

CHAPTER 2: PROJECT IDEA FOR THE WASTE MANAGEMENT SECTOR

2.1 Summary of Project Ideas for the Waste Management Sector

This project proposal focuses specifically on the management of bio-degradable wastes that are produced by household, institutional and commercial activities. Identification of this project as a priority for Kenya arose as a result of consultations with stakeholders during a workshop held at the Ministry of Works Club on November – 29th 2012 during which biogas technology was selected as the most suitable for waste management under the country's circumstances because of its history of deployment in the country, its national and global benefits and its potential for wide diffusion in the country.

2.2 Specific Project Idea: Building National Capacity to Increase Utilization of Bio-Gas Technology towards Enhanced Conservation of Forests and Cleaner Environment

2.2.1 Introduction and Background

Almost all socio-economic activities in the country generate different types of wastes the quantities of which are dependent on type and level of activities. The problem is that the management of these wastes often leads to emissions of greenhouse gases into the atmosphere and other negative effects on the environment including public health. The aim of the project being proposed here is to deploy and diffuse technologies that will greatly improve waste management not only to reduce emissions of greenhouse gases but also to improve socio-economic conditions of communities and other actions of environmental conservation.

The project was developed through a participatory process involving the Mitigation Working Group and key stakeholders.

2.2.2 Project Rationale

Wastes are often justifiably regarded as hazards because of their potential negative impacts on human and animal health, plant life and the environment. However bio-degradable wastes can be managed in a way that not only reduces their negative effects but also improves the environmental conservation and socio-economic conditions of communities.

The rural communities are often the most affected by the impacts of climate change and also undertake activities that lead to global warming such as deforestation. They are therefore the main focus of the climate change technologies being proposed.

2.2.3 Why the Need for Financial Assistance

Response to climate change is now agreed to be at two main levels namely:

- i) Climate change adaptation whose aim is to reduce its impacts.
- ii) Climate change mitigation whose aim is to reduce its magnitude.

Kenya is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and is striving to contribute to global efforts to reduce emissions of greenhouse gases and to enhance Carbon sinks within the country's development plans and programs. However the country does not have the technological and financial capacity to do so, for these reasons in accordance with the Convention there is need to be provided with both technological and financial assistance to enable her to undertake effective measures to respond to climate change.

2.2.4 Project Relationship to National Development Plans and Priorities

Kenya's Vision 2030 recognizes that energy will be the key driver of the national development programs towards realisation of the Vision. In this regard Energy Policy of 2004 and the Energy Act of 2006 promote development of renewable energy resources that are available in the country.

Rural development that is environmentally sound is one of the top national development priorities. Generation of clean renewable energy from wastes and focusing on rural areas has many national benefits such as conservation of forests, community health, improved farm productivity and poverty reduction.

2.2.5 Project Deliverables

According to technology action plan for methane capture at least 120,000 households are targeted to have access to biogas by the vision year 2030.

The main aim of this project idea is to drive the diffusion of the technology. It is expected that at least 6000 households in 20 counties will be recruited to participate in the project during the first year with the number increasing until all the 47 counties are covered.

The main benefits will be as follows:

i) Expected Community Benefits

- Fuel-wood burning increases indoor air pollution leading to increase in respiratory diseases. The use of biogas will reduce the incidences of the diseases and the communities will benefit from avoided medical costs.
- The bio-digester slurry is very rich in crop nutrients and the farmers can use it instead of expensive numeral fertilizer, and hence reducing the cost of crop production leading to enhanced income generation.
- Enhanced quality of indoor lighting at night will increase the ability of school children to do their homework effectively leading to enhanced academic performance.
- Women in rural areas are the ones who search and carry heavy loads of firewood for households. The use of biogas will relieve them of the labour.

ii) Expected National and Global Benefits

- Forests are some of the critical national resources in the country because of their contribution to social and economic development and conservation of the environment. This project will lead to reduced deforestation.
- Forests enhance some of the rain producing processes and forested areas receive more rainfall than non-forested ones. They therefore contribute to enhanced food production and also reduce land degradation. These benefits will result from the project.
- Forests act as carbon sinks absorbing large amounts of carbon dioxide from the atmosphere. Carbon dioxide contributes about 60% of global warming. The sinks will be enhanced through the project.

