REPORT IV: PROJECT IDEA REPORT

This report comprises project ideas for solar home systems (SHS) and solar dryers in the energy sector and methane capture in the waste management sector.

CHAPTER 1: PROJECT IDEAS FOR ENERGY SECTOR

1.1 Summary of Project Ideas for the Energy sector

The following project ideas in the energy sector were identified on basis of their contribution to socio-economic development and climate change mitigation potential. Further they were prioritised among a list of other green technologies with the assistance of Multi-Criteria Analysis using a computer based model. The target group for SHS technology comprises rural households, health and market centres and other institutions based in the rural areas that are not connected to the national electricity grid. For solar dryer technology, the target for the diffusion of the technology comprises small scale and commercial farmers. The objective of concept idea for Solar Home System technology is to widely diffuse solar home systems technology amongst the rural households not connected to the national grid. As for the solar dryer technology project idea, its main objective is to promote its widespread use amongst Kenyan farming communities and other commercial enterprises that hitherto have been using traditional drying in the open or using diesel powered and fuel wood for drying their products.

Diffusion of the two technologies will be done through public awareness campaigns, technical capacity building and financial assistance to the target users of the technologies.

1.2 Specific Project idea: Promotion of Diffusion of Solar Home System Technology in Kenya

1.2.1 Introduction and Background

Kenya lies along the Equator. Solar energy resources are available in many areas of the country in quantities that are commercially viable. Solar Home Systems provide households lights, electrical power for televisions, radio cassette players and small appliances.

Although Solar Home System technology is not new in Kenya, there is potential to increase its diffusion rate especially in rural areas where 80% of the population is not connected to the grid. As one of the largest unsubsidized markets for solar home systems (SHS) in Sub-Sahara Africa, Kenya represents a promising model for rural electrification based on private purchases of clean decentralized photovoltaic technologies.

Kenya has put in place an enabling an enabling framework in terms of national policies and legislation for accelerating diffusion of SHS. Additional measures are being recommended for the same.

As a technology in the energy sector, SHS was prioritized with the assistance of Multi-Criteria Analysis (MCA) which is a computer based model. MCA was conducted with involvement of key stakeholders. The project will involve promotion of country-wide diffusion of SHS technology. This is expected to result in wide application of SHS technology by rural household and institutions such as schools, health clinics and markets not connected to the grid. Again, due to high frequency of power blackouts across the

country, households and institutions connected to the grid may wish to install SHS for purpose of secure power supply.

The projects were developed through a participatory process involving the Mitigation Working Groups and key stakeholders (Annex I).

1.2.2 Objectives

The major objective of this project idea is to promote wide application and diffusion of SHS technology, a green energy technology, to replace fossil fuel based technologies associated with emissions of greenhouse gases into the atmosphere. At national level, 165,000 SHS units by 2017 and to reach 3 million SHS household units by 2030. The project will target about 83,000 households annually in 24 counties and is expected to reach an overall target of 332,000 households by 2018. By 2030, an estimated 1.5 million households are expected to access SHS technology. The targeted households solely depend on kerosene lamps and candles for lighting. These lamps/candles are harmful to the environment including human health because they produce black particles and smoke resulting in upper respiratory diseases. Because of poor illumination eyesight is also affected.

Green technologies assist in reduction of the country's reliance on fossil fuels which are imported and making the country spend a lot of hard currency which could otherwise be used for other national development priorities. Adoption and diffusion of SHS technology therefore assists the country save on the foreign currency, improve human health and assist in mitigation of emissions of GHGs into the atmosphere. SHS can replace use of kerosene, and fossil fuel for lighting rural households. The mitigation potential is in the range of 1,000ktCO_2/year in 2030 (Saidi et.al. 2012).

1.2.3 Outputs

The project is targeting 332,000 households by 2018 in 24 counties in the rural Kenya who are not connected to the electricity grid. A rural household on average consumes 3KWh/day. This would translate into 996,000 KWh/day for the target population. A rural household on average consumes 1 litre of kerosene at Kshs. 84/week. This would translate into Kshs.1, 454,160,000 per year being spent by the country to import kerosene. Adoption of the SHS technology by 332,000 million households by 2030 would mean that the country will save Kshs. 1.45 billion per year that could be used for other economic development activities.

1.2.4 Relationship to the Country's sustainable Development Priorities

At present, Kenya relies heavily on use fossil fuels as sources of energy to meet her increasing energy needs. In order to achieve the goal of low carbon developed society, Kenya is expected to pursue an energy mix that greatly relies on carbon-neutral energy sources such as solar and other renewables. The implementation and use of renewables will increase Kenya's energy security besides mitigating climate change associated with droughts and floods in the country. This is in line with Kenya's vision 2030 and the national energy policy of 2004 and the National Climate Change Response Strategy.

