

WASTE MANAGEMENT

The EPD has traditionally conducted monitoring and regulation of the solid waste management and government operated solid waste disposal sites. The Solid Waste and Hazardous Substances Section was established in 2005 with the aim of improving the regulation of solid waste management.

The EPD is mandated to:

1. Regulate and monitor solid waste disposal facilities
2. Develop policies for the regulation of solid waste management.

The Sanitation Service Authority (SSA) is responsible for the collection and disposal of non-hazardous solid waste from homes island and government agencies around the island. The SSA also has a commercial arm which offers services to the private sector. The SSA also operates the four (4) Government solid waste disposal sites:

- Mangrove Pond Landfill;
- Bagatelle Bulky Waste Disposal Site;
- Rock Hall Asbestos Disposal Site; and
- Lonesome Hill Blood and Grease Disposal Site.

The Solid Waste Project Unit (SWPU) is responsible for the implementation of the Integrated Solid Waste Management Programme (ISWMP). The ISWMP is an infrastructural project which commenced in 1993 with a feasibility study. It is a major component of the general policy of the Health Sector Development Plan 1993-2000, encompassing the whole island of Barbados, and providing for the preparation of a long term (20 year) vision of managing solid waste in Barbados.

These policies are further clearly reinforced by the Barbados Sustainable Development Policy which specifically highlights the issue of waste management. Under this wider umbrella of waste management, the Policy draws attention to the need to ensure that a focus is retained on solid and liquid waste, as well as the challenges associated with air emissions. It also encourages that these concerns be addressed within the context of a comprehensive framework of environmental quality guidelines.

While at present there is no comprehensive solid waste management legislation, waste disposal is governed by the following legislation:

- The Health Services Act (Cap. 44), 1969 - "An Act relating to the promotion and preservation of the health of the inhabitants of Barbados".

- Health Services (Nuisances) Regulations, 1969 – These Regulations prohibit nuisances which may include solid waste that is left or placed in a manner that may be injurious or dangerous to health.
- Health Services (Disposal of Offensive Matter) Regulations, 1969 – These Regulations restrict the disposal of offensive matter to approved disposal sites only.

Non-Hazardous Waste

Concrete Progress in Implementation

Recommendations of the BSD Policy

The BSDP makes the following recommendations with respect to the management of solid waste:

- *Continuing the development, implementation and execution of an appropriate, comprehensive and efficient solid waste management programme for Barbados, including elements such as the comprehensive public awareness and education programme developed and being implemented by the [Sewerage and] Solid Waste Project Unit.*
- *Continuing efforts towards introducing and adopting the various recommendations of the Integrated Solid Waste Management Plan.*
- *Encouraging the involvement of private sector enterprises and other stakeholders in sustainable waste management initiatives.*
- *Initiating appropriate mechanisms and procedures to support small scale, sustainable waste management practices, including recycling and backyard composting where possible, and re-education of farmers in the techniques of organic farming.*
- *Completion of the various projects for sewerage treatment and management.*
- *Continuing to implement programmes and activities which comply with and address Barbados' national obligations as Party to various international Environmental Agreements which seek to eliminate marine pollution from the disposal of ship-generated waste, including but not limited to the Convention on the Prevention of Marine Pollution from Ship Generated Waster (MARPOL).*

Policies aimed at Waste Prevention and Minimization, Reuse and Recycling

Recycling is a private sector led activity. Generators of household waste benefit from a free national collection service by the Sanitation Service Authority (SSA) which is scheduled for at least once a week. In densely populated areas on the island, this service is offered for two days a week. In Bridgetown there are collections 13 times a week because of the commercial activity there. Generators of commercial and bulky waste can call the SSA to remove this waste at a cost. Alternatively, they have the option of utilising a private commercial service to remove their waste.

