

**Third Meeting of the Regional 3R Forum in Asia**

“Technology Transfer for promoting the 3Rs

–Adapting, implementing, and scaling up appropriate technologies”

Singapore, 5-7 October 2011

## **Country Analysis Paper**

**(Draft)**

**< Bhutan >**

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This country analysis paper was prepared by Bhutan as an input for the Third Meeting of the Regional 3R Forum in Asia. The views expressed herein do not necessarily reflect the views of the United Nations.

**Bhutan** is a small landlocked country in the Eastern Himalayas bordered by China in the North and India on the other 3 sides. Bhutan has a population of 695,822 in the year 2010<sup>1</sup> with total land area of 38,394 square.

The landscape is characterized by rugged terrain and steep mountain valleys ranging from 150 meters in the sub-tropical valleys in the southern foothills, through temperate zone to heights exceeding 7000 meters in the alpine regions of the mountains.



**Bhutan's** economy is based mainly on agriculture, and forestry which provide the main livelihood for 80% of the population and account for about 40% of GDP. The major source of its revenue is the hydroelectric power. Other sources of revenue include tourism and minerals like coal, gypsum, cement production and ferro-chemicals. The nominal GDP at market is estimated at Nu. 61,223.5 million



(Year 2010) and a per capita GDP estimated at Nu. 87462 equivalent to US\$ 1943 (year 2010). The GDP growth rate is around 6.7 percent per year.

### ***Solid Waste Management in Bhutan***

Like any other developing country, Bhutan too is facing the challenges of rapid urbanization with more than 30% of the country's population living in the urban areas which is expected to increase in the next few decades. With the increase in the urban population came the issues of solid waste management due to



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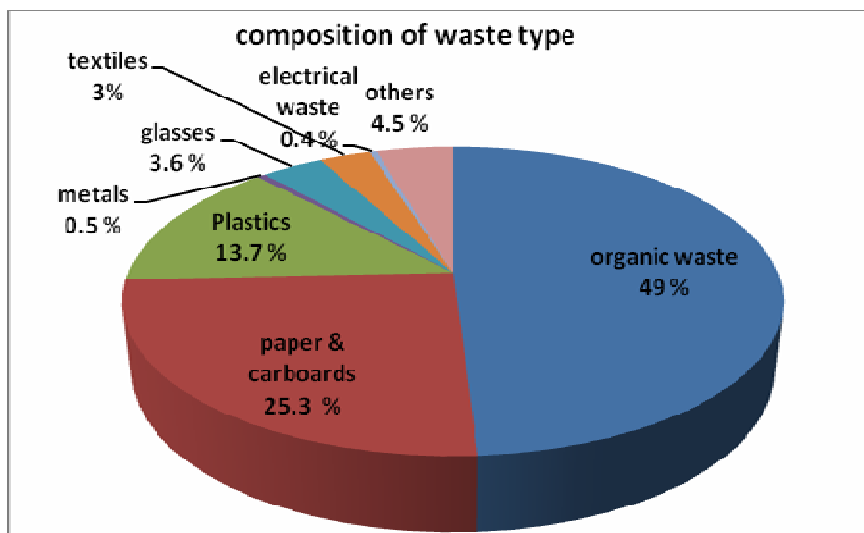
<sup>1</sup> Source : National Statistical Bureau of Bhutan ( [www.nsb.gov.bt](http://www.nsb.gov.bt) )

insufficient infrastructure planning, municipal facilities and services. According to UNEF report 2001, garbage has been identified as emerging problems in the larger towns of *Thimphu and Phuentsholing*.

Recognizing importance of managing the solid waste, the Royal Government of Bhutan (RGoB) has initiated to collect more reliable solid waste generation and composition data in the year 2007. The main objective of this research survey was to study the waste generation rates from different sources and their compositions.

The Department of Urban Development and Engineering Services (DUDES) under the Ministry of Works and Human Settlement (MoWHS) carried out the survey in 10 selected towns with financial assistance from Danish International Development Agency (DANIDA) under the Environment and Urban Sector Programme Support.