According to Vision 2030, the government intends to make SHS technology accessible to all rural households and public institutions not connected to the grid by 2030.

1.2.5 Project Deliverables

The project benefits include the following:

i) Employment creation. About 480 technicians will be employed on full time basis in the 24 counties to install, repair and maintain SHS.
ii) Foreign currency savings. 78 million litres of kerosene are imported annually for use by 1.5 million households. Use of SHS technology will avoid importation of the same.

Social and health benefits include:

i) Good learning opportunities for students in the evenings. Use of SHS will increase the ability of school children to do their homework effectively at night and thereby improving their academic performance.
ii) **Improved health**
Traditionally families in rural areas use paraffin and candle lamps as source of light. These lamps produce fumes which are harmful to human health. Enhanced quality of indoor lighting using SHS will reduce incidences of respiratory diseases.
iii) **Mitigation of climate change**.
About 664,000 paraffin lamps would be replaced by SHS in the 24 counties by 2018.

1.2.6 Project scope and possible implementation, Feasibility and Linkages to Current or Past Projects

The project will be implemented in 24 out of the 47 counties targeting rural households, market and health centres and other institutions in the rural areas that are not connected to the grid. The project is feasible because solar energy resources are available in many areas of the country in quantities that are commercially viable. Solar Home Systems (SHS) technology is available in the country and its diffusion is being promoted by the private sector, NGOs and the government. Solar electric systems are being sold to end users in Kenya through a competitive and growing free market network.

The government has also put in place an enabling framework aimed at removing barriers related the implementation of green energy technologies in the country. The government has exempted SHS components and parts from import duty and Value Added Tax (VAT), formulated standards for SHS technology, and is in the process of actualising a green energy facility fund to be accessed on concessionary rates by people investing in green energy technologies such as SHS.

This project is linked to current government's efforts to provide green energy based electricity including SHS to all Kenyans by 2030 to ensure sustainable socio-economic development.

1.2.7 Project Activities and Budget

The project will be implemented by the Ministry of Energy in collaboration with the private sector and Non-Government Organizations (NGOs), development partners and the beneficiaries.

The following activities will be supported:

i) Public awareness campaigns through print and electronic media to promote wide diffusion of the technology in the country

ii) Training of technicians and selected households in installation, repair and maintenance of SHS
iii) Provision of financial incentives to the consumers of technology in order to remove the barrier of high up-front costs associated with acquisition of the technology
iv) Marketing campaigns by the industry and other stakeholders
v) Institutional collaboration mechanism between the government, private sector, NGOs and community groups.
vi) Quality control of SHS components by the Kenya Bureau of Standards to ensure that only high quality SHS are imported into the country
vii) Monitoring and Evaluation

The total project budget is US dollars 17,565,882.35. Details of the project budget are indicated in the tables below.

Table 1.1: Project Activities and Budget

Activity	Target Group	Main actors	Cost in US Dollars	Justification
i) Public Awareness Campaigns. To educate and sensitize the rural households and other potential users of the technology on its socio-economic and environmental benefits of SHS technology	Rural households and other potential users of the technology	Media, Civil society and private sector and county governments	2,400,000	At US $ 100,000 for each of the 24 counties
ii) Training of technicians, rural households, and other potential users on installation, repair and maintenance of SHS technology	Technicians; rural households and other potential users of the technology	Ministry of Higher Education, Science and Technology; local universities Private sector; partners in development; and NGOs	6,240,000	At US $ 2,000 for 20 technicians and 30 rural households in all the 24 counties. Trained households and business men/women will train others i.e. Training of Trainers (TOT). Tot will be allocated US $ 5,000 per county for four years to train other households in installation, repair and maintenance of solar PV and SHS technology.
iii) Provision of financial incentives to enable poor farmers access affordable credit to buy SHS technology	Poor rural households	Ministry of Finance; financial institutions private sector; development partners; NGOs	2,400,000	At US $ 10,000,000 per county
iv) Marketing campaigns by private sector and civil society	Rural households; market centres, health centres, schools	Civil Society; and private sector	2,400,000	At US $ 100,000 per county
v) Institutional collaboration. This is to ensure harmony and avoid conflicts in the project implementation	Government, private sector, rural households, businessmen and women	Ministry of Energy; and Public Private Partnerships	1,200,000	At US$ 50,000 per County
vi) Quality control of SHS	Importers and retailers of the technology	Kenya Bureau of Standards and Kenya Revenue Authority (immigration section)	2,4000,000	At US$ 100,000 for 24 counties
Monitoring and Evaluation	Project management unit	Ministry of Energy, private sector, NGOs and the project beneficiaries.	$8,000	At US$ 2000 per annum per county
Sub-Total in US Dollars			**17,088,000**	