The SSA works in collaboration with the Solid Waste Project Unit (SWPU) at the SWPU's home-composting workshops and encourages recycling where it is available. While members of the public are not encouraged to enter the Bulky Waste landfill to recycle materials, this occasionally occurs and is permitted. The practice is not actively encouraged however, since the authorities wish to regulate this activity to ensure that it is conducted appropriately. Several approaches to facilitate the regularization of this type of activity are being considered, including the use of fees, permits and licenses.

The Mangrove landfill receives approximately 90% used tires on the island and there is currently research underway into recycling of these tires the options including their conversion to rubberized asphalt or to use them as a fuel source.

The level of infrastructure needed to facilitate curb-side recycling is currently not available in Barbados. A separate complement of equipment, including specialized trucks and color coded containers would be required. The private sector is therefore currently the main driver of this activity, while Government regulates their operations. Recyclable materials are either returned to a depot or collected by the recycler.

Another area of concern is illegal dumping and littering. Bins have been placed throughout the country by the SSA and other entities, especially in problematic places like Bridgetown as well as other locations heavily traversed by tourists. This is in an effort to decrease the amount of littering. Dumping normally takes place in gullies and remote areas of the island. Nevertheless, reduction in dumping has been realized as a result of monetary compensation as a part of the recycling effort of the private sector for white goods like, refrigerators, washing machines and stoves.

The SSA has also established a committee for the prevention of illegal dumping in Barbados. This committee comprises representatives from the SSA, SWPU and the Ministry of Health. The aim is to educate communities across the island about the problems associated with illegal dumping, and in effect, discourage such practices. The committee goes into communities and hosts town hall meetings to promote clean-up events, as well as to educate persons on the benefits of sustainable waste management practices. The identification of the communities to be targeted is usually led by the Environmental Health Officers of the Ministry of Health, and in some cases, by the District Emergency Organisation (DEO).

Financial Mechanisms for Waste Management Service Development in Deprived Areas

With respect to the SSA, in the past, access to certain areas for household waste collection might have been considered problematic, however, more recently, with the infrastructural improvements by the Rural and Urban Development Commissions, this constraint is now much less relevant. Another issue surrounds the composition of the types of vehicles in the fleet operated by the SSA. The fleet now consists of vehicles of various sizes including smaller collection vehicles to service some of the small alleys in an overall effort to increase the level of efficiency of their service.

Lessons Learned and Best Practices

Development of Environmentally Sound Disposal Facilities, Including Technology to Convert Waste to Energy

The main landfill in use, the Mangrove Landfill, is an engineered landfill. The Government of Barbados has plans for the development of another environmentally sound facility which will be properly engineered, with stormwater and leachate collection systems. There will also be a leachate treatment plant with tertiary level standards.

The Mangrove landfill receives approximately 1000 tonnes of garbage daily. The tonnages for domestic waste have not increased significantly in recent years, but construction and demolition waste has done so as a result of various large demolitions and the recent construction boom. To accommodate this recent activity, two satellite quarries were opened to receive construction and demolition waste and relieve the pressure on the main sites.

There is a new waste management facility at Vaucluse, St. Thomas. It comprises a transfer station with a materials recovery facility, composting facility and chemical waste storage facility which government is likely to upgrade to a chemical waste management facility. This new waste management facility receives all the waste previously taken to the Mangrove landfill. There is a significant amount of waste which is diverted-approximately 70%, and this includes construction and demolition waste, green waste, wood pallets and other recyclables including plastics, glass and metals.

The SSA also handles liquid waste, for example, blood and grease. These are managed at the Lonesome Hill disposal sites. Other non-sewage waste, such as effluent from the paint industry, is disposed of at the Mangrove.

Recovery, Reuse and Recycling of Wastes and their Transformation into Useful Material

Under the Returnable Containers Act (1987), all beverage containers, both plastic and non-plastic, have a return on deposit. The fees received encourage high rates of

collection and return. Given the success of this initiative, Government is looking to apply that principle to other recyclable items.

