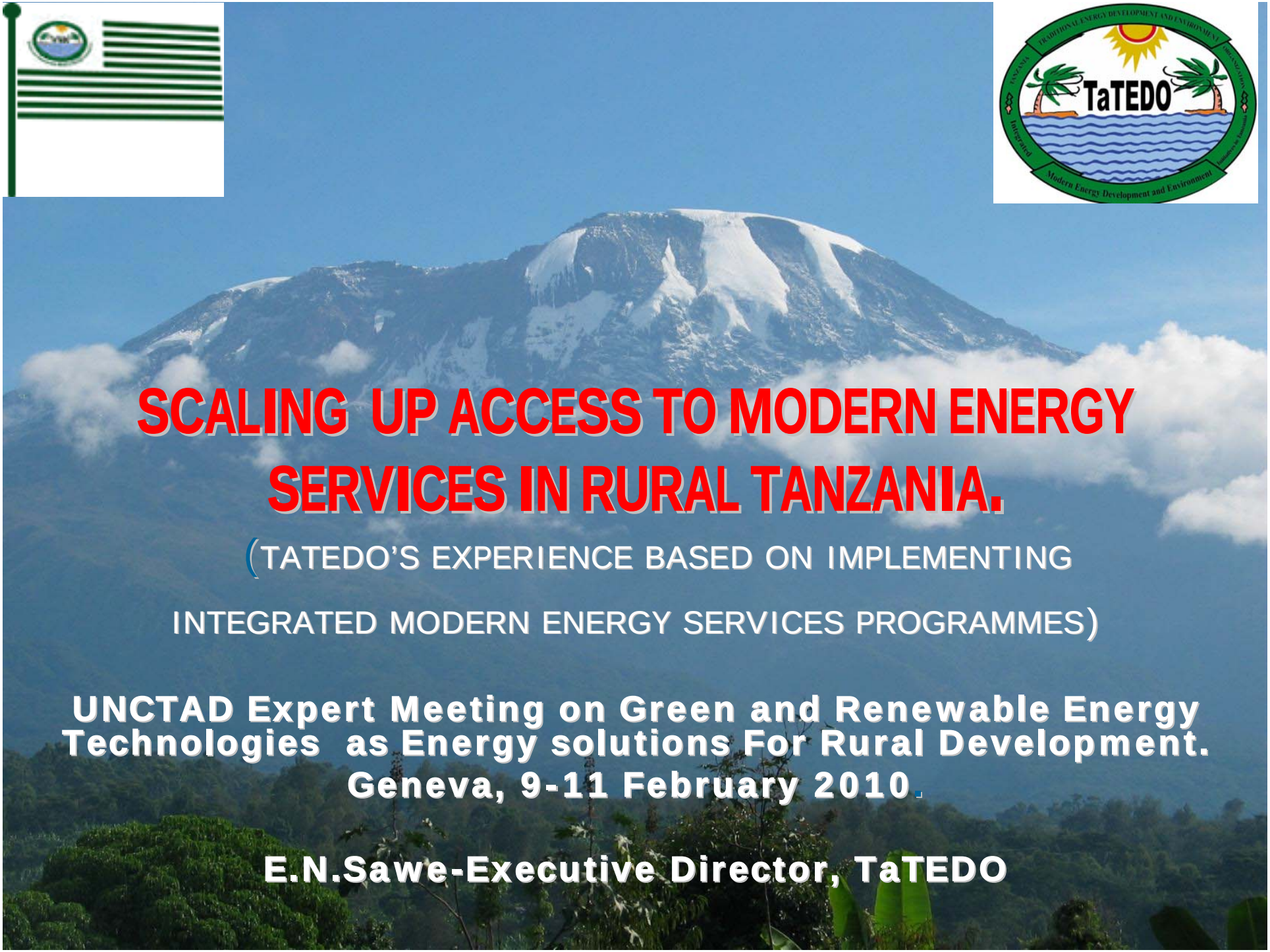


SCALING UP ACCESS TO MODERN ENERGY SERVICES IN RURAL TANZANIA.