The chart below shows the total quantity of each components of the MSW generated from the urban areas in 2007.



**a) Current State of Application of 3R technologies in the product process and waste management in different sector.**

For countries like Bhutan, the policy and institutional arrangement options of the 3Rs concept may be more cost-effective and for this the public awareness and education has to be a priority. Although, the concept of 3Rs has been known to Bhutan for a long time, the actual implementation of the 3Rs concept has been difficult due to lack of proper guidance,

budget, human resource and public awareness. However, we have now managed to take one step forward in managing organic waste, PET bottles and paper wastes.

***Organic waste management:***

As seen from the table above, 50% of the waste generated in the urban centres is organic waste and therefore it was felt necessary to install a compost plant. Organic waste is mainly composed of kitchen wastes such as vegetables, fruits, food remains, etc.

In Thimphu, a compost plant with capacity of handling 30 tonnes of organic waste per day has been installed recently which will strengthen business and employment opportunities, reduce waste and prevent methane generation at the landfill. This will be further replicated in other districts in the country after analyzing the success of the compost plant in Thimphu.

***Plastic Waste Management:***

Although, the uses of plastics for carry bags, package wrappers and pouches have been banned in Bhutan since 1999 through a government decree, plastic waste formed up to 12.73% of the total municipal solid wastes generated in the urban areas. Plastic wastes is composed mainly of packaging plastic products, hard and flexible plastic household items, PET bottles, Jerry can, etc. Plastic wastes especially packaging materials do not decompose and compact easily which is why it significantly affects transportation cost and landfill life. The only facility that Bhutan possesses in terms of plastic recycling is shredding plant for PET bottles which when crushed and shredded to pellets can fetch better prices in export while reducing the transportation cost.



### ***Saw Dust Briquetting:***

Sawdust briquetting venture in the outskirts of Thimphu town addresses the sawdust problems from the saw mills in Thimphu and Paro. Until early 2005, sawdust generated from the saw mills has been a concern across the country and especially in Thimphu. Controversial water pollution and sawdust hindrance to the surrounding inhabitants during the windy season has pressured the government to search for alternative solutions. On the other hand, the high rate firewood consumption has depleted forest resources around Thimphu. Ultimately, through repeated research and trial, the Forestry Development Corporation Limited (FDCL) has managed to establish a sawdust briquetting plant in the outskirts of Thimphu. This plant substantially consumed sawdust generated in Thimphu and Paro and substituted the firewood supply, reducing pressure on the local forest resources.

### ***Technology needs and gaps in handling different types of wastes, including new and emerging waste streams such as e-waste, plastics in marine environment, and hazardous waste.***

As in the case for many countries e-wastes is an emerging environmental issue in Bhutan. Electrical and electronic wastes formed only 0.37% of the total municipal wastes and it consisted mostly of printer cartridges from the offices. It may be mentioned here that most modern electrical and electronic equipments such as TV, computers, etc became popular only recently. Electronic gadgets and other equipments are yet to be considered a fashion

by most Bhutanese and hence are expected to be used to its full life unlike in other developed countries where electronic and electrical equipments are often discarded due to changing fashion.

As in the case for most municipalities around the world, wastes disposed in municipal bins generally comprise mostly organic or biodegradable wastes that are not toxic. However disposal of small amounts of toxic and hazardous wastes such as e-wastes can contaminate most of the non toxic wastes in the municipal bin. For the case of Bhutan almost all the municipal landfills do not have leachate control mechanisms. Hence, there is no doubt that the soil and water surrounding or downhill of municipal bins in Bhutan are contaminated with all kinds of harmful liquids leaching out of the landfill. Currently the scale of problem is relatively small and manageable because Bhutan is a small country with a small population. Before the scale of problem becomes unmanageable, initiatives need to be taken now to raise awareness on the hazards of e-wastes and proper disposal methods and mechanisms need to be put in place to enable safe disposal of e-wastes.