Actions Taken

The Integrated Solid Waste Management Programme

The SWPU implements the Integrated Solid Waste Management Programme (ISWMP) which focuses on waste minimization and the 3Rs, Reduce, Reuse and Recycle. More recently the Government of Barbados has been looking at the feasibility the recovery of energy from waste which introduces the fourth R, Recover.

Relevant Trends, Constraints, Challenges and Emerging Issues

Need for an Alternative to the Mangrove Landfill

The Government of Barbados is looking at the feasibility of introducing waste-to-energy facilities in Barbados. This would be of benefit to the island as it would address the issues of waste management, energy security and carbon capture and storage.

New Developments

The SSA attempts to work closely with the appropriate government agencies to facilitate the location of stationary waste management equipment, for example stationary compactors, to manage shop generated waste in the central business district.

Financial Support of the Sanitation Services Authority

Financial support comes from the consolidated fund to facilitate operations at the SSA for purchasing equipment and materials like compactor trucks and for the, management of disposal facilities and administration.

Handling of Meat Processing Waste

In an effort to reduce the quantity of offal being disposed to landfill, the SSA is currently working with a private sector entity to make greater use of the local rendering facility to manage the offal. The types of offal that are accepted are currently limited to that of chicken and fish. It is recycled to produce a beneficial protein meal as animal feed. In the event that the offal is not fresh, it cannot be rendered and so the producers of the offal are asked to treat it with lime to reduce odors and transport it to the landfill.

Hazardous Waste

Concrete Progress in Implementation

Recommendations of the National Sustainable Development Policy

The BSD Policy makes the following recommendations with respect to hazardous wastes:

- *Development of a comprehensive policy to guide the management of hazardous materials including chemicals for agriculture and manufacturing, as well as wastes.*
- *Including in the policy, mechanisms and procedures for the importation, handling, transport, storage and disposal of hazardous wastes in accordance with Barbados' obligations as party to the Basel Convention.*
- *Development of appropriate legislative measures to support the implementation of policy recommendations.*
- *Investigating incidents of groundwater contamination by the disposal and/or accidental release of liquid and solid hazardous substances, with a view to devising mitigative measures to minimize future incidents of pollution.*

Policy Measures for the Prevention and Minimization of Hazardous Wastes

An Environmental Management Act (EMA) and associated regulations have been drafted which makes provisions for the management of hazardous wastes for individuals and commercial entities.

The Draft EMA has a section addressing toxic substances from import to disposal. At present the EPD reviews any hazardous waste disposal on a case-by-case basis in accordance with the material safety data sheet (MSDS). If the waste can be neutralized the disposer is given the relevant information, but otherwise the waste is exported under the stipulations of the Basel Convention, usually to Canada. The main issue with this system is that it is dependent upon the waste producer realizing and reporting the waste as hazardous. The absence of this legislation is the primary constraint on the operations of EPD in most areas.

The EPD has expressed a need for a holistic framework for chemicals and other hazardous wastes. The National Implementation Plan (NIP) for the Stockholm Convention exists and was endorsed by Cabinet in 2007. The NIP contains a number of activities that would address chemicals management, but it is focused on POPs. The EPD is currently assessing the status of action items under the NIP.

The EPD is also looking for project opportunities to further their work in chemicals management and have supported a draft Project Identification Form (PIF) to the United Nations Environment Programme (UNEP) for "Implementing NIPS and Chemicals Management for Small Island Developing States (SIDS)".

Notification Systems and Registries of Exposed Populations

There is a National Oil Spill Contingency Plan and a Hazardous Materials Response Plan which were developed with the involvement of the relevant stakeholders. These would deal with the notification on procedures. The oil spill plan was approved in 2002 and is

being reviewed with stakeholder input. As part of the review, appendices regarding disposal, sensitivity mapping, dispersants policy among other things will be added. It is anticipated that a revised plan will be sent to Cabinet with revisions based on a simulation exercise that was recently completed. There was also a notification exercise for the oil spill plan in 2008, and a full exercise will be executed in the short-term.

There is currently no registry of exposed populations since there have been no health matters as a result of incidents, requiring follow-up procedures.

