

Support to Tanzania Traditional Energy Development (TAN-2308)

Review

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Executive Summary

The Government of Norway supports TaTEDOs program '*Integrated Modern Energy Services for Sustainable Development and Poverty Reduction*' (IMESPORE) with 10 million NOK for three years (2008-2010). The goal of the program is to contribute to sustainable development and poverty reduction by enhancing access to sustainable modern energy technologies and services for consumptive and productive needs in households, SMEs and social service centres in eight regions. The purpose of the review is to assess the progress, achievements and effectiveness of implementation of the program, identify lessons learned and provide recommendations on the way forward.

TaTEDO serves a niche in the energy service for which there is a need. The nature of their support requires funding for some time to come. Their overall performance over the years has been steadily of good quality. It is therefore recommended to continue support to TaTEDO.

STRATEGIC APPROACH

TaTEDOs main approach to dissemination of modern energy is to establish and strengthen Small and Medium Enterprises (SMEs) in this field. This approach works well and has resulted in the establishment of 71 entrepreneurs. Some of the entrepreneurs have and are supporting others so the impact is larger than the reported numbers.

TaTEDO assess the current energy status of the village, collect baseline data, prepare a Village Energy Action Plan (VEAP) and facilitate formation of Village Energy Teams consisting of both women and men. Where this approach works well, it gives a considerably increase in use of cleaner energy technologies. TaTEDO's experience with a wide range of energy technologies is an important asset for mitigating the energy needs of different villages. When implementation in a village is delayed, TaTEDO's inputs are increased in order to fulfil the planned output. TaTEDO should consider a more demand oriented approach to select villages and develop a strategy and when necessary, exit the village/discontinue cooperation with the partner.

Implementation of the program is geographically wide-spread taking considerable resources. It is recommended to consider concentrating a heavy implementation to a geographically more confined area before moving on to the next area. Experience shows that scaling-up of newly acquired technologies could continue without much external effort when a coverage threshold is reached.

TECHNOLOGY

TaTEDO intervention has demonstrated that the main problems connected to widespread use of solid biomass can be avoided and dissemination of the technologies can be taken to scale. In some villages the entrepreneurs have established good business and improved cook stoves will soon be in use by the majority of the households. The promoted improved wood stoves have proved to reduce fuel consumption substantially (40%-75%). Stoves with a chimney almost eliminate the smoke problem, reduce the heat in the kitchen and risk for accidents connected to open fires. The improved charcoal kilns introduced through the program increase the useful output about 30%. Improved charcoal stoves cut charcoal consumption by half. Together the improved kilns and charcoal stoves have a potential to reduce the wood needed for production of charcoal for a household as much as 2-3 times.

TaTEDO should be supported to continue and if possible increase the activities development of efficient use of solid biomass. Solid biomass is not only widely used today, but will also play an

important role of a future sustainable energy sector, given use of efficient technologies. TaTEDO's dedication to the topic represents a continuation of this work in Tanzania. When projects like ProBEC comes to an end, TaTEDO will stay and develop the work further.

PROGRAM DESIGN; MONITORING AND REPORTING

The current program document has a too long list of indicators and many of them measure input rather than results. The new program document should develop clear results, indicators and means of verification that measure the inputs and results, and –where possible- impact of the program. If necessary TaTEDO should be provided external assistance in this process in order to develop TaTEDO's capacity to clarify results and indicators. Annual reports are structured along the six strategic objectives and provide a good account of the activities, but with little analysis.

GENDER EQUALITY

Many of the beneficiaries of the improved energy technologies are women and care is taken to involve both women and men. However, there is a need to increase the understanding and capacity to address gender equality of staff members and partners. Some staff has a good understanding, but others believe gender is addressed because women are the main beneficiaries.

There is a need to mainstream gender better into the program document, its results, indicators and approach. Gender equality also needs to be incorporated in TaTEDO procedures, materials and monitoring system. It might be helpful to include a gender specialist in the next support to strengthen the gender equality capacity of TaTEDO staff incorporating gender equality into the next program, facilitating a gender equality assessment and strengthening a gender equality approach in the approach and all activities.

TATEDO MANAGEMENT

Generally TaTEDO cooperates well with partners and other institutions on the implementation of the program. At the national level TaTEDO cooperates well with relevant government ministries and is an initiator and main driving force in three energy networks.

It is the impression that lessons learnt are taken into account and acted upon. Examples are the business training for entrepreneurs and facilitating access to credit.

TaTEDO accounting complies with international accounting standards and practices to avoid corruption. The same principles apply when contracting external partners. TaTEDO's accounts and financial statements have been accepted by external auditors. TaTEDO approach to quality assurance and avoidance of corruption are according to common internationally accepted practices.

TaTEDO staff is committed and dedicated to their work. Commitment of cooperating organizations and institutions varies. The planning process could have been more participatory and the program document used in a flexible manner. Generally risks are mitigated by including activities into the program, for example facilitating access to credit, providing information and adopting modern energy technologies.

IMPACT AND SUSTAINABILITY

Over half of the key targets were achieved by 65% or more by the end of 2009. Some of the targets were already achieved, for example the number of active SME's run by women (123%) and the number of stove workshop establishments facilitated (100%). A few targets are critical and may not be reached. The budget is not sufficient to procure the targeted number of MFPs planned due to an unexpected price increase. The target of planting 3 million trees is still a long way off

and may not be reached. Of the remaining targets that have achieved less than 65% by the end of 2009, it is estimated that most will be achieved by at least 80%.

Successful entrepreneurs making a profit are likely to continue the production and sales of the cleaner energy technologies. Several are spreading the technologies by training others. At present most entrepreneurs still need support to become stronger. There is also a need to continued development for some of the entrepreneurs' skills on marketing and after sales service in order to increase the request for their knowledge and skills.

Sustainability of continued promotion, monitoring and support by the local government authorities is questionable when the incentives currently provided by TaTEDO ends, or when other more lucrative program are operational within their area.

TaTEDO is financially dependent upon external funding and so far has only self raised 0%-20% of the annual budget. The Strategic Plan 2008-2010 proposes to offer services at cost and to share costs. There is a need to work out a strategy to increase own funding. One opportunity might be to sell advisory and consultancy services.

1 Introduction

TaTEDO is one of the few Tanzanian NGOs that aims at improving the quality of life, reducing environmental degradation and dependency on imported energy by promoting sustainable energy technologies focusing on marginalised communities in Tanzania, through technology adaptations, capacity building, and community mobilisation. TaTEDO has been operating for close to 20 years.

On the 10th of December 2007 TaTEDO entered into an agreement with the Government of Norway to provide support to the '*Integrated Modern Energy Services for Sustainable Development and Poverty Reduction*' (IMESPORE) amounting to 10 million Norwegian Kroner. The program goal is to contribute to sustainable development and poverty reduction by enhancing access to sustainable modern energy technologies and services for consumptive and productive needs in households, SMEs and social service centres at both rural and urban areas of nineteen districts in eight regions in Tanzania. The modern energy technologies and practices earmarked for up-scaling include efficient wood fuels stoves, charcoal and firewood baking ovens, improved charcoal production kilns, solar PV and dryers, Multifunctional Platforms (MFPs), and biogas systems. In addition, the program promotes the growing of multipurpose energy and oil producing *Jathropha* trees. The supported program is a core activity of TaTEDO supplemented by other smaller projects and programs being implemented by TaTEDO in collaboration with her local partners. The program was further be supplemented by the Integrated Improved Wood fuel Services for Poverty Reduction program implemented in eight districts in regions from 2006 to 2009 with support from EU/HIVOS. The program's anticipated positive contribution to improved livelihoods is particularly believed to be beneficial to women. The main strategic objectives of the program are formulated as:

- Upscale uptake and use of modern biomass energy technologies and services
- Mitigate health related and environmental adverse effects with energy production and use
- Increase access to electricity, solar drying and motive power through decentralised energy systems
- Facilitate participatory planning, monitoring and evaluation of the program activities
- Strengthen managerial, institutional and core support for TaTEDO and local partners

The purpose of the review is to assess the progress, achievements and effectiveness of implementation of the program, identify lessons learn and provide recommendations on the way forward.

The review team consisting of Annelies Leemans, team leader and Dag Hoystad, household energy specialist, visited the various activities of TaTEDO from 9 to 18 May 2010. The field visit program is attached in appendix C. The review team conducted a document review, semi-structured interviews and participatory observation as the main methodologies. The review was limited to the IMESPORE only. A debriefing meeting was held with staff responsible for IMESPORE and REDD programs at the Embassy of Norway and with the TaTEDO management.

The Review Team would like to thank the staff of TaTEDO and the Government of Norway and all the entrepreneurs, social organisation members and beneficiaries who took us around on our interesting fieldtrip and shared their experiences. The observations in this report represent the view of the Review Team members.

2 Findings and Recommendations

The Review Team has an overall good impression of the way in which TaTEDO implements the scaling up of the achievements of the program to the 'Integrated Modern Energy Services for Sustainable Development and Poverty Reduction'. The project has managed to scale up and in several areas achieved a higher target than reported because those trained have trained others. These results are not systematically reflected in TaTEDOs reports.

TaTEDO is addressing a niche in the market for which there is a need. Most of the resources of the government go to providing electricity and very little are made available for alternative environmentally friendly energy and even less for household energy. Yet, energy is an important source for improving the livelihood and for developing the rural economy and thus reducing poverty. More efficient use of fuel saves time when collecting firewood and finance when buying firewood or charcoal. Some technologies improve the health conditions by reducing smoke. Access to energy services as baking oven and solar dry lay a fundament for business activities.

2.1 TaTEDO's Strategic Approach

TaTEDO uses three main complementary strategic channels to spread the use of clean energy and sustainable forest management: Firstly, establishing small and medium scale entrepreneurs (SME's): Secondly, close collaboration with local government and communities: Thirdly, support to local organisations. Further, geographical coverage and selection of villages are addressed.