(TATEDO'S EXPERIENCE BASED ON IMPLEMENTING INTEGRATED MODERN ENERGY SERVICES PROGRAMMES)

UNCTAD Expert Meeting on Green and Renewable Energy Technologies as Energy solutions For Rural Development.
Geneva, 9-11 February 2010.

E.N.Sawe-Executive Director, TaTEDO

PRESENTATION OUTLINE

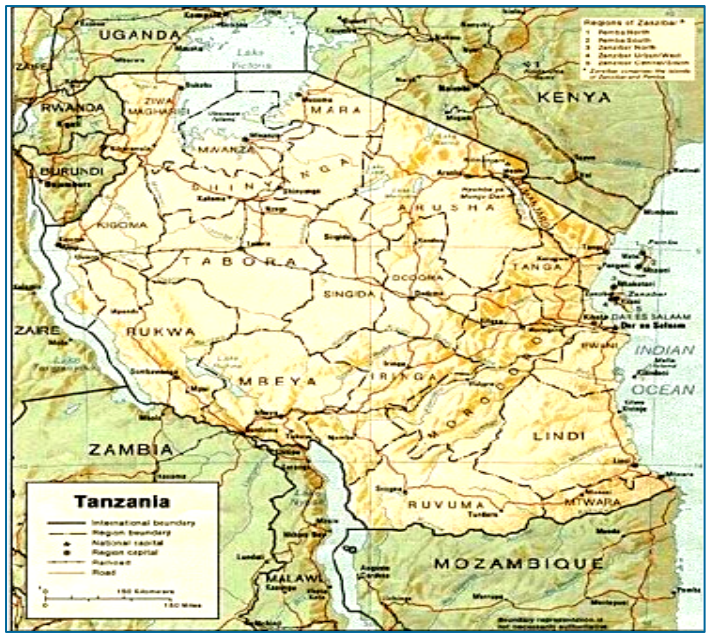
1. Tanzania country context.
2. Energy Resources in Tanzania.
3. Energy problems and situation overview.
4. Rural energy Problems and situation overview.
5. Challenges of low access to modern energy services in rural areas.
6. Barriers to scaling up Access to modern energy services in rural areas.
7. Roles of different stakeholders in alleviating the situation.
8. TaTEDO's Programmes on scaling up access to modern energy services.
   - 8.1 Target groups.
   - 8.2 Stages of implementation.
   - 8.3 Sub-programme 1 to 4.
   - 8.4 Selected Quantitative achievements.
   - 8.5 Other ongoing projects not presented
9. Lessons Learnt.
10. Recommendations.
11. About TaTEDO.

1.0 COUNTRY CONTEXT

Tanzania - Location and Features.

Size: 945,087 square Kilometres

Location: Tanzania lies between 1^0 and 12^oS and 30^o and 41^oE between three great lakes - Victoria (north), Tanganyika (west) and Nyasa (south) in the Western Rift Valley and the Indian Ocean (east) in East Africa.



Altitude: The altitude varies between the summit of Mount Kilimanjaro 5,950 m. above sea level and the floor of Lake Tanganyika 358 m. below sea level.

Lake Tanganyika-Gombe Shore (358 m below sea level)

1.0 COUNTRY CONTEXT cnt…
Key Economic Indicators

- **Population:** 41 million (2009 est.)
- **GDP per capita:** $750 (2009 est.)
- **GDP composition by sector:**

(Agriculture:27% industry:23% Services:50%)

- **Major sources of foreign exchange.**
  - Minerals (Gold, diamond, Tanzanite, etc.),
  - Agriculture (Coffee, cotton, cashew, sisal, etc)
  - Tourism
- **Inflation:** 11.6 % (2009 aver.)
- **Electricity Access:** 12% of total population, 2% of rural population.