Lessons Learned and Best Practices

Transfer of Environmentally Sound Technologies and Know-how on Clean Technologies and Low-waste Production

Under the Marine Pollution Control Act (1998) (MPCA), the EPD is mandated to characterize sources of pollution and to develop initiatives geared towards the prevention, reduction and control of pollution. The EPD undertakes characterization of the types of waste generated via environmental audits on a sector by sector basis. The audit process includes review of practices and procedures, assessment of waste streams and pollution control equipment. Recommendations are made for companies to improve their environmental performance.

Initiatives to Treat, Recycle, Reuse and Dispose of Wastes at the Source of Generation and Regulatory Mechanisms

Ideally the EPD should be in constant contact with companies using and generating hazardous wastes. However Government is of the view that by employing appropriate regulatory mechanisms which complement the current efforts of the EPD, more significant gains will be realized. One such recognized mechanism is effective legislation; as a result the Marine Pollution Control Act (1998)(MPCA) is based on the polluter pays principle.

As mentioned previously, persons who have hazardous materials to be disposed can contact the EPD to get advice on the best way to proceed. Where the item can be neutralized, the EPD will provide the necessary information to the waste generator. Though it is the responsibility of the generator to identify a shipper with the necessary capabilities, the EPD will undertake background checks to ensure that the proposed shipper will be able to meet the requirements of the Basel convention. The EPD also makes checks to ensure that the country where the waste will be disposed is signatory to Basel convention. Typically, chemicals from Barbados are shipped to Canada. The paperwork for shipping between the EPD and Environment Canada has to be facilitated for the waste generator.

The EPD has responsibility for reporting the number of shipments to the Basel Secretariat. A major challenge in this reporting is the accuracy of the figures since legislation is not in place for monitoring of emissions and other waste streams, other

than that which is exported. Particularly, in the case of gaseous emissions, sufficient technical capacity to monitor and collect the relevant information for POPs is currently lacking.

Procedures for Environmental Impact Assessment

In Barbados, an application to undertake a development must be submitted to the TCDPO, which is the development control authority. Depending on the nature of the development, the TCDPO may request the developer to submit an EIA. Review of the EIA documents is undertaken by a panel of relevant Government agencies, which includes the EPD. Concerns of the agencies with respect to the potential impacts of a development, and recommendations with respect to impact mitigation and environmental monitoring will be submitted to the TCDPO. The Chief Town Planner will make a decision on whether the development should be granted approval, taking the recommendations of the EIA Review Panel into consideration.

The Health Services (Building) Regulations, 1969 require persons wishing to construct, extend, alter or change the use of a building to obtain the permission of the Minister of Health via the Director of the Environmental Protection Department. This legal requirement is independent of that requiring permission from the TCDPO.

If an application is submitted to the Town and Country Development Planning Office a separate application to the Environmental Protection Department is not necessary since that Office is required by Regulation 3 of the Health Services (Building) Regulations, 1969 to submit copies of building development applications to the Environmental Protection Department.

In the case of proposals that do not require approval from Town and Country Development Planning Office such as internal renovations or alterations to approved structures, an application must be submitted directly to the Environmental Protection Department.

Asbestos

The current policy for the regulation of asbestos requires the participation of the EPD in the removal and disposal activities. Inspectors will visit the site, give advice and generally work with accredited contractors who have been trained in asbestos removal. The EPD held a workshop in 2008 to certify qualified contractors. The EPD's proactive involvement at this level is consistent with the policy and guidelines on asbestos management which have been approved by the Cabinet of Barbados.