In Bhutan, amongst the hazardous waste, medical waste is considered major source of concern. Although, the relevant health officials are well aware about the negative social and environmental impacts of improper disposal of health care wastes, the actual implementation of safe disposal methods has been difficult so far due to lack of funds for establishing the required structures and technical facilities for treating waste or disposing them off safely. Only two functioning autoclaves exist in the entire country. Hence, it is possible to treat the infectious wastes generated from the two hospitals (Thimphu JDWNRH and Mongar hospital) with the autoclaves only. Deep pit burial is the predominant method of disposal of health care wastes throughout the country. However, the pits are ordinary earthen pits without any protective lining, hence making it easy for the chemical and other liquid wastes to leach out into the soil and nearby water bodies. Though all district hospitals have pits with well sealed roofs the BHU's mostly have ordinary open pits in the ground. Hence, serious efforts need to be made to raise funds for enabling safe health care waste disposal and management in the country.

*Existing policy instruments and measures, including institutional mechanism and fiscal incentives or any master plans, that encourage application of sound 3R technologies for improving resource efficiency and reducing waste in the production processes, waste minimization, resource recovery( Including energy recovery), treatment, recycling and safe disposal*

### **Waste Management Rules and Regulation 2011**

The rules and regulation on waste management has been issued in accordance with the Waste Management Act 2009 and these rules and regulation takes care of Waste Management at various levels of Waste Segregation, Waste collection and transfer, Waste Recycling and Composting.

**Waste Segregation:** According to this rules and regulation, an individual house owners are required to have separate bins for atleast “bio-degradable” and “non-biodegradable” wastes and the Municipality Authority or authorized provider are to collect the segregated waste separately. Furthermore, the area for placement of waste bins has to be carried out during the building approval process.

#### ***Waste Collection and Transfer:***

The Collection of waste shall be done in a manner which prevents damage to the receptacle, or spillage or scattering of solid waste within the collection vicinity and minimum frequency of collection shall be two times a week for residential and three times a week for commercial area or may be determined by Municipality from time to time.

In regards to the transportation, littering at the loading point and during transport are to be avoided and vehicles or containers used for the collection and transportation of waste are required to be covered.

#### ***Waste Recycling and Composting:***

It is the responsibility of the Municipality to identify, construct and operate by itself or through a third party, a Material Recovery Facility where recyclable waste is collected and further segregation is done to optimize waste diversion from the landfill. Furthermore, the Municipality is responsible for creating environment for waste recycling to be a viable business opportunity to the private sector also to the informal waste pickers by providing technical support, leasing of land, government subsidy and through initiation of collaborative waste recycling projects with private sectors wherever feasible.

In regards to composting, the Municipality is responsible for installing composting facilities or through arrangement with private sectors. They shall also raise awareness amongst the public through print and broadcast media.

### **Public Private Partnership pilot project**

The Public-Private Partnership pilot project aims to improve the solid waste management system through separation of wastes at source by supporting storage infrastructures and enhancing recycling of organic wastes through composting. Outsourcing of collection system is also expected to be experimented during this project. The reduced burden on the local government through outsourcing of such services means, they will have more time to focus on the delivery of other services. Waste segregation that will be encouraged through the project will highlight the effectiveness of the approach in reducing the volume of waste and also demonstrate that through recycling waste (as recyclable waste after segregation will be sold to waste / scrap collectors) trash can be converted into money. Through the project, engagement of community groups or private business enterprises to provide services could generate employment opportunities to many unemployed groups in the capital city including youth and the poorest section of the society. If this pilot project is successful, then this project will be enhanced to cover whole Thimphu town and also to other Districts in the country.

***Specific policy and strategy for promotion of 3R technologies in small and medium size enterprises (SMEs), which lack required expertise and resources in implementing resource efficiency, environmentally friendly technologies.***

#### References:

- Studying municipal solid waste generation and composition in the urban areas of Bhutan, 2009
- Managing Hazardous wastes Inventory report, 2008.
- Waste Prevention and Management Act, 2009
- Waste Management Rules and Regulations for Thromde 'A', 2011