2.0 Energy Resources in Tanzania

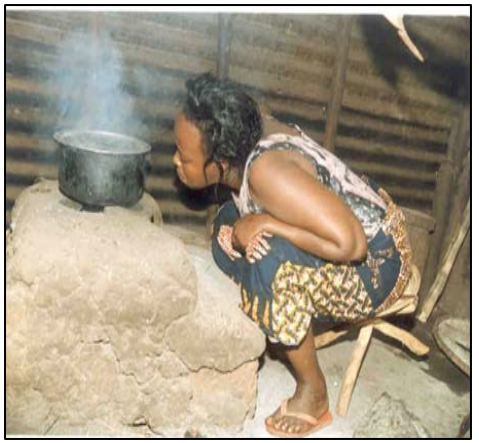
- Main energy resources in Tanzania are, biomass (forest 35mil.hacteres), hydro (4700Mw), Small hydro(475Mw).
- Solar energy (>6000MJ/sq.m. of solar radiation) play a significant role in the agric. sector (crop production, drying etc).
- Moderate wind speed yet to be explored (4-8 m/s)
- No crude oil resources in commercial quantities.
- All petroleum products have to be imported(1.8Mt/annum)
- Natural gas exploited for power production and industrial use since 2004.
- Coal resources available little exploited for fuel and electricity generation (735.95Mt)
- Geothermal resources (650Mw) available, not yet exploited
- Uranium resources available, not yet exploited

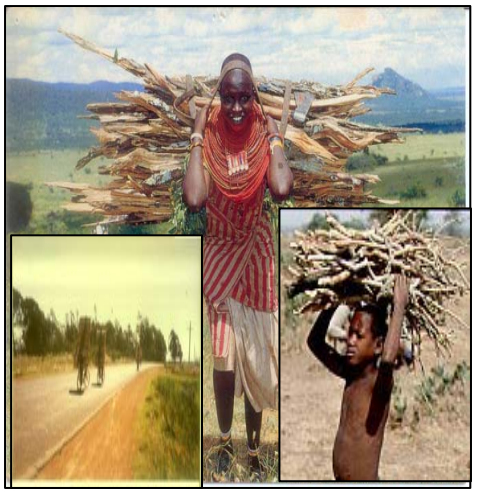
3.0 Energy Problems & Situation overview

- Although Tanzania is endowed with enormous energy resources, access to modern energy services is still very low or non-existent in most rural areas.
- Characterized by low per capita consumption of modern energy- about 100kgoe- Africa average is 300kgoe.
- Low electricity consumption annual per capita about 150Kwh.
- 80 percent of energy is consumed in rural areas.
- Biomass consumption (per capita 1 to 1.5kg/day) is on the increase in absolute terms.

4.0 Rural Energy Problems & Situation Overview

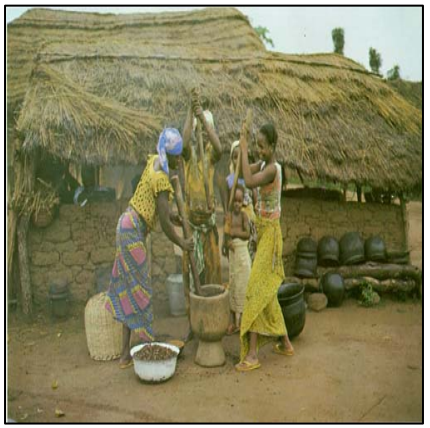
- Very low consumption of modern energy in all key sectors i.e. agriculture, households, transport, commerce and services.
- More than 80 percent of energy for agriculture & transport is from human in particular women and children
- More than 90 percent of energy for lighting is through wick lantern using kerosene or firewood since 98 percent of the rural population has no access to grid electricity.





5.0 Challenges of Low Access to Modern Energy Services in Rural Areas

- Trap the rural people in poverty
- Damages rural peoples (women/children) health (smoke, overwork).
- Damages the environment i.e. forest depletion.
- Denies rural people access to modern technologies and appliances (i.e. TV, computer, refrigerator, mobile phones etc).
- Denies rural people quality social services (i.e. water, health and education) and productive opportunities.
- Increased unemployment in rural areas, forces youth to migrate to cities leading to overcrowding and crime.
- More than 40% of agricultural products are wasted due to post harvest losses and lack of appropriate energy to process or preserve them.