- In Kenya deforestation has been taking place at the rate of 12,000 hectares per year. The use of biogas will lead to significant reduction of deforestation resulting in national and global benefits.
- Methane is a powerful greenhouse gas whose global warming potential is 21 times that of Carbon Dioxide. If a household uses on the average 200 kilograms of biogas per year 120,000 households will prevent emission of about 20,000 tonnes of methane in the atmosphere per year leading to corresponding reduction of global warming resulting in global benefits.

2.2.6 Past and Ongoing Activities Related to the Project

Biogas technologies have been deployed in the country for many years now and have been targeting farmers who practice dairy cows in zero grazing conditions. But the diffusion of the technology to the communities has not marched the period during which it has been deployed.

There are now Non-Governmental Organizations (NGOs) who are making efforts to deploy the technology within the rural farmers.

The Dutch Ministry of Foreign Affairs has provided funds for implementation of a five year (2009-2014) biogas project in Kenya Known as Kenya National Domestic Biogas Programme which is targeting rural households in high potential areas and who practise mixed farming that includes dairy cows under zero grazing. The main objective of the programme, which is supported by the Kenya Government through the Ministry of Energy, is to construct a total of 12,000 bio-digesters of different sizes ranging from 4-12 cubic meters depending on the specific needs of individual farmers.

The project being proposed here will build on the achievements and experiences of this project and others to diffuse the technology not only to the high potential areas but also to the dry land pastoral communities by removing the identified financial and technical capacity barriers. The project activities will be undertaken in all parts of the country in both dry and rainy areas depending on the availability of suitable wastes for raw materials.

2.2.7 Project Goal

The goal of the project is to enhance sustainable development through environmental conservation and improved socio-economic conditions while addressing climate change mitigation.

2.2.8 Project Objectives

Objective 1: To determine the Methane capture technology needs of the country.

Objective 2: To enhance national and technological capacity for wide diffusion of Methane bio-digesters.

Objective 3: To enhance financial capacity for diffusion of biogas technology in the country.

2.2.8.1 Outputs and Activities to Achieve Objective 1

Table 2.1: Outputs and activities to achieve Objective 1

Output 1	Report of current level of biogas installations and the views of the users	
Activity 1	Conduct survey of existing biogas installations in different parts of the country. This activity will help to identify and assess the present status of the technology and experiences of the users concerning its value	Timeline Year 1 of the project
Activity 2	Conduct survey of technical capacity of biogas users to operate and maintain bio-digesters. This activity will help to assess the need for organising field training activities for the users including demonstration exercises	Timeline Year 1 of the project
Activity 3	Conduct survey of existing technical capacity for construction and maintenance of bio-digesters. This activity will help to assess the training needs of the country in biogas technology	Timeline Year 1 of the project
Output 2	Report of training capacity in the country	
Activity 1	Conduct assessment of existing training and research institutions which have interest in biogas technologies. This activity will help to assess training and research capacity needs of the country in biogas technology.	Timeline Year 1 of the project
Activity 2	Conduct a survey of the current biogas marketing situation and potential. This activity will help to assess the current market situation and future potential for marketing of the biogas in various areas of the country.	Timeline Year 1 of the project

2.2.8.2 Outputs and Activities to Achieve Objective 2

Table 2.2: Outputs and activities to achieve objective 2

Output 1	Training programs for bio-digester technical personnel and users are implemented.	
Activity 1	Identified training institutions develop short and longer term training programs for technical personnel. This activity will be undertaken in consultation with the relevant government ministries, the private sector and technology suppliers	Timeline Year 1 of the project
Activity 2	Conduct training of bio-digester construction and maintenance technicians. This activity will enable bio-digester users to have easy access to technical support and hence make them technically sustainable. Training courses will be implemented in the existing institutions in the country.	Timeline Year 2, 3 of the project period and beyond
Activity 2	Conduct appropriate training of bio-digester users on operation and maintenance. This activity will enhance the capacity of users in operation of bio-digesters including efficient methods of feeding the units with raw materials and collection of the gas	Timeline Year 2, 3, 4 of the project and beyond
Activity 3	Identify institutions that have technologies which are appropriate to Kenya's conditions. This activity will help to provide ways and means of transferring the technologies for deployment in the country	Timeline year 1 and 2 of the project