2.1.1 Enterprise Centred Approach

TaTEDO supports SME's in three main areas. Firstly, the production, promotion and sales of wood fuel saving and alternative technologies, such as fixed and portable energy saving wood and charcoal stoves, wood and charcoal ovens, solar and biomass installations. Secondly, SME's receive formal and on-the-job training in the production of the devices. Thirdly, SMEs are supported to access finance using various channels including commercial and community banks as well as other mechanisms. Facilitating access to finance, on-the job training in business management, marketing and after sale care was added when TaTEDO realised SME's needed supported in this area in order to effectively scale up.

The enterprise-centred approach offers rural energy entrepreneurs a combination of enterprise development services consisting of: 1) Knowledge and skills on rural modern energy technologies, 2) Business management, marketing, and after sale services, 3) Linkages to finance. The approach is structured into five major parts:

- Identification, mobilisation and selection of entrepreneurs including business screening.
- Assessment of the business and the market for cleaner energy technologies. The results provide an input into the business development support plan from TaTEDO.
- Provide support into the various identified areas. This is done both in groups and individually.
- Linking the entrepreneur with credit institutions, both at first- and subsequent stages.
- Monitoring performance, follow-up and coaching.

Through this approach TaTEDO has supported 71 active entrepreneurs by the end of 2009. Businessmen are engaged in small solar systems for households and small institutions, production and

sales of small portable stoves, charcoal and wood ovens, and fixed wood and charcoal stoves. The businessmen visited have successfully installed cleaner energy technologies at institutions and households. They have trained others and thus contributed to earn an income for themselves, their employees. Some have trained others.

The establishment of entrepreneurs within the cleaner energy technology sector is successful as an increasing number of entrepreneurs are engaged in this sector. The number is sufficient to consider organizing the energy entrepreneurs. This could be a platform for exchanging experiences and lessons learnt but also for joint cheaper procurement of raw materials and certification of entrepreneurs that fulfil quality standards. Further, they could play a role in lobbying for better policies and conditions. TaTEDO could play an important role of bringing the entrepreneurs together.

RECOMMENDATION

In the next program, continue the approach of providing comprehensive support to establish entrepreneurs in the clean energy sector. In addition, facilitate a platform for entrepreneurs to exchange experiences and coordinate their efforts.

2.1.2 Local Government and Community Approach

When entering an area TaTEDO visits the Provincial Government offices to provide information on the program and to select districts for support based on agreed criteria. In the selected districts TaTEDO staff meets with the District Executive Director and other staff. Next an information meeting is organised to create commitment and prepare a plan of action detailing the tasks of the district. TaTEDO also facilitates the establishment of a District Sustainable Energy Development Cluster (DiSEDCs) usually consisting of staff from various departments such as forestry, community development, health and agriculture, representing the various areas in which TaTEDO is working. DiSEDCs tasks are to implement the action plan, incorporate energy activities into district plans and budgets, conduct awareness raising, promote clean energy technologies, monitor performance and provide support to energy community groups. In all four districts DiSEDCs visited (Rombo, Hai, Monduli, Kahama) members who had left were not replaced. The Review Team did not manage to get figures, but were informed that only little finance is included in the approved annual district plans and budgets and even less disbursed.

In communities TaTEDO facilitates an inventory of the current energy status and needs. This forms the basis for the preparation of a Village Energy Action Plan (VEAP) that details the commitments of both the village and TaTEDO. Village members themselves implement the VEAP with support from DiSEDC members and district and TaTEDO staff, and –where available- active local organisations (often women groups) and individuals. Where this approach works well the use of cleaner energy technologies increases considerably. When implementation is delayed the village is visited more often and/or TaTEDO provides inputs even though the village has not fulfilled its commitment in an effort to encourage action to meet the VEAP targets. TaTEDO does not have a clear strategy on how to respond to non-performance and when to exit a village.

RECOMMENDATION

A structured step by step approach to facilitate and support the implementation of the VEAP and a clear exit strategy will increase the effectiveness of TaTEDO's approach.

2.1.3 Geographical Coverage

IMESPORE is implemented in 8 regions and 19 districts and thus covers a large part of the country. In order to reach the far away regions better TaTEDO has established zonal offices in Moshi and Mwanza. Travelling to the intervention areas takes considerable time and resources as distances are vast and often only accessible by road.

Experience shows scaling-up continues without much external effort when the coverage in an area is about 20%. Although there is a demonstration effect from one village to another the up-scaling process is faster when several villages within an area have reached the critical threshold coverage. At present TaTEDO's intervention areas are quite widespread and often far apart. It could be considered to concentrate efforts within a smaller area until the critical coverage is reached and then move into another area whilst gradually pulling out of the first area.

RECOMMENDATION

In the next program consider concentrating efforts to scale up to a geographically smaller area (or areas depending on the resources) to reach the critical threshold for continuation without support faster. Then gradually pull out of the area whilst at the same time moving into the next. This would optimise the use of the available resources.

2.1.4 Selection of Villages and Intervention Areas

As described above selection is decided by TaTEDO in consultation with the districts. The approach is participatory in the sense that districts are involved in the selection but from the point of view of the villages it is more supply than demand oriented although villages do write an application after receiving information on the program. It is, however, rare for villages not to write an application because of fear of losing the support. Another approach could be to invite applications from interested villages within a geographical area. Participation is dependent upon fulfilment of certain criteria and preferably some contribution in cash. This would require an information campaign within the area to inform of the opportunity and the applications process. It also requires that an application and selection process is in place. Generally, this demand oriented approach, combined with the requirement to contribute cash, has shown better results than the supply oriented approach.

RECOMMENDATION

In the next program consider a more demand oriented approach to select villages and intervention areas for support of TaTEDO whereby villages/social organisations have to apply and fulfil certain criteria.

2.1.5 Providing Information, Support and Backstopping to Local Organisations

TaTEDO is an important competence centre for cleaner technologies and sustainable forest management. TaTEDO shares their knowledge and views through various channels such as; a) TV and radio programs were developed and broadcasted; b) information leaflets and brochures in Kiswahili and English were distributed; c) guidelines on the construction of cleaner technologies were developed, printed and distributed; d) taking part in exhibitions to demonstrate and promote the cleaner energy technologies; e) maintain and information centre to provide information and demonstrate cleaner energy technologies; f) construct cleaner energy technologies for demonstration, etc. Providing information and creating awareness is mainstreamed in all activities. Further, TaTEDO publishes a magazine in English (Sustainable Energy and Development Forum) and in

Kiswahili (Tujelimishe) and maintains a website www.tatedo.org. TaTEDO cooperates and involves local organisations and groups. Some of these implement part of the program whilst others are beneficiaries. This approach to reach a wider public is positive and necessary to spread its use further.

2.2 Technology

The program includes work with several technologies. The lion's part of the project is dealing with efficient technologies for utilization of solid bio-energy as firewood and charcoal. This includes improved cook stoves, baking ovens and improved kilns for production of charcoal. Other technologies included are solar dryers, solar PV, solar multi-charger, biogas, multifunctional platforms and development of a stove for plant-oil.

2.2.1 Wood stoves

Traditional cooking is made on an open fire with three stones as support for the pot. It is flexible and makes it possible to cook relative fast with all kinds of pots. When the fireplace is outside, it is to some extent possible to reduce the impact of the smoke by sitting on the leeward side. When the fireplace is inside it will create an indoor air pollution exceeding the recommended levels 10 or hundred folds. The main disadvantages with open fire are 1) Low efficiency (5-10 %) which gives a high fuel consumption and 2) Smoke and heat which affects the users.

Firewood needs to be dry and in relative small pieces in order to be suitable for use in the stove. The lack of tools for cutting and splitting and different kind of regulations, limit the firewood harvesting to branches and dry wood. This limits the threat to the forest from collection of firewood, although it is a question how it is possible to find such quantities of branches and dead dry wood.

In the project two different types of improved fixed stoves for firewood have been promoted. One is a stove made with fireproof bricks and a chimney from cement. It is made in different sizes in order to suit every need from small households to big institutions/schools. The second type is a smaller and cheaper version made of mud without a chimney. Improved firewood stoves can reduce the fuel use by 40 to 75 % compared to open fires (three stones). This is confirmed by users that tell about substantial fuel savings and by scientific water boiling tests. The improved combustion in the stove reduces the smoke and with a chimney it can be totally removed from the kitchen. A raised and closed stove will protect the user from intense heat and smaller children from burns from flames or boiling liquids. Both designs have proved to be efficient, but when it comes to reduced smoke in the kitchen, only the version with a chimney give satisfactory results. The mud stove also has some problems with durability and requires frequent maintenance. The clay stove does not stand water leakages. Many low-income households do not have a water proof roof on the kitchen house. The more expensive brick & chimney stoves (with high up-front payment) are only affordable for the households with a certain level of income.

Both models are promoted by technicians trained by TaTEDO. The quality of their product depends on the skills and attitude of the builder. A stove always needs services (i.e. cleaning of the chimney and repairs when cracks appear). Such service needs gives an after sale and service opportunity for the stove technicians and are crucial for long and proper operation of the stoves. This has got a prominent place in TaTEDO business training. The stoves show good performance where technicians have included this in their business strategy. Promotion of cheaper stoves for low-income households and training of women groups in construction of mud stoves seems to

show a lesser degree of self-sustained activity after training. This might improve when a smoke-free model is found and health affects and better kitchen management receive a higher focus.

Training of trainers has proved to be a successful strategy in up-scaling. In some active regions the use of improved stoves has reached around 20 %. This, we believe, is above the threshold needed for a self-sustained market where existing entrepreneurs will provide further dissemination. The level reached is remarkable when the general figures for improved stoves use in Tanzania is around 1 %, among the lowest in Africa (WHO / UNDO, 2009).

TaTEDO is likely to reach the goal of 5000 improved firewood stoves before the end of the program period. With a good number of technicians trained both in construction works and business, the number will continue to grow after the end of the program.

2.2.2 Charcoal stoves and ovens

Charcoal is mostly used in towns and by a few rural households that have no time/possibility to collect wood. The cooking is traditionally made in metal baskets (stoves) where the heat is radiated in all directions. Improved stoves have a basket made from ceramics that insulate and direct most of the heat to the pot. Charcoal is a relative smokeless fuel. The benefit from an improved stove is faster cooking and reduced fuel (can cut the fuel consumption almost by half).