6.0 Scaling up Access to Modern Energy Services in Rural Areas.

Barriers

1. **Policy and institutional**
   - **Poor understanding by policy makers and planners of rural energy issues, inadequate information and data for effective planning.**
   - **Low priority and inadequate resources allocated to rural energy development by the Government and other stakeholders.**
   - **No clear strategy, legal and regulatory framework for energy policy implementation to facilitate greater access to modern energy services in rural areas.**
   - **Inadequate local institutional framework for facilitating energy access in rural areas (technical and financial).**
   - **Low participation of the private sector and communities in planning, implementation and monitoring of rural energy initiatives.**
2. **Financial**
   - **Rural energy is mostly outside formal and monetized economy, yet contribute to about 80 percent of the total energy consumed in the country.**
   - **low investments, unaffordable credits hence low affordability by the majority.**
   - **Private sectors have little interest due to low load demand and low purchasing ability of rural people.**

6.0 Scaling up access to modern energy services in rural areas.

Barriers Cntn…

3. Technical

- Low quality & inefficient energy technologies dominate.
- Inadequate local production of modern energy equipment.
- No reliable data for planning rural energy initiatives.
- Limited access to energy technical knowledge and skills.

4.Social and Cultural

- Adherence to inefficient traditional technologies and practices.
- Poor understanding of local priority needs and linkages (top down approach), hence resistance to change by the target groups and beneficiaries.
- Low awareness of modern energy technologies benefits visa-vi traditional energy technologies,
- Rural energy options are mostly applications and area specific.

7.0 Scaling up Access to Modern Energy Services in Rural Areas
Roles of key Stakeholders

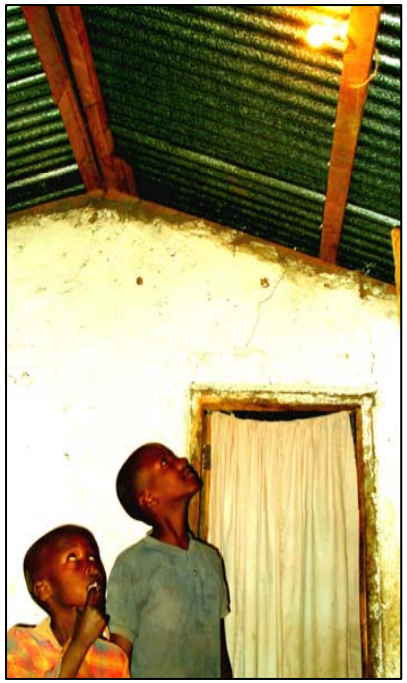
- Ministry of Energy and Minerals- To Create enabling policy, strategy, regulatory and incentives environment for different stakeholders and market to participate and function in the rural energy development initiatives.
- Government energy Agency (REA and REF):- A coordinating, facilitating/funding agency for initiatives by energy projects/ initiatives developers.
- Local governments (District and village): Creates local enabling environments for NGOs, CBOs, private sector and financial actors to operate.
- NGOs:- Raise public awareness/education, mobilize communities, mobilize financing, provide extension services, technical and material support to energy entrepreneurs, community groups and beneficiaries.
- Private and commercial sector:- Market appropriate energy technologies and services to users of energy technologies on commercial basis.

8.0 TaTEDO's programme on Scaling up Access to Modern Energy Services

Objectives

1.0 Overall:

Contribute to improved livelihoods, poverty reduction and sustainable rural development through greater access to modern energy services;



2.0 Specific :

- **To enhance greater access to modern energy technologies and services.**
- **Reduce environmental adverse effects associated with energy production and use.**
- **Scale up access to electricity, heat and motive power from decentralized energy systems.**
- **Facilitate local institutions and peoples' participation in energy planning, entrepreneurship, financing, marketing, monitoring and evaluation of the programme activities.**
- **Develop income generating and employment activities through productive uses of energy in rural areas.**
- **Strengthen networks, partnership, managerial and institutional capacity of TaTEDO and her local partners.**
- **Contribute in setting up Community centers for sustainable energy and enterprises services.**
- **Enhance local production, use and management of local energy resources and systems.**

8.1 Scaling up Access to Modern Energy services: TaTEDO'S MODERN ENERGY TECHNOLOGIES: CATALOGUE SUMMARY.















8.1 TaTEDO's Programme on Scaling up Access to Modern energy services

Technologies and practices ctn…

- The energy technologies and practices promoted Include:
  - use of efficient wood fuels stoves and ovens (firewood and charcoal).
  - use of improved charcoal production kilns and simple retorts.
  - commercial use of Solar dryers.
  - use of biogas for fuel and electricity provision.
  - Enhance rural electrification through, micro hydro, solar, wind and liquid bio-fuels.
  - Facilitate the growing of multipurpose energy trees and crops i.e. Jatropha, Avocado, etc

