drought Policy. Windhoek. National Drought Task Force.

7. GRN / Government of the Republic of Namibia (2002). Initial National Communication to the United Nations Framework Convention on Climate Change

8. Government of the Republic of Namibia (2013). Report of the Auditor General on a Performance Audit Study on the Green Scheme Programme in the Ministry of Agriculture, Water and Forestry for the Financial Years 2009, 2010 and 2011. Windhoek

9. Hanns Seidel Foundation, Ruppel O. C. & Ruppel-Schlichting K., (2011). Environmental Law and Policy in Namibia. OrumbondePress.na & Welwitschia Verlag Dr. A. Eckl, Essen.

10. Intergovernmental Panel on Climate Change (IPCC) (2006). Guidelines for National Greenhouse Gas Inventories.

11. Ministry of Agriculture, Water and Forestry (2005). Agricultural Statistics Bulletin 1995 - 2004

12. Ministry of Environment and Tourism (2011). Proceedings of the Green economy Stakeholder Dialogues Kick-Off Conference, 11 – 13th July 2011, Windhoek, Namibia.

13. Ministry of Environment and Tourism (2012). National Report to the United Nations Commission on Sustainable Development: Namibia 2012

14. Ministry of Health and Social Services (2012). National Public Health Laboratory Policy

15. Ministry of Health and Social Services (2012). National Public Health Laboratory Strategic Plan

16. Ministry of Trade and Industry (2012). Namibia's Industrial Policy

17. Namibia Organic Association (2010). Namibia Standards for Organic Production Version 1

18. NamPower (2014). Status of PCB Phase-Out: Namibia. Presentation Made at the Inception Workshop for the SADC Regional PCB Workshop: 16 – 17 October 2014.

19. National Planning Commission (2012). Annual Economic Development Report 2012

20. Namibia Statistics Agency (2013). Annual Trade Statistics Bulletin 2012

21. Namibia Statistics Agency (2013). Profile of Namibia: Facts, Figures and other Fundamental Information

22. Ndhlukula, K. & du Plessis, P. (2009). Green labelling, eco-certification and fair trade: Threats and Opportunities for Namibia (S. Montgomery, Ed.) Windhoek: Polytechnic of Namibia, REEI.

23. PreventionWeb, (2010). Namibia – National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – interim. Available on: http://www.preventionweb.net/files/15617_nam_NationalHFAprogress_2009-11.pdf

24. UNDP (2011). Energy & Environment Practice Gender Mainstreaming Guidance Series -Chemicals Management

25. UNEP (2001). Global Environment Facility PDF Block B Request for the Project: Prevention of Human and Environmental Exposure to DDT and Other Toxic Pesticides and Strengthening of Malaria Control Programmes in Africa

26. UNEP (2009). Hazardous Substances from Opening Burning of Waste in Developing Countries. Osaka/Shiga: United Nations Environment Programme (UNEP).

27. UNEP (2010a). Technical review of the implications of recycling commercial Penta and Octabromodiphenyl ethers. Stockholm Convention document for 6th POP Reviewing Committee meeting (UNEP/POPS/POPRC.6/2) Geneva 11-15. October 2010.

28. UNEP (2010b). Technical review of the implications of recycling commercial Penta and Octabromodiphenyl ethers. Annexes. Stockholm Convention document for 6th POP Reviewing Committee meeting (UNEP/POPS/POPRC.6/INF/6) Geneva 11-15. October 2010.

29. UNEP (2013). Toolkit for the Identification and Quantification of Releases of Dioxins, furans and other Unintentional POPs

30. UNEP (2015b) Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants (draft)

31. UNEP (2021). Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants (draft)

32. Vetter, W., Weichbrodt, M., Scholz, E., Luckas, B., Ager_a, H.O., 1999. Levels of organochlorines (DDT , and HCHs) in blubber of South African Fur seals (Arctocephalus pusillus pusillus) from Cape Cross/Namibia. Marine Pollution Bulletin. 38, 830–836

33. Waeger, P., Schluep, M. & Müller, E. (2010). RoHS substances in mixed plastics from waste electrical and electronic equipment final report St. Gallen, September 17, 2010, available on URL: http://www.ewasteguide.info/files/ Waeger_2010_Empa-WEEEForum.pdf