Charcoal stoves are a well known and accepted technology. In bigger towns it is believed to have a market share of around 50 %. The cost of the stove prevents some households from investing, but the reduction in the amount of charcoal used is substantial and money saving for its users.

The main limitation for further increase in uses of improved charcoal stoves is on the production site. Unlike firewood stoves that are built on site, charcoal stoves are mobile, small and “factory” made. Limited production capacity is especially affecting distant regions. The quality stoves (long life time) produced in established and registered workshops get strong competition from cheaper but lower quality stoves. Customers are willing to pay more for quality stoves, but it is difficult to distinguish quality stoves from the others as they look the same. The stoves are not labelled or otherwise recognisable and even if this is done, the pirate producers might replicate it.

Production of quality stoves and ovens remains a challenge for various reasons such as the availability and pricing of quality metal, maintaining the quality of the ceramic linings and parts, and competition with lower quality stoves. This is particularly the case for the free standing charcoal ovens. The demand for charcoal ovens is high but the quality producer faces problems because of high cost for quality materials and formal registration of the business that results in a low profit.

TaTEDO will likely reach the goal of 50,000 improved charcoal stoves before the end of the program period. With a good number of persons trained and several workshops in operation, the numbers will continue to grow after the end of the program.

Charcoal baking ovens for small enterprises is also made by SEECO. The ovens work well and have made the firmament for several small businesses. The interest for the oven is bigger than the production capacity. It is a problem that most of the stoves do not stand long time heavy professional use. It is a question how the lifetime could be increased with better quality metal or a new model made out of bricks. Charcoal ovens are produced in Dar es Salaam. The price for consumers in the districts can be high due to the transport costs.

2.2.3 Charcoal kilns for charcoal production

Traditional earth kilns for production of charcoal has an extremely low efficiency. From the energy in the wood, as much as 90-95 % can be lost in the charring process. The improved methodology of charcoal kilns is successful in terms of efficiency and economy. Better control of the air inlet improves the quality of the process. *The outputs of charcoal are about 30% higher and the better quality¹ attracts a higher sales price.* The technology is easy to learn. It requires some extra work to prepare the kilns, but the production time is substantial shorter. Charcoal production poses the main threat to the forest because it uses whole trees and has a bigger energy loss through the process. The increased profitability may lead to an increased production and additional pressure on the forest resources. Therefore the introduction of improved kilns should be followed by restriction and connected to improved forest management to reduce the threat on the forest by producing more charcoal.

2.2.4 Other technologies

The program also includes a number of other technologies, although to a lesser scale than the solid biomass activities described above.

Solar PV: Small Solar PV home systems are disseminated through trained technicians. Most of the installations are made by a few technicians that have become professional dealers with a good business fundament. TaTEDO-trained entrepreneurs are likely to reach the goal of 2,000 solar household installations before the end of the program period. With a good number of persons trained and several workshops in operation, the numbers will continue to grow after the end of the program.

Multifunctional platforms: This is motor on a platform equipped for several purposes as milling, water pumping and electricity production. Increased cost and technical challenges may limit the number of platforms. Initiatives have been taken to grow *Jatropha* for oil production with possible delivery to the engines. It takes time for plants to grow and more testing is needed before starting local bio-diesel production.

Solar dryers: Solar drying is a simple technology that can be useful given they are developed around business with collection of products, organising of drying and packing before final marketing and sales. The dryers have a potential for income generation and to meet the need bigger models are under development. With a good number of persons trained in construction the numbers will continue to grow after the end of the program.

RECOMMENDATION

Continue and if possible increase the development of efficient use of solid biomass. Solid biomass is not only widely used today, but will also play an important role of a future sustainable energy sector, given use of efficient technologies. TaTEDO represent a continuation of this work in Tanzania. Some more specific recommendation related to lessons to learn from IMESPORE:

- *Emphasise more the indoor air pollution / health aspects in the work with efficient firewood stoves. This should also be kept in mind in the REDD project when 50% households in 10 villages of Shinyanga rural and Kahama districts will have efficient stoves*
- *Develop and promote fixed stoves (low cost alternative) with chimney*
- *Concentrate effort on improved stove marketing in one region in order to be able to reach critical threshold for amount and quality*

¹ The IBEK efficiency is 15% to 25% and it increases the yield by 30%.

- *Continue efforts to improve and increase the production facilities for improved and quality charcoal stoves*
- *Use the benefit of improved kilns to introduce additional requirements (selection of trees, re-planting) and limitations for charcoal activities.*
- *Continue to train more technicians/businessmen on solar systems*

2.3 Program Design, Monitoring and Reporting

2.3.1 Program Design

The monitoring and reporting format are based upon the program proposal and report on the annual achievements. The program consists of 6 sub-programs, one for each of the strategic objectives of the logical framework matrix, each with their own goal, purpose, outputs and activities. Indicators, means of verification, assumptions and risks are indicated for each. Some of the strategic objectives are more like an approach. For example, facilitating participatory planning, monitoring and evaluation of program activities² is an approach to gain commitment and ownership of the participants and hence increase the chances for sustainability. The same is the case with facilitating sustainable energy development through related information acquisition, processing, storage and dissemination to different stakeholders³. Strengthening managerial and institutional capacity of TaTEDO⁴ is an activity to ensure the necessary input into the program.

The logical framework of IMESPORE contains a too long list of indicators. Most of the indicators measure inputs, for example provided numbers of staff, seminars, broadcasted programs, persons (women and men) trained, etc. Few indicators measure outcomes but hardly any measure impact. Examples of indicators measuring outcomes are: number of stove/oven selling shops established, number of linkages facilitated between modern biomass energy technologies producers/sellers and credit institutions, etc. Some areas for improvement in the next program document:

- Some indicators are not sufficiently clear, for example; facilitate market networks between small scale oil producers with potential users. What does this mean? What is measured?
- Some indicators measuring the up-scaling are not included. For example, only the number of demonstration solar PV and biogas systems installed is indicated but not the number of systems installed by the partners. Also the number of wood and charcoal stoves and ovens sold is not included. During the review those trained told us about the number of persons whom they in turn had trained and who are now installing clean energy technologies. This information is important to measure the extent of up-scaling.
- Hardly any gender information is collected beyond the numbers of women and men participating in program activities (see also section 2.4 on gender equality).
- Other indicators are not relevant such as the number of collected and analysed monitoring forms.

2.3.2 Monitoring and Reporting

TaTEDO uses a Participatory Rapid Appraisal methodology to obtain an understanding of the village and baseline situation. As part of the process a Village Energy Plan is prepared and a Village Energy Committee is elected responsible for coordinating implementation. This exercise is guided by TaTEDO's "Practical PRA Guide for Rural Energy Planning". The guide describes

² Fifth strategic objective in the program proposal.

³ Fourth strategic objective in the program proposal

⁴ Sixth strategic objective in the program proposal

various participatory methodologies to involve villagers in the collection of data and thus increase the understanding of their village. This is a comprehensive approach providing a good insight into the village of both villagers and TaTEDO staff.

Baseline data are collected on all the basic topics such as population (desegregated by gender), existing SMEs and institutions, economy, annual seasonal calendar, energy technologies in use, environment and communication networks. Using participatory methods benefits the creation of awareness and increases commitment. Although the basis is good, the review team has some observations:

- Information on the actual number of each type of modern energy technology installed and in use by type of technology is not recorded making it more difficult to determine the exact level of scaling-up later on.
- Household and energy surveys are conducted in each area that, among others, collects information on energy needs and preferences of both women and men. Information from the survey form an input into the village meeting where the decision on which energy needs to prioritise in the Village Energy Plan is determined by a simple majority. Energy needs of men are more often included because often the majority of the participants in the decision making meetings are men.
- There is no information on number of female/male owned and employed staff by SMEs and size and number of female owned land versus male, etc.

The PRA guide includes a checklist for household interviews. When household questionnaires are found feasible to obtain baseline information, it is recommended to make a standard questionnaire and to tailor the questions and answer categories similarly to the national survey questionnaires. This will make comparison with national survey results easier.

TaTEDO use a participatory monitoring system in the sense that beneficiaries collect and submit data on their activities. Data are mostly collected when visiting the field for monitoring and/or providing inputs. The monitoring forms address different audiences such as the village government and charcoal producers. The participatory approach is positive. However, the monitoring forms seen contained a number of mainly qualitative questions on the activities. Most of the answers were brief and not answering the question completely. Collection of monitoring data is not sufficiently related to the key indicators.

Data are kept at the main office at Dar es Salaam and copies at the zonal offices. According to the staff monitoring information is reviewed and reported back to districts and partners during field visits and telephone contacts. This is a good practice.

Although the monitoring system was not reviewed in detail the review team has the impression that there is a need to review and improve the monitoring system in order to get a better impression of the outcomes and impacts of the program and their gender dimension. TaTEDO identified 'weak capacity to measure impact' as one of their weaknesses during a SWOT exercise in connection with the development of the Strategic Plan 2008-2012. At the moment the monitoring systems is being revised and improved. This includes development of a monitoring database.

Annual reports are structured around the six sub-programs, one for each of the strategic objectives. Thus, it follows the structure of the program proposal. The content is mainly an account of the activities conducted in the reporting report with little analysis on what works well or not and why, the background of decisions taken, etc. The report contains some unclear table headings and mistakes, for example some percentages in the reporting of achievements are not calculated correctly. An improved program structure with clear strategic objectives and results, and fewer but

relevant key indicators would benefit the management of the program, the monitoring system as well as the reporting and reduce the size of the reports.

RECOMMENDATION

Develop a clear engendered structure for the next program with clear strategic objectives, results, indicators and means of verification that measure the inputs, results, outcomes and –where possible- impact of the program. Gender is to be incorporated and mainstreamed.