Table 1.2: Staffing Budget and Car Purchase

Item		Time	Salary/Month in Kshs.	Kshs.	US Dollars 1 US $=85KShs.
1	Project Manager	60 Months	200,000	12,000,000	141,176.47
2	Deputy Project Manager	60 Months	150,000,000	9,000,000	105,882.35
3	Project Secretary	60 Months	80,000	4,800,000	56,470.58
4	Driver	60 Months	50,000	3,000,000	35,294.11
5	Support Staff	60 Months	35,000	2,100,000	24,705.88
6	Field allowances	60 Months	100,000	6,000,000	70,588.24
7	Purchase of Project Vehicle			6,000,000	70,588.24
8	Vehicle Fuel and Maintenance	60 Months	20,000 Per month	1,800,000	21,176.47
	Sub Total			44,700,000	525882.35
	Total in US Dollars				17,613,882.35

The government of Kenya will seek support from bilateral and multi-lateral donor agencies and NGOs to fund the project as part of Nationally Appropriate Mitigation Actions (NAMAs).

1.2.8 Timelines

The project will be implemented within a time span of five years as follows:

Table 1.3: Project Timelines

	Timeframe in Months	Activity
i	01-03	Hiring of Project Manager and Deputy Manager and other project staff
iii	09-60	Training of technicians as well as selected households and other potential users of solar dryers technology in operations and maintenance of the equipment
iii	06-60	Public Awareness campaigns
iv	12-60	Provision of financial incentives to those who are unable to pay for the technology
v	12-60	Quality control of SHS equipment
vi	01-60	Institutional collaboration
vii		Marketing campaigns

1.2.9 Measurement/Evaluation

A monitoring and evaluation system will be put in place to monitor the project achievements on quarterly basis.

The project will have a project steering committee chaired by the Ministry of Energy. Other members will comprise representatives from the relevant government institutions, R&D institutions, academia, financial institutions, media, NGOs and project beneficiaries. The Project Steering Committee will be responsible for monitoring project implementation and will receive project progress reports from the Project Manager on quarterly basis.

Monitoring will be conducted in collaboration with the government, private sector, NGOs and the project beneficiaries.

1.2.10 Possible Complications/Challenges

The biggest challenge is to get funding for the project. Other challenges include convincing the private sector, NGOs and development partners to support the project

1.2.11 Responsibilities and Coordination

The project will be coordinated by the Ministry of Energy in collaboration with the interested stakeholders. These include the following:

i) R&D institutions
ii) Academia
iii) Print and electronic media institutions
iv) The Kenya Bureau of Standards
v) Immigration Department
vi) Service providers: financial institutions; NGOs, industry and development partners
vii) Project beneficiaries

1.3 Specific Project ideas: Promotion of Solar Dryers Technology and Capacity Building for Technicians and Farmers in Kenya

1.3.1 Introduction and Background

The main economic activity in Kenya is agriculture that includes production of cereals mainly maize, wheat, rice, sorghum, millet and other produce such as beans, peas, vegetable and fruits etc. The export market is dominated by tea, coffee and horticultural products.

Traditionally direct solar drying has been used for processing and preserving food, vegetables, fruits and other crops by laying products out in the sun to dry. However for bulky products, the National Cereals and Produce Board of Kenya has dryers that use diesel in all its stations in the country. These diesel powered dryers contribute to emission of carbon dioxide. However, there is no baseline data on the level of emission.

At the various consultative meetings with relevant stakeholders, it has been suggested that the issue of the use of fuel-wood or fossil fuel in the drying of agricultural products be reviewed with a view to promoting application of green energy technologies such as solar energy as a mitigation option. The results of Multi-Criteria Analysis also placed Solar Dryer technology high in the list of prioritised technologies that can contribute to the socio-economic, environment and climate change mitigation.

In many other countries of the world, the use of solar thermal systems in agriculture to conserve vegetables, fruits, coffee, tea leaves and other crops has shown to be practical, economical and environmental friendly by reducing the use of fuel-wood and fossil fuel.

The development of this technology can be at different levels namely the family units, medium scale systems for groups or cooperative societies, and large scale commercial applications for large commercial farming operations.