Radioactive Materials

The EPD is currently working on establishing a database to increase their efficiency in monitoring radioactive materials. Following a cabinet decision, EPD was given the responsibility of assessing and approving applications to import radioactive materials,

while the Consumer Affairs Department issues the requisite import licenses. The database system will support these processes; it will be designed to capture logistical information on radioactive imports/ exports; as well as provide additional information on responsible companies and businesses. This project will also include an evaluation and review of the approval forms systems associated with this process

Actions Taken

Inventories of Hazardous Waste Production, their Treatment/Disposal, and Contaminated Sites

The National Profile of Chemicals Management has indicated that there are inadequate or absent inventories of the chemicals stored by individual companies. This is both a constraint and a challenge for the EPD in quantifying what is stored, where and how, and ultimately leads to problems with identifying the waste chemical and how to deal with it.

Phase-out of Toxic, Persistent and Bio-Accumulative Waste

The POPs project under the Stockholm Convention undertook inventories of the various sub-groupings of POPs and developed a National Implementation Plan (NIP) for managing POPs in Barbados. The NIP was approved and contains the various steps needed to reduce emissions. A review of the NIP is underway to see whether each agency responsible for the specific activities in the plan has made any progress in implementing those activities.

Relevant Trends, Constraints, Challenges and Emerging Issues

Policy Measures for the Prevention and Minimization of Hazardous Wastes

There are specific pieces of legislation for different hazardous materials, for example pesticides and explosives, but there is no over-arching law that addresses all hazardous materials. This is possibly because the chemicals are used by very different sectors, for multiple purposes.

Prevention and Minimization and Environmentally Sound Management of Hazardous Wastes

The recommendations of the BSDP pertaining to waste management address the issues of solid and liquid waste, as well as air emissions. In general, it is recommended that waste generation, emission, disposal and management standards which are appropriate in the Barbadian context, be developed as part of comprehensive environmental quality guidelines to be completed by all individuals, sectors and industries as appropriate.

Establishment of Combined Treatment/Disposal Facilities for Hazardous Wastes in Small and Medium-sized Industries

Disposal of hazardous wastes is still a difficult issue because there are no facilities readily available for handling them. The transfer station located at Vaucuse in the

parish of St. Thomas does have facilities for the storage of hazardous waste, but this service is not yet operational. Once this situation is remedied in the short to medium term, the Vacluse facility will be able to accommodate hazardous wastes.

COMMON ISSUES

Education, Training, Awareness-Raising and Capacity Building

Waste

As part of the Integrated Solid Waste Programme, the SWPU has an educational component aimed at promoting an increased awareness of proper solid waste practices. This programme utilizes a combination of both formal and informal activities e.g. town hall meetings, media programmes, literature and website promotion, work-shops, and educational expos. Examples of success that could be held up would include the recycling programs at schools, churches, and communities; and ongoing efforts to engage and work with NGOs and the business community. In addition, there are institutional strengthening programmes which facilitates training opportunities for Government Agencies dealing with solid waste management

The EPD prepares newsletters twice a year, display brochures and posters, and have the capacity to run advertisements on television or in newspapers through the Government Information Service (GIS). There has been some discussion with the Ministry of Agriculture and GIS on running a series of notices on banned agricultural chemicals. If requested the EPD will also do school visits, but most of their educational activities are based on the role of EPD and water. They would be more likely to handle questions at Town Hall meetings or other similar *fora* or via working directly with the separate industries.

National Legal Frameworks *Waste*

The SSA operates under the Sanitation Service Authority Act and the Health Services Act (1963).

Institutional Capacity Building

The engineering department at SSA was recently augmented to increase its capabilities to research and address queries and issues with the existing landfill, the landfill gas to energy project and the tyre recycling project among others. Within recent times training has been conducted in several areas including landfill gases and landfill management.

Cooperative Frameworks and Partnerships

The waste Management Facility at Vacluse, St Thomas, is a private public partnership (PPP) between the Government of Barbados and Sustainable Barbados Recycling Centre (SBRC) Inc. It comprises a transfer station where all wastes will be taken to be sorted

and processed. All recyclables are redirected away from the landfill to more sustainable avenues.

Technology Development, Transfer and Dissemination

Composting workshops are held by the SWPU where individuals attending may learn solutions to particular problems that they are experiencing with their composting.