It is recommended to provide external expertise to strengthen the capacity of the staff of TaTEDO and facilitate the preparation of the next program proposal and its structure. In addition, check whether the monitoring system currently being developed is adequate to collect the required data. The professional expertise of the expert has to include gender and participatory approaches.

2.4 Gender Equality

Culturally the role of women is to cook the meals for the families. Therefore, by the very nature of the program many of the beneficiaries are women, especially at the household level. In all their activities TaTEDO makes an effort to ensure both women and men benefit also in the entrepreneur program. TaTEDO also makes an effort to employ both female and male staff. Gender is referred to throughout the program proposal mainly analysing the division of roles and responsibilities between men and women but there is room for improving the approach to address gender equality based upon a comprehensive gender assessment. Existing gender and-or energy specific gender assessments could provide an input into further analysis. The review team found the following areas for strengthen the approach to gender equality:

- Improve the understanding, knowledge and skills of gender equality, firstly of TaTEDO staff and secondly of the main partner implements. This is a prerequisite for being able to address gender equality. For example, it requires strong negotiation and facilitation skills to ensure a gender balanced decision making process.
- Incorporate gender equality into the strategic approach and implementation mechanisms such as training, procedures, guidelines, etc. For example, the PRA does look into the energy needs of women and men, but there is a need to mainstream gender into all aspects of the process aspects of the program. For example, how is gender capacity developed of staff and stakeholders, and how are gender concerns taken into account when preparing Village Gender Action Plans.
- Incorporate and mainstream gender equality into the program proposal for the next phase (and other proposals). Experience shows that mentioning gender equality specifically in the strategic objectives, targeted results and indicators is a strong driver for addressing gender equality because these are reported on and used to assess achievements and impact.

RECOMMENDATION

Include a gender specialist and gender budget in the next support to strengthen the gender equality capacity of TaTEDO staff and to facilitate incorporation of gender equality into the next program. Further, to facilitate a gender equality assessment and to strengthen a gender equality approach in the approach and all activities (e.g. procedures, guidelines, training, monitoring and reporting, etc.)

2.5 TaTEDO Management

2.5.1 Planning and Budgeting

Planning and budgeting is done by the management team at Dar es Salaam after consultation with the members of their team. The point of departure for making plans and budgets is the program documents and achievements to date. The remaining activities are broken down into annual, quarterly and monthly targets without sufficient analysis on whether this is realistic and why some targets are not met. There may be a reason that requires adjustment of the approach and/or the target.

RECOMMENDATION

Use participatory methods to prepare plans and budgets and use the program document in a flexible manner.

2.5.2 Cooperation with other institutions and partners

TaTEDO is cooperating well with other institutions and partners on the implementation of the program. For example:

- The provision of credit is facilitated through existing micro/finance mechanisms such as SACCOS, Pride, Vicoba and other community credit facilities (e.g. group credit schemes).
- Where feasible TaTEDO works together with existing institutions, for example the Angaza Women's Group.
- TaTEDO works together with the local government at village, district and to a lesser extent at provincial level.
- For the production and sales of cleaner technology methodologies TaTEDO develops the capacity of local SME's.

At the national level TaTEDO takes part in at least three national networks in which they were among the initiators and are a main driving force (Gender Energy Network, Solar Energy Association, Solar Drying Organisation).

At national level they cooperate well with the Ministry of Energy and Minerals and the recently established Rural Energy Agency. The latter is drawing regularly upon the expertise of TaTEDO on a wider number of issues related to the establishment of the Agency. TaTEDO also relates to a number of African and international organisation engaged within the same sector.

Most of the cooperation is on an individual basis. It may be considered to establish a national and African/international network to exchange lessons learnt on scaling up the appropriate energy methodologies further.

2.5.3 Lessons learnt taken into account

TaTEDO used some of the lessons learnt to adjust the approach. For example, business training of entrepreneurs was added when realised business management, marketing and after sale care were weak points. Business training focuses on after sale services worked well for those trained and picked up these skills. Also ways to obtain credit were facilitated when realising that investment capital was an obstacle for scaling up. Ways to improve the quality of the stoves are being investigated when monitoring visits observed a quality problem. TaTEDO is also addressing the problem of distinguishing good from poor quality products.

2.5.4 Anti-corruption and Quality Assurance

TaTEDO accounting procedures are according to international standards and the external audits accepted the financial statements and accounts. Internal procedures to avoid corruption are therefore in place and complied with. When external organisations are contracted to perform certain tasks the same accounting procedures apply.

Staff seemed to be well aware of the performance of their various partners. TaTEDO partners who provide a service, for example training, have a performance based agreement and, in principle, are only paid when the contract has been implemented satisfactorily. Quality assurance of the inputs of District staff is more difficult to assess but it was observed the field staff knew which district staff were commitment and capable.

The issue of quality of production of the portable stoves and other technologies is looked into and ways and means of ensuring quality assessed. It is not easy to solve the issue in a competitive and generally unregulated market. Procedures for assessing the quality of staff performance seem to be in place. The size of the organisation also makes it relatively easy to know the overall performance of each staff member.

2.6 Impact and Sustainability

2.6.1 Current and Expected Achievements

The table below provides an overview of the key indicators of the revised targets agreed upon with the Government of Norway and included in the contract with TaTEDO. Data reported are taken from the annual reports of 2008 and 2009 and information obtained from TaTEDO. By the end of 2010 the program is scheduled to end. Taking into account the late start of the program, it is assumed two thirds of the targets should have been reached by the end of 2009.

The table below shows that more than half of the targets were achieved by 65% or over by the end of 2009. Those targets are expected to be achieved by the end of 2010. Some of the targets have already been achieved completely, for example the number of active SME's run by women (123%) and the number of stove workshop establishments facilitated (100%). Below an estimation of the achievement of the targets that have achieved less than 65% by the end of 2009:

- The targeted number of urban households using improved charcoal stoves in the program area is achieved by 60%. The number of users increased by 20,000 in 2008 and just below 10,000 in 2009. If the same numbers as in 2008 can be achieved in 2010, the target will be met.
- The targeted number of social service centres/institutions using improved firewood stoves is achieved by 60%. It is expected that another 25-35 improved stoves are added in 2010, bringing the expected achievement up to 85%-95%.
- The targeted hectares reforested with multi-purpose trees have been achieved by 57%. When a similar area is reforested in 2010 as in 2009, the target is expected to be achieved by about 85%.
- Of the targeted 3 million trees planted 13% of the seedlings had been raised and 9% planted. Tree seedlings had been raised in almost all villages visited so the number of actual tree seedlings raised and number planted may be underrepresented. From the figures obtained so far it is not likely the target of 3 million trees will be reached by the end of 2010.
- The target of installing 4 MFPs has been achieved by 50%. It is not likely the target of 4 MFPs will be achieved because the actual costs are substantially higher than the budgeted costs.

- The number of solar multi-chargers has been achieved by 42%. When a similar amount of units is installed in 2010 as in 2009, about two thirds of the target will be met.
- The number of SME's accessing electricity from solar and MFP has been reached by 28%. No units were reportedly installed in 2008. It is expected a higher number of units will be installed in 2010 than in 2009 because it takes time to establish a company. The target may be reached if about three times as many solar units are installed in 2010 compared to 2009. This may not be the case, but it is expected the target will be met by about 80% to 90%.

Table 1: Overview of targets and achievements of most important key indicators

Main indicators	Target	2008	2009	Total	Outstanding 31-12 2009	%
From the Program Document						
Number of urban households (both women and men headed households) using improved charcoal stoves in the program area	50000	20040	9960	30000	20000	60%
Number of rural households (both women and men headed households) using improved firewood stoves in the program area	5000	1428	2343	3771	1229	75%
Number of woodstoves constructed by partners			2685			
Number of social service centres-institutions using improved firewood stoves in the program area	100	35	25	60	40	60%
Number of active SMEs run by women and men (milk processing, local brewing, small bakeries, food vending etc) using improved firewood stoves in the program area	650	150	649	799	-149	123%
Women run enterprises	450					
Men run enterprises	200					
Hectares reforested with multi-purpose energy trees in the program areas	500	153	130	283	217	57%
At least 3 million trees planted in program area by target groups	3000000					
Number of tree seedlings raised		200000	198715	398715	797430	13%
Number of seedlings sold			96175	961,175		
Number of Jathropha trees planted			243965	243965		
Number of other tree seedlings planted			15850	15850		
TOTAL		<u>200000</u>	<u>355990</u>	<u>259815</u>	<u>815805</u>	9%
Number of at least charcoal producers using sustainable charcoal production methods in the program area	500	129	225	354	146	71%
At least four projects registered by TaTEDO local partner institution as CDM	4		4 PINs	2	2	50%
Number of PV installations installed	2000	1000	500	1500	500	75%
Number of MFP installed	4		2	2	2	50%

Main indicators	Target	2008	2009	Total	Outstanding 31-12 2009	%
Number of solar drying systems	100	59	38	97	3	97%
Number of solar multi-chargers	50	8	13	21	29	42%
Number of households using electricity for consumptive uses in the program area	2000	1000	510	1510	490	76%
Number of institutions accessing electricity from solar and MFPs	15		13	13	2	87%
Number of SMEs accessing electricity from solar and MFP	50		14	14	36	28%
Number of stove production workshops establishment facilitated	100	50	50	100	0	100%
Number of charcoal ovens and stoves selling shops established	8	2	5	7	1	88%

2.6.2 Impact on Poverty

The program offers a range of technologies in different price classes to cater for as wide an income category as possible. Improved wood fuel stoves, however, need a kitchen of a certain quality. A large group of households cook in the open and do not have a kitchen or a kitchen of sufficient quality. The more expensive technologies, such as solar PV, are only available for those who can afford. To that extent the program offers a range for each budget. The largest scaling up is in the lower costs technologies range that are within the financial means of the poorer section of society. Those using cleaner energy technologies save time in wood fuel collection and finance in purchasing wood fuel. Thus, the users benefit in terms of livelihood (more time for other activities) and/or financial savings.