2.2.8.3 Outputs and Activities to Achieve Objective 3

Table 2.3: Outputs and activities to achieve Objective 3

Output 1	Public awareness of biogas technology is enhanced	
Activity 1	Conduct public awareness campaigns on the benefits of biogas energy use. This activity will help to promote the use of biogas as clean energy with health, economic and environmental benefits	Timeline Year 1, 2, and 3 of the project
Activity 2	Establish demonstration centres in different parts of the country and conduct demonstrations. This activity will be extended to pastoral communities in the dry land areas of the country	Timeline Year 1, 2, and 3 of the project
Output 2	Markets for biogas are established	
Activity 1:	Facilitate formation of groups which can construct common bio-digesters. This activity will help in the formation of groups of manageable sizes which can have access to raw bio-digester materials and be able to share the gas products through appropriate arrangements among themselves with equal benefits	Timeline Year 2, 3 and 4 of the project.
Activity 2	Facilitate marketing of biogas by small scale farmers. This activity will enable farmers to produce biogas and sell it to other people through appropriate and safe containers. Manufacturing technologies will be developed for appropriate sizes of the gas containers which are easy to be transported.	Timeline Year 2, 3 and 4 of the project
Output 2	Financial mechanisms to support bio-digesters are developed	
Activity 1	Conduct awareness campaigns within financial institutions in the country on the need for granting loans at low interest rates for bio-digester construction This activity will be conducted by government ministries in collaboration with other partners	Timeline Year 1 and 2 of the project
Activity 2	Conduct information campaigns within international financial institutions on the need to provide financial support for construction of bio-digesters This activity will be undertaken by the government ministries in collaboration with other institutions	Timeline Year 1 and 2 of the project
Output 3	Bio-digesters are financially feasible	
Activity 1	Enhance financial incentives to make biogas technology more attractive by reviewing the existing Energy Act. This activity will be undertaken by the Ministries of Finance and Energy	Timeline Year 1 and 2.
Activity 2	Formulate mechanism for government financial support for bio-digester construction. This activity will help small scale farmers construct bio-digesters	Time line Year 1 of the project
Activity 3	Formulate framework for financial institutions to provide loans at low interest rates to construction of bio-digesters. This activity will help small scale farmers access bio-digesters through loans at repayments they can afford with their farm produce	Time line Year 1 and 2 of the project
Activity 4	Facilitate manufacturing of bio-digester accessories in the country at low costs. This activity will enable manufacturers to produce accessories at affordable prices	Time line Year 2 and 3 of the project.

2.2.9 Institutional Arrangements and Collaboration

Arrangements will be put in place for collaboration between the following institutions among others:

- The project will be implemented by the Ministry for Environment and Mineral Resources which is mandated to coordinate climate change activities. The Ministry is also responsible for implementation of the Kenya Climate Change Response Strategy Action Plan and Multilateral Environment Agreements including UNFCCC.
- Ministry of Agriculture and Livestock Development will provide extension officers to work with farmers in the country.
- Ministry for Energy has a Department for renewable energy. It will provide experts who will be members of the project steering committee
- Research and development institutions such as KARI, KEFRI, and KIRDI will conduct activities towards improvement of the technology.
- Training institutions such as University of Nairobi, JKUAT, Kenya Technical University will prepare and conduct training courses for manufacturers and users of the technology.
- The private sector will provide construction of the bio-digesters and accessories under the umbrella of Kenya Association of Manufacturers (KAM) including maintenance and hands-on training of the users.
- Non-Governmental Organizations (NGOs) and Community Based Organizations (CBOs) will be actively involved in developing links between the technology providers and the users through awareness creation and demonstration activities.

2.2.10 Project Duration

The project will be implemented over a period of 5 years.