Being implemented in twenty districts and 100 villages in Tanzania

8.2 TaTEDO's Programme on Scaling up Access to Modern Energy services in Rural Areas

Target Groups

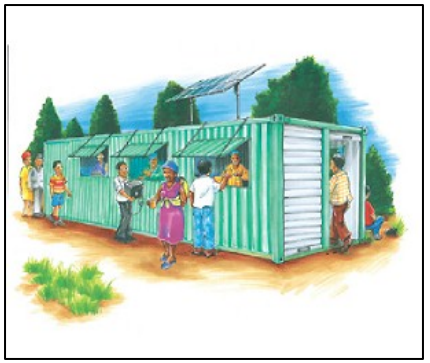
- Households, Social services centres and SMMEs
- Rural energy services entrepreneurs/company (SEGs) Community Centre for sustainable enterprises Services (COSEESE).
- Local government (Districts and villages),
- Jatropha small scale farmers and their associations/cooperatives.
- Communities and Villages Energy Teams
- Finance/ micro finance institutions.
- Individual women, technicians and operators of technologies.

8.3 TaTEDO's PROGRAMME ON SCALING UP ACCESS TO MODERN ENERGY SERVICES

STAGES FOR IMPLEMENTATION.

- Participatory and consultative identification of programme villages in collaboration with local partners (DiSED, CBOs etc).
- Baseline data/Indicators (resources, socio-economic, etc) establishment.
- Conduct PRA exercises to assess, needs, opportunities, stakeholders, strengths and determine self expressed local priorities and link with energy needs.
- Participatory preparation of energy development action plans with targets.
- Awareness creation through, posters, media and demonstration of relevant technologies.
- Technology enterprises identification, market assessment, business plans preparations.
- Market development through technical and business management capacity building
- Participatory monitoring of the programme activities and offspring businesses (collect key information on technology quality and business performance).
- Capture Lessons, adapt the technologies to help with scaling up, replication and mainstreaming successful initiatives in other local areas.

8.4 Scaling up Access to Modern Energy Services : Sub-programme 1.0: Scaling up Access to integrated Modern Energy Services for Poverty reduction



Financially supported by the EU and the Hivos

This programme facilitates the establishment of Multi-purpose Energy & Enterprises Services Centers (MPESCs in rural areas, they include:

- **Installation of Energy Services Platforms (ESPs or MFPs), powered by Jatropha oil.**
- **Installations of Sustainable Energy Enterprises Centers (SEECS or PUCs), powered by Solar PV.**
- **Development of Rural micro-enterprises centers.**
- **Jatropha seeds production and Processing for oil by small scale farmers to be used in the ESPs.**

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8.4 JATROPHA ESP SYSTEM, MULTIPLE USES AND BENEFITS ctn…

Biogas

Electricity/ motive

Mill

Fertilizer

Oil Cake

Environment conservation

Firewood

ESP

Jatropha Plant

Jatropha Oil

Biodiesel

Diesel engines

Soap

Glycerin

Jobs and Income

8.4 Energy Services Platform

Selected Results ctn…

- Four ESPs installed in Rukwa, Arusha and Dar es Salaam.
- More than 175 households and business centers connected to mini grids, battery electricity.
- Capacity/expertise on design and installation has been developed for 11 technicians/contractors,
- Training on operation and maintenances for 10 operators
- Awareness raising campaign and promotion of jatropha cultivation for energy supply and poverty reduction for 45 villages, and to policy makers.
- Education and training on the benefits of jatropha for more than 500 farmers and 20 TOTs
- Business and enterprises development for 12 ESP entrepreneurs.
- Support farmers through provision of high yield seeds/seedlings, tools for nurseries establishment.

To be scaled up to more than 100 villages.