The program supports entrepreneurs and partners to become an entrepreneur or to improve their business. Through the program several people are earning an (additional) income as entrepreneurs or their employees, as suppliers or salesmen. This contributes to reduce poverty.

Poverty in Tanzania, like elsewhere, has been shown to be multi-dimensional and due to complex factors, both personal and societal. It is therefore difficult to attribute poverty reduction to one program alone. Collecting information on income is difficult and often inaccurate for various reasons, such as unwillingness to provide income data, inaccurate and incomplete valuation of the non-monetary economy, and lack of knowledge on the income situation. Therefore, the PRA uses wealth ranking to get the villagers' perception of their wealth status. The best option may be an assessment of the savings in terms of wood fuel volume and price (indexed for a proper comparison) when using modern energy saving methodologies and an assessment of the income gained by entering the cleaner energy market. This information is included in the baseline and monitoring system. This art is finding a balance between the value of the data collected versus the time and effort taken to collect the data.

2.6.3 Sustainability of Program

Successful entrepreneurs making a profit are likely to continue the production and sales of the cleaner energy technologies whilst others, who are not making a profit, may stop. Several of the entrepreneurs and partners met are training others and thus are spreading knowledge and skills. It

is expected that some of those will in turn become successful entrepreneurs. At present most entrepreneurs still need support to become stronger. There is also a need to develop capacity of additional entrepreneurs in order to get a critical mass of entrepreneurs actively using and transferring the knowledge and skills.

It is the impression of the review team that those who have acquired the newer technologies are likely to continue using these provided the devices as well as after sales services are available at affordable prices. The review team did not come across people who stopped using the device but also did not meet those who had constructed for a second time apart from one household. There are some areas requiring attention. Firstly, for up-scaling, the quality of the devices it is important. The technology must work well and lasts for the expected lifetime. Secondly, it is important that users have access to quality and affordable after sales services. During the field visit the review team came across one person who wants to replace the broken down wood stove, but he could not get hold of the entrepreneur. Thirdly, the technologies have to be available at affordable prices. At present the production of charcoal ovens is not sufficient to satisfy the demand. According to the information of the manufacturer, the cost of raw materials has increased substantially making the production expensive and subsequently minimises profit. Therefore the manufacturer produces other more profitable technologies rather than the charcoal stove.

Sustainability of continued promotion, monitoring and support by the local government authorities is questionable with the limited resources of districts. It is not certain whether social institutions providing a contracted input will continue without payment. Active social organisations are likely to continue construction if the stoves are sufficiently durable. More input is required to address the proper use and maintenance of the stoves.

2.6.4 Impact of the REDD Program⁵

The REDD program was launched on the 13th of April 2010 but started operating earlier in the same year. Under this program four technicians and four support staff are to be employed. In addition the TaTEDO director will spend part of his time on REDD. So far, TaTEDO has hired one staff from its partner in the program, the Natural Forest Resource Management and Agroforestry Centre (NAFRAC). At the moment TaTEDO is using its own staff for three main reasons: Firstly, TaTEDO staff is already familiar with the program and its approach and does not need an introduction period: Secondly, TaTEDO is not sure the IMESPORE program will be continued beyond the end of 2010 and therefore prefers to maintain its staff and engage them in the REDD program rather than laying them off. TaTEDO plans to hire additional staff once it is clear additional funding for a new phase of the IMESPORE is forthcoming. Thirdly, using TaTEDO's own staff during the first year is in line with the REDD Project Document that elaborates in the section on co-financing, that IMESPORE paid staff will be used for implementation of the REDD project in the first year of 2010.

The program is implemented in Shinyanga region. Because of the intensification of the activities within this region TaTEDO decided to move the zonal office from Mwanza to Shinyanga. One member of staff of the Mwanza office is already transferred from Mwanza to Shinyanga. The move of office may be negative for Mwanza region but positive Shinyanga region activities of IMESPORE.

⁵ Full name of the program: Community-based Reduced Emissions from Deforestation and forest Degradation (REDD) Mechanisms for Sustainable Forest Management in Semi-Arid Areas (Case of Ngtilis in Shinyanga Region)

Due to the nature of the selection criteria of the villages included in the IMESPORE program only one village is included in the REDD program. Continuation of at least part of the IMESPORE program through the REDD program is therefore limited.

In conclusion, there is an impact of the REDD program on the IMESPORE activities, partly because of the uncertainty of future funding.

2.6.5 Sustainability of TaTEDO

The role of TaTEDO is to promote improved and alternative energies for households and SME's, develop capacity and do research on existing adapted and new technologies. Some technologies may be temporary and will be phased out. TaTEDO will use the currently acquired experiences and continue with the same role for other technologies. This will continue to require external funding for some time to come. To date the level of self-financing ranged from 0 to 20% per year. So far, TaTEDO has been able to attract funding mainly from development partners which is likely to continue in the future. TaTEDO acknowledges the need to widen the scope for sourcing funding. The Strategic Plan intends to raise income through cost sharing and cost recovery of expenses whilst at the same time reducing management costs and reducing the funding risk by increasing the number of funders. There is a need for a higher level of self-financing to become more independent financially. For example, at the moment advice is given for free but those that can afford could pay for their services. They could also consider becoming a consultant as far as their activities allow. Another possibility would be to request payment for services provided to partners, either for the full prices or subsidised according to their capacity. TaTEDO already employs a cost-recovery approach towards the installation of demonstration units in the program area. Repayments are used to construct demonstration units in other areas. This approach will pay for at least the construction costs of additional demonstration units.

Experience shows that something that is paid for with cash is valued higher than what is given. Also, that people can and do pay if they are interested. A strategy and work plan needs to be worked out to increase the self financing of TaTEDO.

2.7 Risk Management

Risks are mitigating by including activities in the program to mitigate the effects.

National Policies are generally supportive to providing sustainable energy to all Tanzanians. In practice, however, the provision of electricity is favoured and most of the funding in the sector is for improving and extending the electricity grid and larger scale electricity generation. TaTEDO is a well respected player in the energy sector in Tanzania and as such is invited to meetings and workshops on a number of issue including policy issues. At present TaTEDO is an important advisor to the Rural Energy Agency and thus has an influence on the development and improvement of the Tanzanian rural energy sector policy framework. Small NGOs generally do not have sufficient negotiation power to make a large impact. Their negotiation power is stronger when bundled through a network. The three national networks could play a stronger role in this respect.

The risk of access to credit is mitigated by linking end users and service providers to existing micro-finance credit institutions and gradually to larger credit institutions. In some cases TaTEDO employs a cost-recovery approach for the installation of demonstration technologies in the program area and plans to use the repayments as a revolving fund to extent the services into other

areas. Linking to existing credit institutions is a good approach and preferred over financing from TaTEDO resources.

TaTEDO has a Centre for Modern Energy where several types of modern energy technologies are constructed and tested. The centre is also used for research into the manufacturing of oil from *Jathropha* seeds that can replace diesel and as a training institute. Problems observed with the technologies are reported and solutions sought in cooperation with the manufacturers and TaTEDO program staff.

Providing information is mainstreamed in TaTEDO's activities. The SEICM (Sustainable Energy Information, Communication, Management and Networking) section is specifically responsible for information management and communication. TaTEDO maintains a library, manages a website (www.tatedo.org) and publishes newsletters and information materials in both English (Sustainable Energy Forum) and Kiswahili (Tujielimishe). TV radio programs have also been produced and broadcasted. TaTEDO further takes part in exhibitions. This covers a wide range of modern information technologies. It could be considered to open a blog on the website on certain topics and/or to conduct an electronic questionnaire to obtain the views of the users. Visitors of the website might also be given an opportunity to download documents for a fee. The website records the number of visitors to the site and information is kept on the number of information materials printed and distributed. As far as known, the impact of the provision of information is not measured systematically.

The effects of drought were mitigated by postponing those activities that required financing from the partners.

TaTEDO staff is dedicated and committed. Implementing agents and institutions are generally committed when paid for their services. TaTEDO trains stove builders and encourages those trained to construct stoves at cost price. During the field trip the review team came across Village Energy Team members and village groups who were rendering services without payment. These services included the construction of improved stoves. This shows their commitment and dedication.

Inflation is more or less as predicted when preparing the proposal budget. However, it is difficult to predict price-hikes. The way this could be mitigated is by including a budget line for 'contingencies'. This budget line is mainly to cater for unforeseen inflation and exchange rate differences and only to be used with written approval of the financier.

Appendix A Terms of Reference

TERMS OF REFERENCE

Project name: **Support to Tanzania Traditional Energy Development**
Project number: **TAN-2308**

Agreement name: **Development of modern energy technologies for poverty reduction**
Agreement number: **TAN-06/059**

1 BACKGROUND

- **Description of the programme that will be reviewed, based on the Agreement, Programme Document(s) and appraisal**

TaTEDO is a Tanzanian NGO working with developing and promoting modern energy efficient and sustainable energy technologies, with more than 10 years experience. Throughout the last decade TaTEDO has actively involved itself in spreading information and building capacity within the area of modern and energy efficient technologies in several regions and districts in Tanzania. On 10th of December 2007 TaTEDO entered into an agreement with the Norwegian Ministry of Foreign Affairs, through the Royal Norwegian Embassy (the Embassy) in Dar es Salaam, providing support over a 4 year period to the 'Integrated Modern Energy Services for Sustainable Development and Poverty Reduction' programme (IMESPORE), amounting to NOK 10 million. In addition to the Embassy support to IMESPORE, EU through HIVOS is providing support to 3 projects under TaTEDO¹.

The use of traditional and low quality biomass based energy technologies have severe effects and impacts on livelihoods and the environment in Tanzania. Dependence on biomass (90% of total energy consumption in Tanzania) has serious consequences for poverty and environmental degradation; through deforestation, soil erosion and poor land productivity etc.

TaTEDO is one of a few Non Governmental Organizations in Tanzania looking into the area of promoting the use of modern energy technologies focusing on household energy. Through IMESPORE the upscaling of several TaTEDO activities intends to lead to increased use of improved cooking fuels, efficient woodfuel stoves, promotion of the transition to modern energy sources (solar, mini-hydro, biofuel etc), a/reforestation, improved livelihoods particularly for women (due to reduced health risk with more efficient stoves – less respiratory diseases from smoke), improved access to alternative energy sources, promotion of small scale business ideas, improved access to credit facilities etc.