2.2.11 Project Budget in US Dollars

The following are the proposed budget lines for the various project activities:

Table 2.4: Project Budget

National survey of current level of installation of bio-digesters, views of the users, training needs of construction and maintenance technicians and those of the users.	1,000,000
Training of bio-digester construction and maintenance technicians including development of training courses: year 1, 2 and 3	2,500,000
Training of bio-digester users including development of appropriate hands-on training courses that are suitable for communities in different parts of the country and construction of pilot bio-digesters: years 1, 2, 3 and 4	5,000,000
Formulation of financing framework involving government, private sector, financial institutions, NGOs CBOs and international institutions; year 1 and 2	500,000
Public awareness campaigns including site visits and demonstrations, print and electronic media: years 1, 2, 3, 4 and 5	3,000,000
Developing biogas marketing strategies for individual owners and groups: years 2, 3, 4, and 5	2,000,000
Monitoring and Evaluation including end term and end project external evaluation: years 1, 2, 3, 4, 5	2,000,000
Sub-total	16,000,000

Office expenses:

Office computers, printing, projectors etc.: years 1, 2, 3, 4, 5—	60,000
Workshops expenses: years 1, 2, 3, 4, 5—	1,500,000
Monthly Steering Committee meetings: years 1, 2, 3, 4, 5—	500,000
Travel expenses: years 1, 2, 3, 4, 5—	200,000
Project vehicle: year 1, 2, 3, 4, 5 —	100,000
Vehicle maintenance: years 1, 2, 3, 4, 5 —	200,000
Sub-total	2,560,000
Remuneration of project staff:	
Project Manager: years 1, 2, 3, 4, 5 —	250,000
Deputy project manager: years 1, 2, 3, 4, 5 —	180,000
Project technical officers-3: years 1, 2, 3, 4, 5 —	270,000
Secretaries-2: years 1, 2, 3, 4, 5 —	120,000
Vehicle driver: years 1, 2, 3, 4, 5 —	50,000
Project support staff-2: years 1, 2, 3, 4, 5 —	60,000
Sub-total	930,000
Total	19,490,000
Contingency; 5% of total	960,000
Grand total	20,450,000

2.2.12 Sources of Funding

- International funding institutions will be requested to provide funds for project activities.
- Government co-financing from proposed Green Fund.

2.2.13 Project Implementation Strategy

- The project will be implemented under the Ministry of Environment and Mineral Resources.
- The project manager will be responsible for coordination and management of all the project activities.
- The deputy project manager will assist the manager in the coordination and management of the project activities.
- The project Steering Committee consisting of experts and representatives of stakeholders will be responsible for developing project implementation plans.
- Project consultants will undertake technical activities.
- In addition to construction of bio-digesters the training activities will complement and strengthen other bio-digester projects that are being implemented by other organizations in the country in a collaborative and synergistic way.

2.2.14 Monitoring and Evaluation

Monitoring will be through quarterly reports to the executive ministry, funding institutions and other stakeholders.

Evaluation will be conducted through internal and external evaluation process

2.2.15 Possible challenges

The project may face a number of challenges such as:

- i) Community cultural barriers e.g. negative perception of energy from waste and waste handling. These barriers will be addressed through public education and awareness campaigns.
- ii) Development of other new sources of energy
This challenge will be addressed through public education to show that different types of energy sources can be used in a household for example solar home system for lighting and biogas for cooking.
- iii) Limited sources of financial support
This challenge will be addressed through justification of the Project activities

2.2.16 Situation at the End of the Project

At the end of the project it is expected that biogas energy will be one of the most preferred source of energy for rural communities because of its demonstrated benefits and its use will also be extended to urban areas due to adoption of more effective and attractive production, storage and portable gas containers technologies. Communities will enjoy clean indoor conditions leading to better health. Deforestation will be significantly reduced resulting in increased global benefits on account of enhanced carbon sinks among other environmental benefits. In addition, emissions of methane into the atmosphere will be reduced.

The project will therefore be a major driver of diffusion of the biogas technology long after the end of its activities are completed in support of the country's technology action plan for climate change and will therefore contribute to the achievement of the Vision 2030.

For these reasons sustainability of the biogas technology as a major contributor of energy generation in the country will be greatly enhanced.