

Chapter 1 Project Idea for Solid Waste Management

1.1 Brief Summary

Solid waste management through composting is a matured technology and has been a key strategy to address the issue of waste and reducing associated GHG emissions from the sector in Bhutan also. There are on-going efforts being made across organizations in the country in setting up composting plants in the country. A plant has already been set up in the city of Thimphu, managed by Thimphu City Corporation. While efforts are being undertaken, there is still dearth of knowledge on various other economically viable composting techniques in the country. The plant set up in the city of Thimphu, is confronted with several issues related to difficulties of transporting waste to the plant, quantity of waste generated for successful running of the plant, marketing of the compost, etc. There is a realized need for exploring different option of composting techniques at both centralized and decentralized level, given the small demography of the country.

The proposed project idea based on other parts of the TNA report suggests a set of activities focussing on technical aspects associated with evaluating composting techniques, undertaking pilots and designing support infrastructure. The project includes an assessment of different composting techniques and financing models for implementing these techniques and documenting it in a form of guidebook. In order to have a better understanding of the kind of support infrastructure needed for setting up and managing composting projects, the project also recommends studying some models on support infrastructure (in terms of waste collection, segregation and transportation) of other countries keeping in mind few important cities of Bhutan, to start with Thimphu.

1.2 Specific Project Ideas

1.2.1 Introduction

Project title: *Promoting composting in Bhutan by assessing different techniques, building support infrastructure and undertaking pilots*

Background and rationale

In recent years, rapid rates of urbanization, rural-urban migration, changing consumption pattern and high population growth rate in Bhutan has led to rapid increase in waste generation and thereby problem of waste disposal. According to Bhutan's SNC, in 2000, GHG emissions from the waste sector in Bhutan accounted for 2.9% of the total national emissions. Emissions in waste sector have steadily risen since the past decade, especially from solid waste disposal on land. There is a growing recognition of the issue of waste disposal and Government has started to explore several avenues for efficient solid waste management in the country. The Waste Prevention and Management Act, 2009 is the guiding document for the current waste management system in Bhutan and is based on three guiding principles of Precautionary principle; Polluter pays principle and Principle of 3 Rs (reduce, reuse, recycle) and Waste Minimization Hierarchy.

With this background, and in line with the action on ground in the country, composting was finalized as the technology for development and diffusion under the current TNA process. The current report, building on the work undertaken in the other parts of the TNA exercise, proposes a project idea with a view of initiating a process towards implementing the needed measures for overcoming the barriers associated with development and implementation of composting projects in Bhutan. The project aims to facilitate deployment of composting as a key strategy for waste management by identifying and disseminating knowledge on various economically viable composting techniques, assessing the support infrastructure required and setting up a pilot model of decentralized composting projects using effective public and private partnership models.

1.2.2 Objectives

The project aims to achieve the following:

- To identify potential techniques of composting best suited to Bhutanese households along with potential financing models

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- Identify the kind of support infrastructure needed for setting up and managing different composting projects.
- Demonstrate a decentralized method of composting by undertaking a pilot

1.2.3 Project Outputs

Following measurable outputs would be attained after the end of the program

- A guidebook on composting techniques and financing models for promoting composting at decentralized and centralized level A better understanding of the kind of support infrastructure needed for setting up and managing
- An assessment of support infrastructure needed for setting up and managing composting projects
- Pilots for demonstration for a decentralized composting technology at household level

1.2.4 Relationship to the country's sustainable development priorities

With the growing issue of solid waste generation and disposal, efforts are being made in exploring different solutions as well as formalizing the waste management sector in the country. The current programme evolving out the extensive stakeholder consultation as part of the TNA exercise is reflective of the views of concerned government officials as well as in line with the principles of the Bhutan's, Waste Prevention and Management Act, 2009. Bhutan has started exploring public-private partnership projects to improve solid waste management systems and even for setting up composting projects. A composting plant has been set up in Thimphu and there are plans for setting up plants in other urban towns. The National Environment Commission, responsible for overall coordination, particularly regulatory aspects of waste management in the country is in the process of developing an integrated strategy for waste management in the country of which composting is a major component.

1.2.5 Project Benefits

The project by identifying and prioritizing composting technologies along with potential financing models will facilitate setting up of composting projects in the country and overall waste management. One of the key components for successful operation of composting projects is availability of compost as a raw material, the current project through a study on developing support infrastructure for waste collection, segregation and transportation will greatly facilitate the availability of compost. The project also focuses of undertaking a pilot for demonstrating decentralized composting model in the country, this will facilitate uptake of similar projects in the country.

1.2.6 Project Scope and Possible Implementation

The project scope will be comprehensive focusing on creating knowledge on technical aspects for both central and local level authorities. The technology demonstration would be in major cities such as Thimphu. The assessment study will be conducted evaluating all potential composting technologies along with financing models for implementation, which will vary by city. The project will be undertaken in a way to contribute to the development of an integrated strategy for waste management in the country of which is currently under progress within NEC. The pilots for decentralized composting projects could be undertaken in a few select cities or a beginning could be made in the city of Thimphu where different composting techniques could be piloted.