TaTEDO has during the last years through IMESPORE undertaken several training sessions, and arranged awareness raising workshops throughout the programme area,

¹ 1. *Up-scaling of production, development and uptake of sustainable biomass technologies with TaTEDO , 2010-2015*

2. *Bio-fuel powered and solar powered rural energy service platforms (MFP), 2008- 2012 with TaTEDO to be installed in 100 villages*

3. *Hivos Climate Fund project with TaTEDO which supports the installation of 6,000 household efficient woodstoves for cooking and heating in 2 districts.*

covering both rural and urban areas in 19 districts in 8 regions. These are areas that have been introduced to TaTEDO's activities in previous programmes, and where there is need for large scale uptake of modern energy technologies and services. Furthermore, the geographical choices have been made on the basis of areas with environmental and energy challenges, areas of major charcoal production, areas with potential for adaptation of modern energy technologies, areas with promising economic growth in middle and low classes, and finally due to the existence of TaTEDO partner organizations and groups (or possible new ones).

Overall and long term Objective/Goal

The **overall** and **long term objective/goal** of the programme is to contribute to sustainable development and poverty reduction by enhancing access to modern energy technologies and services for consumptive and productive needs in households, SME's and social service centres.

The **main purpose** of the project is to facilitate up-scaling of access to sustainable energy technologies and services.

In order to achieve the objective and the main purpose some **strategic objectives/outputs** have been identified, with their corresponding **indicators**:

- Upscale uptake and use of modern biomass energy technologies and services,
 - At least 5000 rural households, 50,000 urban households, 100 institutions, 650 SMEs (of which 450 are women managed) using improved technologies and services (i.e. stoves and ovens).
- Mitigate health related and environmental adverse effects associated with energy production and use,
 - Five hundred (500ha) hectares reforested with multi-purpose energy trees in the programme area by year four.
 - At least 500 charcoal burners using improved charcoal production methods in the programme area in year four.
 - At least 4 TaTEDO partner institutions implementing CDM projects in year four.
- Increase access to electricity, solar drying and motive power through decentralised energy systems,
 - Access to electricity, solar drying and MFP services for at least 2,000 households, 50 SMEs, 10 schools and 5 dispensaries realized.
- Facilitate energy and related information acquisition, processing, storage and dissemination,
 - Effective system for acquisition, processing, storage and dissemination of energy and gender disaggregated information by energy stakeholders in place and sustained.
- Facilitate participatory planning, monitoring and evaluation of the programme activities,
 - Programme implementation is monitored, evaluated and results are communicated to stakeholders timely.

- Strengthen managerial, institutional capacity and core support for TaTEDO and local partners.
 - Motivated personnel and adequate facilities to implement the programme in place.

- **Why the review is initiated**

The Contract with the Embassy, paragraph 7, states that a Mid Term Review (MTR) should be undertaken in June 2009. However, in close dialogue between TaTEDO and the Embassy it was agreed that the review should be postponed due to delays in carrying out some activities. In addition, TaTEDO prepared a proposal for the REDD NGO pilots² (funded by the Embassy) and it was therefore considered best to await the final decision of this before undertaking the MTR.

Since the project is coming to an end, and this review is no longer mid-project it will hereafter be referred to as a progress and forward looking review. This will also mean that no end-review will be undertaken, as stated in the Agreement.

- **Team composition and leadership. (e.g. Embassy/Norad team, joint donor/Partner, external team or combination of these)**

TaTEDO has undergone several reviews before, where Norad has participated in some, and it is therefore believed that an independent consultant should undertake the review. Thus this review of TaTEDO shall be undertaken by an external party, with no or little previous 'contact' with TaTEDO.

The team shall consist of two or three specialists/consultants with international expertise in the field of small scale renewable energy, preferable in Eastern Africa. Furthermore one of the team members shall have extensive knowledge of gender issues. One team member shall have and be able to document widespread knowledge of energy and civil society issues in the Tanzanian context, or preferably be a Tanzanian based expert.

2 PURPOSE, CONTEXT AND INTENDED USE

Description of the main purpose, context and intended use (stakeholders)

The purpose of the progress and forward looking review is, in accordance with the Contract, to assess the progress and the effectiveness of the implementation of the programme to date. Furthermore, the review shall assess to what extent the purpose is being achieved and also the overall achievements of the programme as compared to the performance targets. In line with the above, the results should form basis for an assessment of whether or not the purpose and different activities/targets are likely to be reached by closure of the programme, set for Dec. 2010.

Results and recommendations from this review will feed into the lessons learnt aspects of TaTEDO's activities, and provide guidance to the Embassy's evaluation and monitoring of how funds are spent, and what tangible results can be derived from the activities carried out under the programme.

² This is now approved, and Agreement signed between TaTEDO and the Embassy.

Finally the review shall give some assessment and recommendations on a way forward in the view of a possible new programme wherein gender mainstreaming should be an even more prominent component than in the current programme.

The review will be financed over and above the grant.

3 SCOPE OF WORK

In general the review shall, as mentioned above, assess the progress to date and the effectiveness of the implementation of the programme, to what extent the purpose is being achieved, and moreover look into the impacts already achieved in the programme.

In particular the review shall look into the following issues:

- **Efficiency** ('productivity')
Assess the efficiency of TaTEDO's strategic approach, by determining if the activities undertaken are leading to the intended results.
Assess how TaTEDO's collaboration with other institutions/partner organizations has worked. This refers to their aim of continuing and increasing their cooperation with partnership organizations at local and district levels and spreading information through networking and whereby up scaling also outside of the programme area might take place.
- **Effectiveness** ('the extent to which the purpose and goal will be achieved')
Investigate the organizational effectiveness, particularly in view of the currently increased workload of TaTEDO, due to the new REDD component. The team shall endeavour to advice on how to ensure continued effective organizational operation of TaTEDO.
Furthermore, the team shall consider to what degree lessons learnt are taken into account when planning and making adjustments of work plans, etc.
- **Impact**
Examine the outputs and intended results of the programme, and then assess the actual impact of the different activities under the programme.
- **Relevance**
Assess the relevance of the programme in relation to the needs of the beneficiaries, mainly through considering the chosen outputs and indicators identified for the programme.
- **Sustainability**
Firstly, the team shall look at sustainability of the achievements, in relation to the goal and purpose.
Secondly, the team shall consider the implications of the fact that TaTEDO is heavily dependent on Developing Partners' funding, and how they might be advised to mitigate this.
Finally, as TaTEDO has recently been approved for funding within the REDD NGO programme (supported by Norway), the team shall assess how to ensure that this increased workload does not reduce the outputs of this programme or jeopardizes the achievements already made under IMESPORE.

- **Risk management**

Some risk factors were identified prior to start up of this programme (external and internal). The team shall examine to what extent these have been real risks, and what measures are taken to mitigate these risks:

 - Supportive national policies
 - Access to credit for end users and service providers
 - Adoption of modern energy technologies and information
 - Drought
 - Continued commitment of staff and implementing agents (cooperating organizations and institutions)
 - Inflation
- **Particular concerns to be investigated**
 - How TaTEDO is able to integrate gender mainstreaming in their overall activities.
 - TaTEDO's processes during budgeting – and planning.
- **Anti-corruption measures**

Assess the newly drafted anti-corruption and quality assurance documents and give advice on how to further improve them. Assess to what extent these measures are actually taken into account in the daily activities of TaTEDO.

4 IMPLEMENTATION OF THE REVIEW

- **Sources of information and methodology to be employed**

The review shall be undertaken as a combination of a desk study of relevant documents, reports etc. and a field visit to assess TaTEDO's actual carrying out of activities on the ground.

The following documents should be included in the review (this list is not exclusive):

 - Programme Document (PD); *Integrated Modern Energy Services for Sustainable Development and Poverty Reduction* - October 2006
 - Mid Term Review of 'Integrated Improved Woodfuels Services for Poverty Reduction in Tanzania' one component of the *Integrated Modern Energy Services for Sustainable Development and Poverty Reduction* Programme, funded by EU, HIVOS
 - Financial Sustainability Strategy for TaTEDO – 2006
 - Strategic Plan 2008-2012
 - Annual Report 2008
- **Division of responsibility between the consultant/team, the Embassy, other donors and the Partner(s)**

Norad will assist the Embassy in contracting the team of consultants, but thereafter the consultant team shall report to the Embassy, which will handle further communications with TaTEDO and Norad. The Embassy and TaTEDO will jointly assist the team in booking of relevant meetings. TaTEDO will be responsible for the planning and practicalities in relation to the fieldwork of the team.
- **Timetable for preparation, field work and finalisation of report**

The team of consultants will meet with Norad prior to commencing the task, in order to clarify issues related to the ToR. Once arrived in Tanzania a kick-off meeting will be held with the team, TaTEDO and the Embassy (called and arranged by the latter).

The preparation and field work for the review should be undertaken before end of the 2nd

quarter of 2010 (June). Other practicalities in relation to the drafting and finalization of the report will be dealt with below.

5 REPORTING

- **Description of required report format**

After concluding the field work the consultant team shall meet with TaTEDO and the Embassy in order to present and introduce their preliminary findings in a brief report. Thereafter the draft report shall be submitted within two weeks after end of the fieldwork. The different parties (Norad, the Embassy and TaTEDO) will comment upon the draft report within two weeks. The final report shall then be delivered to the Embassy no later than two weeks after receipt of comments.

- **The need for an introduction summary with main conclusion on lessons learned and recommendation(s)**

The report shall have a brief introductory/executive summary, giving a good overview of conclusions, lessons learnt and recommendations. **The main report shall not exceed 20 pages but may include supporting annexes.**

- **Report in electronic form and/or paper, language**

The report shall be delivered in both an electronic version and as a printed paper copy (by mail). The report shall be written in the English language.