8.5 Scaling up Access to Modern energy services: Sub programme 2.0: Integrated Modern Energy services for sustainable development

Financially supported by the Norwegian Government

- Contribute to sustainable Development and poverty reduction by enhancing access to modern energy technologies and services for consumptive and productive needs in rural households, SMMEs and social services centers.
- Increase access to electricity, solar drying and motive power through decentralized energy systems.
- Mitigate environmental adverse effects associated with biomass energy production and use.
- Facilitate energy related information management acquisition, processing, storage and dissemination.
- Facilitate participatory planning, monitoring and evaluation of the programme activities

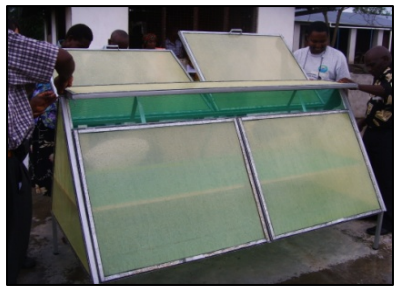
8.5 Solar drying technology ctn…

1.0 One of the technologies promoted by the programme.

- Reduction of post-harvest losses and malnutrition.
- Provision of employment and increase income in rural areas
- Improve food security and reduce poverty
- Increase value to local agricultural products
- Feasible for low and large scale solar drying products producers and entrepreneurs

2.0 Results

- Training on fabrication of solar dryers for 10 carpenters.
- Fabrication of more than 226 solar dryers.
- Provide in-depth knowledge on food processing, solar drying business for 59 entrepreneurs.
- Assist entrepreneurs to prepare business plans to access loan from MFIs.
- Adaptation of large solar drying technology for commercial scale production.
- Publication of relevant materials, brochures, posters and live demonstration to create more awareness.
- Assist establishment of solar dried products producers association.



8.7 Scaling up Access to Modern Energy Services

Subprogramme 3.0: Integrated Improved wood fuels services for Poverty reduction-Objectives

Financially supported by the EU & Hivos

1.0 Overall :-

To contribute to poverty reduction of the beneficiaries and environment conservation

2.0 Specific

Increased income of the rural and urban beneficiaries through reduced costs and increased efficiency for wood fuels utilisation and production by adoption of efficient wood fuels stoves, ovens and charcoal production kilns.

8.7 Improved Biomass Energy Technologies (*Stoves & Ovens*) ctn…

Activities to scale up stoves and oven technologies include:

- Awareness creation at all levels on benefits of stoves and ovens,
- Capacity building in technical and business management on in stoves and ovens ,
- Support entrepreneurs involved in stoves and ovens businesses to prepare business plans and linking with MFIs.
- Lobby and advocate through established DiSEDCs to sensitize community, create awareness, integrate initiatives in other development sectors, support entrepreneurs etc.

8.8 Some Impacts from the Improved Stoves and Ovens interventions ctn..

- **Money saved at a household level with 6 people using improved stove was TZS 472,000/= in 2008**
- **Average number of hectares of trees saved using improved stoves in 2008 was estimated to be 4,500**
- **Baking entrepreneurs earn about $ 5 – $50 per day as profit**

Some General Recommendations:-

- **Build district and village planners capacity to mainstream biomass initiatives in other development strategies and plans.**
- **Promote productive and consumptive use of efficient technologies to speed up number of rural households, SMMEs and social services with access to improved stoves/Ovens.**
- **Clear guidelines and procedures on production and utilisation of biomass energy resources at all levels,**

8.10 Scaling up Access to Modern energy Services: Sub programme 4.0: African Rural Energy Enterprise Development (AREED).

Financially supported by Sida and UNEP,

Objective

- To promote and improve rural access to modern energy technologies and services through enterprise-centred approach.

- AREED works jointly with other programmes through the following steps:
  - Entrepreneurs pipeline development i.e. identification and selection of entrepreneurs.
  - Determination of EDS/BDS support services required (business training need assessment).
  - Depending on the business technology in question, undertake market assessment.
  - Provide seed capital or Link entrepreneurs with credit institutions for financial support.
  - Provision of post investment EDS/BDS - follow up meetings/coaching.