The implementation possibility is high as it is directly linked with the integrated strategy being developed for waste management in Bhutan by the NEC. There are ongoing programs also on exploring public private partnership models for waste management by NEC and UNDP Bhutan. The project has a strong linkage with these programs also. Finally, the country is aiming at developing Nationally Appropriate Mitigation Actions (NAMAs) for the waste sector for which the findings of the proposed project idea would be highly useful.

1.2.7 Project activities and timelines

The key project activities and timelines are shown in Table 1 below

Table 1: Proposed project activities- Solid Waste Management sector

S No.	Activity	Sub-activity	Duration	Budget (USD)	Budget heads	Responsibility/Coordination agency	Measurement/Evaluation parameter	Potential Funding sources
1	Developing a guidebook on composting techniques and financing models for promoting composting at decentralized and centralized level	<p>1.1 Identify organization to undertake such a study either domestically or hire external consultants</p> <p>1.2 Prepare a list of possible composting technologies and implementation models (e.g. decentralized, centralized, hybrid). With particular focus on techniques applicable at household level.</p> <p>1.3 Undertake a cost benefit analysis of each technology/model</p> <p>1.4 Describe implementation mechanism for each</p>	6 Months	50000	<p>Cost of staff in MoWHS for project concept preparation, procurement of external consultants and management of the project</p> <p>Consultancy fees</p>	MoWHS and City Councils	<p>A publicly available report on Composting potential in Bhutanese cities to manage waste.</p> <p>A list of finalized technologies for application in the country.</p> <p>A list of possible financing models for promotion of different techniques of composting..</p>	<p>Funds allocated under Bhutan's 11th Five Year Plan; Technical assistance fund and debt fund support from ADB, World Bank and KfW.</p> <p>For funding policy measures and other measures Nationally Appropriate Mitigation Actions (NAMAs) can be developed for the transport sector in</p>

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		<p>technique, identifying roles of involved agencies.</p> <p>1.5 Analyze possible financing models for different techniques of composting. Explore potential of PPP models, incentive schemes from municipalities for households to promote household level composting etc.</p> <p>1.6 Document the results of such a study in form of Guidebook, to be made publically available.</p> <p>2.1 Appoint a team within NEC or MoWHS for undertaking the study or assign external consultants for the same</p> <p>2.2 Study successful case examples from other countries on the models of support infrastructure applied in other countries. The infrastructure could consist of methods of waste</p>			<p>6 months</p> <p>50,000</p> <p>Staff cost/consulting costs</p> <p>Workshop costs; Documentation and printing costs</p>	<p>NEC and MoWHS</p>	<p>A report on specific models of support infrastructure developed for adoption by city municipalities.</p>	<p>Bhutan. These NAMAs can then attract domestic (unilateral), bilateral and carbon finance based funding (Credited NAMAs)</p> <p>Green Climate Fund, Least Developed Country Fund (GEF); World Bank Clean Technology Fund; UNDP MDG Carbon Facility; ADB Climate Change Fund; International Climate Initiative;</p>
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collection, waste segregation and transportation to composting sites for different methods of composting.

2.3 Undertake a consultative workshop to present study findings and seek advice from experts both from within Bhutan and other countries for example, India.

2.4 The kind of support infrastructure needed should be studied at city level and by type of composting technology.

2.5 Finalize the model of support infrastructure to be developed for each identified technology

3	Undertake pilots for demonstration of a decentralized	3.1 Identify and select sites for undertaking pilot based on the selected composting technology. Pilot	12 months	75,000	Staff cost for planning, implementation and management of the pilots	NEC and Ministry of Works and Human Settlement (MoWHS)	Atleast 2 pilots conducted by the 12 months.
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composting technology at household level could be conducted at an individual household level or at a community housing level

3.2 Appoint the responsible city council as the lead agency for undertaking the pilot.

3.3 Prepare techno-economic feasibility reports and detailed project reports highlighting technology, application and financial details

3.4 Prepare implementation plan including ownership models and project management models, technical skill development plans, etc

3.5 Undertake training of staff of city councils on selected composting technology and implementation model.

- Technical reports including detailed project reports

- Documentation and printing costs

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3.6 Implement the pilot and monitor the pilots to draw lessons from pilot applications of the technology

1.2.8 Possible Complications/Challenges

The key challenges in the project are:

- Limited human resources in NEC and MoWHS for waste management, may slow down the process and thereby increase lag time
- Delay in getting access to fund from domestic and international sources
- A formal institutional structure for waste management in the country is currently being designed in Bhutan, in absence of a proper institutional structure and assigned roles and responsibilities there is likelihood of delay in implementation of above activities.