Appendix B Impact of Improved Stoves

The traditional biomass, firewood and charcoal, are totally dominating as energy source for cooking in Tanzania. Firewood is used in rural areas while charcoal is more common in urban areas and household with a more urban lifestyle. This is the case also in areas where electricity and other modern energy sources are available.

There are a number of challenges connected to use of biomass for cooking:

- Smoke and hazardous impact on the users
- Availability, costly to buy or time consuming (and sometimes risky) to collect
- Non sustainable harvesting, deforestation
- Discomfort, heat in the kitchen and burning risks for children (flames and boiling water)

This appendix to the Review of the Norwegian Support to Tanzania Traditional Energy Development (TAN-2308) aim at giving additional understanding of the importance and relevance of the activities implemented by TaTEDO.

ACCES TO MODERN ENERGY

Access to modern energy is a popular phrase in policy and strategy papers, but it is used and understood in different ways. Often modern energy is used with emphasize on the energy source. Modern energy sources for households are electricity, liquids or gas in contrast to traditional energy as dung, firewood and charcoal. Lately it has been more common to use the term modern energy, not with reference to the energy source, but the energy technology in use. Access to modern energy for households will then include use of firewood and charcoal as long as it is utilized in modern efficient stoves and not on open fires.

NATIONAL ENERGY POLICY

The National Energy policy (2003) states that firewood will, even given a radical increase in use of electricity, be an important source of energy for households in the foreseeable future. It recognizes that this source has negative impacts in houses, including, indoors pollution causing both health risks and safety problems to the end-user and is also time-consuming to collect.

Talking about energy supply, the strategy argues that there is a need to promote efficient conversion and end-use energy technologies and practices in order to minimise health hazards primarily affecting women and children, and environmental degradation. The need to address economic, cultural and social barriers on the local capacity to design, develop, manufacture, market, distribute and provide after-sales services is highlighted and considered due to the low level of awareness and understanding of available practices, technologies and resources. Nevertheless, the policy statement in the strategy is only on energy source:

- To promote the application of alternative energy sources, other than wood fuels, in order to reduce deforestation, indoor health hazards and time spent by rural women collecting firewood;

In a more recent document, East African Community (EAC) Energy Access Strategy (2007), efficient firewood stoves are included when setting up targets for access to modern energy:

- 55 percent of the total population in the region will have access to LPG or improved stoves and to sustained biomass supply.

INDOOR AIR POLLUTION AND HEALTH

Cooking with solid fuels on open fires or stoves without chimneys leads to indoor air pollution. This indoor smoke contains a range of health-damaging pollutants including small soot or dust particles that are able to penetrate deep into the lungs. In poorly ventilated dwellings, indoor

smoke can exceed acceptable levels for small particles in outdoor air 100-fold. Every year, indoor air pollution is responsible for the death of 1.6 million people - that's one death every 20 seconds (WHO). Exposure is particularly high among women and children, who spend the most time near the domestic hearth.

Globally, pneumonia remains the single most important child killer and is responsible for 2 million deaths every year. Newborns and infants are often carried on their mother's back while she is cooking. Consequently, they spend many hours breathing polluted air during their first year of life when their developing airways and their immature immune systems make them particularly vulnerable. Indoor smoke is one of the underlying causes and to blame for nearly 800 000 child deaths annually, where of one third (358 000) deaths, occur on the African continent (WHO 2006).

Despite the magnitude of this growing problem, the health impacts of exposure to indoor air pollution have yet to become a central focus of research, development aid and policy-making. Indoor air pollution is not brought up in the National Health strategy. The topic is recognized as an important factor in the national strategy for Growth and reduction of Poverty.

ACCESS TO IMPROVED STOVES

Access to improved cook stoves varies among developing countries, but is less than 50 percent for almost all LDCs and sub-Saharan African countries where data are available. In most of the countries for which data are available, fewer than 10 percent of people who rely on solid fuels use Improved Cook Stoves. However, in some countries access is much higher, such as Guinea-Bissau (51 %), Mauritania (28 %), South Africa (32 %), and Swaziland (48 %). Tanzania is one of the countries listed with the lowest rate of Improved Cook stoves, only 1 %! (WHO/UNDP 2009)

FIREWOOD AND 3-STONES

Traditional cooking is made on an open fire with three stones as support for the pot. The open fires are used in open air as well as inside separate kitchen rooms/houses. The open fire is a flexible, simple and free fireplace. It makes it possible to cook relative fast and use all kinds of pots.

The main disadvantages is

- Low efficiency (5-10 %)
- Smoke and heat effect the users

Firewood is in some regions commonly purchased on the market (for those who can afford it). In other regions firewood are mostly collected by members of the household. The collection is mainly done by women and children. Getting enough firewood is for many families expensive or time consuming. In many families woman/children use 2- 4 h daily for collection of firewood.

Firewood needs to be dry and in relative small pieces in order be suitable for a cooking fire. The needs for dry wood, lack of tools for cutting and splitting bigger trunks and different kind of regulations limit the firewood harvesting to branches and dry wood. Although it is a question how it is possible to find such quantities of branches and dry wood, it is obvious that collection of firewood do not pose the main threat to forest outside the most marginal areas.

An open fire produces much smoke. When the fireplace is outside, it is to some extent possible to reduce the impact of the smoke by sitting on the leeward side. Open fires is also commonly used inside the house or in separate kitchen houses. Here the fire will create indoor air pollution exceeding the recommended levels 10 or hundred folds.

CHARCOAL

Charcoal is a processed fuel and produced in the forest regions and transported to the urban market. The coal is traditionally burned in iron stoves. Coal glow almost without smoke and give much less negative impact on the users than firewood.

The main disadvantages are:

- Extremely low efficiency (high losses both in production and use)
- Non sustainable forest use

The traditional way of production and use has an extreme low efficiency. In the charring process in a traditional earth kiln normally around 90 % of the energy in wood is lost. Half of the energy content of wood is in volatile gases, this is always lost during the charring process. Traditional kilns with little control of the airflow a substantial part of the remaining energy is also just burned and lost in the kiln. A family using 500 kg charcoal annually might cause cutting of 5000 kg wood, and energy just for cooking will represent a primary energy content of more than 15.000 kWh, comparable to the total use of an European household.

Another important feature is that charcoal is produced from whole trunks and bigger branches of fresh wood. Therefore whole living trees are cut for production of charcoal. This makes bigger impact on the forest than collection of dead wood and branches.

IMPROVED FIREWOOD STOVES

Improved cook stoves for firewood reduce the fuel use by 40 to 75 % compared to cooking on open fire (three stones). In addition use of a closed stove will protect from heat and burns. Finally the stove has a potential for removing the smoke from the kitchen, given that the stove in use has a chimney.

The function of an improved stove is simple. A fire chamber is insulated (by clay or fire resistant bricks) in order to direct all heat to the pot. At the same time higher combustion temperature increase the quality of combustion as well as reducing cooking time. A separate air inlet and draft through the chimney ensures that all wood gases are burned. In order to reach high efficiency the stove has to be of good design, constructed properly, maintained, cleaned and used correctly.

The project promotes two different types of improved stoves for firewood. One is a stove made with fireproof bricks and a chimney from cement. It is made in different sizes from small suitable for a family to big ones for institutions/schools. The second type is a smaller and cheaper version is made from mud. This is without chimney. Both types are built on the site as fixed constructions and both versions give substantial wood savings.

When it comes to reduced smoke in the kitchen, only the version with a chimney gives satisfactory results. The mud stove also has some problems with durability. The clay stove does not stand water leakages. Many low-income households do not have a separate kitchen house and make most of the cooking outside.

Both models are promoted by technicians trained by TaTEDO. The quality of their product depends much on the skills and attitude of the builder. A stove always needs service (i.e. cleaning of the chimney and repairs when cracks appear). Such service needs give an after sale and service opportunity for the stove technicians and is crucial for long and proper operation of the stoves.

This has got a prominent place in TaTEDO business training and where technicians has included this as a part of their business strategy (building good reputation and income from service and after sale) the stoves show good performance.

Training of trainers has proved to be a successful strategy in up-scaling. In some active regions the use of improved stoves has reached around 20 %. This is believed to be above the threshold needed for self-sustained further dissemination. Although the stoves (with high up-front payment) have been most popular by the high to middle income households, total penetration of the marked is within sight.

Promotion of cheaper stoves for low-income households and training of women groups in construction of mud stoves seems to show less degree for self-sustained activity after training. This might be improved with high focus on health improvement and better kitchen management.

IMPROVED CHARCOAL STOVES

Improved charcoal stoves have an insulation (clay) basket that limit radiation losses and increase the efficiency with 40 – 60 %. Improved charcoal will hardly change the working conditions, but it will reduce the cost of the users and can give substantial contributories to reduction in forest cuttings. The improved charcoal stoves of Jiko type is well known in the population and has already a substantial share of the marked (50 %?). This is related to higher price of the fuel and lower price of the stove – compared to wood stoves.

The charcoal stoves are mobile units produced in workshops or semi-industrialized units. A stove has two parts, one from clay (the inner liner) and one from metal (the outer coating). The metal part is mostly made from different scrap metal. The quality is linked to the thickness and quality of the metal use. Good quality will make a stove that last for many years, while thin metal of low quality brake within months or even weeks.

The inner clay liner has a limited life span. The length will relate to the quality of the production. Type of clay, production technologies and dray and burning process will influence on the quality.

For the consumers it is hard to distinguish between the different qualities. All stoves have the same shape and look. Informal business with low skills and quality control use often lower quality materials and cut down on production time make it possible and enter the marked with cheap but low quality products.

TaTEDO has trained a number of producers and initiated own production units. This gives a substantial push for increased production volume and higher quality. Initiatives have also been taken to establish a Tanzanian official quality standard for charcoal stoves. This will benefit the serious part of the marked and the consumers if it is possible to establish and enforce.

IMPROVED COAL KILNS

Traditional earth kilns are basically the only production technology in use outside the project area. Improved kilns include additional work on stable the wood and improved control of the air-inlet and thereby the charring process. Additional work in the production is paid back by much shorter charring time and increased output in terms of quantity and quality. The improved, but still simple, earth kilns increase the output 2-3 times.