8.10 Scaling up Access to Modern Energy services: Rural energy Enterprise investments ctn..

Supported the development and investment in seven (7) businesses worth USD 684,564 in total, the distribution of the investments is as follows: -

Enterprises	Amount invested (USD)	Technologies
BETL	50,000	Fuel switching from fossil -> Biomass.
MONA	100,000	Solar PV marketing
SEECO	54,324	Energy Efficiency stoves
RESCO	63,240	Solar PV
FADECO	27,000	Solar Drying
FELISA	300,000	Bio-fuels development
MENA	90,000	Biomass Briquette

8.11 Scaling up Access to Modern Energy services Access
Selected Programmes Quantitative Achievements

Target Groups Trained

Duration	2008	Cumulative 2000 -2008
Stove Artisans	215	625
Charcoal Producers	141	547
Bakers	163	508
Tree Nursery Owners	21	116
SMEs and Institutions	185	1490
Partners	13	52
Solar Technicians	61	210
ESP Technicians	7	7

Production and Uptake of Sustainable Energy Technologies

Duration	2008	Cumulative 2000 –2008
Charcoal Stoves	192,745	1,700,051
Firewood Stoves	1,240	117,062
Charcoal Ovens	183	608,474
Tree Seedlings	315,000	1,997,474
Solar PV Systems	69	1,473
Solar Dryers	57	167
Solar Multi-Charger	8	28
Energy Services Platforms (ESP)	4	3
Micro Hydro Electricity Plant	1	1

8.12 Scaling up Access to Modern Energy Services

Other ongoing projects not presented here

1. House holds Efficient woodstoves project (6000 stoves) – A voluntary Carbon Market Project.
2. Community based reduced Emissions from deforestation and forest degradation (REDD). Mechanism for sustainable forest management in Semi-Arid Areas of Shinyanga Region.
3. Core support and capacity building of a "Sustainable Energy and Development Centre".
4. Enabling access to sustainable energy (EASE.)
   - Sustainable Energy business development officers capacity building at district levels.
   - Sustainable energy information management capacity building.
   - South South sustainable energy technologies transfer from (Vietnam. Bolivia, Mali and Tanzania).

9.0 Scaling up Access to Modern Energy Services:
Lessons learnt

- Rural energy planning and implementation cannot be isolated from other aspects of rural development such as agriculture, SMMEs and services.
- Rural energy systems are successful when they are managed and maintained through private or cooperative ownership.
- Rural energy services should as much as possible support productive needs (income generation) and facilitate to improve social services delivery (e.g. healthcare and education).
- Energy's importance to rural development is poorly recognized in the national development policies and strategies which mostly consider large scale electricity infrastructure projects.

10.0 Scaling up Access to Modern Energy Services:

Recommendations

- Governments should formulate and implement effective rural energy policies and strategies which create enabling environments for markets to operate while ensuring the needs of the marginalized in the community are met.
- It is important to improve governance and local institutional framework and capacity for scaling up access to modern energy services in rural areas.
- Commit adequate financial resources and expertise for scaling up and replicating successful energy technologies and practices necessary for facilitating access to modern energy services which are crucial for improving rural productivity and social services.
- Finally, stakeholders need to cooperate and do much more on the ground and probably talk and write less if we are to significantly contribute to greater access to modern energy services by rural people for rural development.

13.0 About TaTEDO

- Is a sustainable modern energy development organisation based in Dar es Salaam with energy activities in 9 regions and in more than 100 villages in Tanzania.

- Vision: Poverty free and self reliant communities in Tanzania accessing sustainable modern energy services.

- Mission: To Advance popular access to sustainable modern energy technologies in marginalized communities in Tanzania, through technological adaptations, community mobilization, capacity building and advocacy for increased access to sustainable energy services, poverty reduction, environmental conservation and self reliance.

- Has diverse partnership base locally and internationally with GOs, LGAs, NGOs, Private Sector, Donors, and communities.
- Has field experience of more than 18 years on sustainable energy activities - studies, planning, implementation, enterprises and policy support, monitoring and evaluation.
- Has an interdisciplinary team of about 50 staff.

THANK YOU FOR THIS OPPORTUNITY AND YOUR ATTENTION

FOR MORE INFORMATION, PLEASE CONTACT:

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