The steep increase in output and profit from charcoal production might pose a result in increased production and forest cutting. It is therefore important to introduce the new production technology as a part of a package that includes limitations on cuttings and re-forestation activities. On the other hand, such limitation might be easier to accept when new production technologies give substantial increased output.

WAY FORWARD

Based on the above observation it seems that there are two areas where further progress is especially important to address:

- Smoke and indoor air pollution from cooking on open fire
- Unsustainable forest cuttings for production of charcoal

Improved stoves with chimney are the most efficient way to address smoke from open fires. To reduce the charcoal production a combination of improved stoves, improved kilns and improved forest management is needed. With stoves that cut consumption by half and kilns that increase output 2-3 times, it is possible to increase the efficiency of the whole chain 4-6 times. Combined with better control and management of the forest this will deliver important environmental benefits.

IMPROVED WOOD FUEL STOVES

This is first and foremost a question of improved working conditions in the kitchen. It is therefore reasonable to put much stronger emphasis on a smoke-less kitchen and provide stoves with chimney suitable for all households and income-groups.

Promotion of the fire wood stoves as a mean to get a smoke free kitchen will benefit from closer involvement of the health issues (mother and child control). The environmental issue is a secondary positive effect. This might also make it easier to motivate and educate the user in terms of maintenance and cleaning of the stove.

IMPROVED CHARCOAL STOVES

The stoves are well received and the main challenge is improved production in terms of efficiency and quality. Targeted effort to support development of semi-industrial production is the most efficient way to overcome limitations in quantity and quality. New production facilities are also needed in several parts of the country in order to reduce transportation costs from Dar. The use of charcoal is today unsustainable high. Improved stoves are important in order to reduce the need for charcoal and unsustainable charcoal production practices.

IMPROVED KILNS

Improved kilns will increase the profitability in the charcoal business. This might increase the forest pressure and bring production out in new areas. On the other side, introduced together with proper production policies on limitation of areas, selection of trees and compulsory re-planting, the sustainable charcoal business might be within reach.

Improved earth kilns, although way better than traditional ones, is not the final solution. The charring process will still release all the wood gases (50 % of the energy in wood) in the form of methane. The methane emission is not only wasted energy, but a strong green house gas. This emission represents something like xx t CO₂ per ton charcoal produced. In fixed kilns it is possible to collect and burn the methane gas and thereby reducing the climate change impact. In order

to utilize the wood gas new methods need to be developed or wood has to be applied as fuel directly.

Appendix C Field Trip Program

Support to Tanzania Traditional Energy Development (TAN-2308). Review report

PROPOSED MID-TERM REVIEW PLAN

S/N	ACTIVITY	TIME	DATE	CONTACT PERSON	RESPONSIBLE	REMARKS
1	Consultants arriving in Kilimanjaro Region		09/05/2010		Consultants	
2	<ul style="list-style-type: none"> Visit TaTEDO Northern zone Office at Moshi 	8.00-9.00 A.M	10/ 05/2010	Mr. Thomas Mkunda Northern zone Coordinator (0713 496207)	Consultants, Rosada and Thomas Mkunda	
3	FIELD ACTIVITIES IN ROMBO DISTRICT Travel to Himo township	9.00- 9.20 A.M		Rosada Kimaro and Thomas Mkunda		
	<ul style="list-style-type: none"> Meet baking entrepreneurs at Himo 	9.20- 10.00 A.M				
	Travel to Rombo	10.00- 10.45 A.M				
	<ul style="list-style-type: none"> Brief meeting with DiSEDC of Rombo District Conduct visit to 	10.45 – 11.45 A.M		Rosada Kimaro and Thomas Mkunda MR. Magupa (Rombo DiSEDC) (0784 379 264)		
	Travel to Mengeni Village	11.45-12.00				
	<ul style="list-style-type: none"> Meet stove technicians (Victor 075087233 or Felician 078317944 Visit 1-2 Households with Improved stoves Visit Institutional Stove Visit Tree nursery, Visit Sustainable Energy local Financing groups baking activities 	12.00 – 4.30 P.M		Rosada Kimaro and Thomas Mkunda MR. MAGUPA (Rombo DiSEDC) (0784 379 264)		Need to have packed lunch (Lunch box)
	Back to Moshi	4.30-5.30 P.M				
4	FIELD ACTIVITIES IN HAI DISTRICT(Morning)				Consultants / Thomas and Emmanuel	
	Travel to Magadini Village	7.30- 8.30 A.M				
	Conduct discussion with Umoja SACCOS, meet with solar technician entrepreneur (Mr. Frank Evance . 0754954113)	8.30 -10.30 A.M	Mr. Elisha Philemon (Stove technician 0653 680452 /0783 773357)			
	Travel to Sabuko Village	10.30 – 11.00 A.M	Emmanuel and Thomas			
<ul style="list-style-type: none"> Visit Solar drying business at Sabuko Village – (Ms. Ngimaryo 0784397704) 	11.00 – 12.00	Thomas and Emmanuel				

	Travel to Hai District council	12.30 – 1.15 P.M	11/05/2010			
	Lunch	1.15 – 2.00 P.M				
	<ul style="list-style-type: none"> Brief meeting with DiSEDC team of Hai District 	2.00 – 3.00 P.M		Msafiri Mbelwa (Hai-Di SEDC) 0787 919332	Consultants / Thomas and Emmanuel	
	<ul style="list-style-type: none"> Visit Bomang'ombe charcoal stove selling centre Visit KIUKAFOO tree nursery group (if time allows) 	3.00-4.30 P.M	11/05/2010		Consultants / Thomas and Emmanuel	
	Travel to Arusha (evening)	4.30 – 5.30 P.M	11/05/2010		Consultants / Thomas and Emmanuel	
5	FIELD ACTIVITIES IN MONDULI DISTRICT Travel to Monduli District (160 Km from Arusha)	7.30- 9.30 A.M			Consultants , Shukuru and Thomas	
	<ul style="list-style-type: none"> Brief meeting with DiSEDC team of Monduli District 	9.30- 10.30 A.M		Mr. Mchomvu Monduli DiSEDC 0754 673411) (Mrs. Fatuma. Mshana (0754 869785)		
	<ul style="list-style-type: none"> Conduct visit to Selela village in Moduli District Arusha Region (Visit MFP installed in Selela Village, visit electrified institutions (school and dispensary), 	10.30 A.M – 12.30 P.M	12/05/2010	Hamed Mohamed Horia (0682 089955)	Consultants , Shukuru and Thomas	
	<ul style="list-style-type: none"> visit school Jatropha farm, Visit institutional stoves and meet with stove technicians 	12.30 – 1.30 P.M				
	Lunch	1.30 – 2.30 P.M				
	Travel back to Arusha	2.30 – 4.30 P.M			Consultants , Shukuru and Thomas	Need to have packed lunch (Lunch box)
6	Travel from Kilimanjaro to Mwanza by plane	Reporting time KIA 8.00 A.M			Consultants	
	Travel from Mwanza to Shinyanga by Car (180KM)	11.00 A.M – 1.00 P.M	13/05/2010		Consultants , Mary Swai,	
	Lunch	1.00 – 1.45P.M			Consultants , Mary Swai, Boniface	
	Field activities in Shinyanga region	2.00- 3.00 P.M			Consultants , Mary	

	<ul style="list-style-type: none"> Brief meeting with REDD Field coordinator (Mr. Pastory Mwesiga) 			Mr. Pastory Mwesiga (0786 843925) and Ms .Mary Swai (0713 549862)	Swai, Boniface	
	<ul style="list-style-type: none"> Brief meeting with NAFRAC manager in Shinyanga Mr. Minja 	3.00- 4.00 P.M	13/05/2010	NFRAC Manager Mr. Minja (0755 737466)	Consultants , Mary Swai, Boniface	
	Travel to Kahama District	4.00- 5.30 P.M				
7	FIELD ACTIVITIES IN KAHAMA DISTRICT <ul style="list-style-type: none"> Brief meeting with DiSEDC of Kahama district 	8.30-9.30 A.M		DiSEDC member Frorian Shirima (0784605642/ 0714629080)	Consultants, Mary Swai, and Boniface	
	Travel to Igung'wa village	10.30 A.M - 11.00 A.M		Leocadia Rwegoshora (0754 443792)		
	<ul style="list-style-type: none"> Visit Tree planting groups , improved stove, REDD pilot project areas 	11.00 – 1.00 P.M				
	<ul style="list-style-type: none"> Lunch 	1.00 P.M- 1.45 P.M				
	<ul style="list-style-type: none"> Travel to Chela village 	1.45 – 2.30 P.M			Consultants, Mary Swai, and Boniface,	
	<ul style="list-style-type: none"> Visit Chela Village Jatropha farm, Oil pressing activities 	2.30- 4.00 P.M	14/05/2010		Frorian Shirima	
8	Travel to Bugomba village – (100 Km from Kahama Town)	7.00 A.M – 9.00 A.M	15/05/2010	Frorian Shirima (0784605642/ 0714629080)	Consultants / Mary Swai, Boniface	
	<ul style="list-style-type: none"> Visit charcoal producers and Improved Charcoal Production activities 	9.00- 11.00 A.M				
	Travel back to Kahama Town	11.00- 1.00 P.M			Consultants / Mary Swai, Boniface	
	Lunch	1.00 – 2.00 P.M				
	Travel back to Mwanza by car	3.00 – 5.00 P.M	15/05/2010		Consultants	
	Travel back to Dar es Salaam by plane (Morning)	Reporting time 7.30 A.M	16/05/2010		Consultants	
	Brief meeting at TaTEDO Office and agree with plan for Dar es Salaam + others	9.00- 10.00 A.M	17/05/2010	Ms. Gisela Ngoo (0718 352373) Mr. Estomih Sawe (0754 279868)	Consultants, ED and TaTEDO Managers	
9	Debrief and potential meeting with others		18/05/2010			

