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Drivers and Barriers to Successful Rural Electrification in Tanzania

Report from Stakeholder Workshop held in Dar es Salaam, 23rd of April 2012

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Cover: Picture taken in Tanzania by Hanna Sand Lindskog.

Contents

This workshop report has been written by Helene Ahlborg based on notes from discussion held at the workshop, and the lists of drivers and barriers have been compiled from lists filled in by workshop participants. Participants have had the opportunity to comment on the draft version before publication. The views presented do not necessarily reflect the group at large as we did not strive for consensus in discussion. Any misunderstandings or mistakes in the report are on behalf of the author.

Drivers and Barriers to Successful Rural Electrification in Tanzania

Report from Stakeholder Workshop held in Dar es Salaam, 23rd of April 2012

The following report presents results from small group work and discussions held at the stakeholders' workshop. The report first gives the background information about the workshop, then presents results from the exercise carried out in small groups during the workshop on drivers and barriers to RE, and finally summarizes the round table discussion. The two Tables at the end contain the full compilation of the workshop exercise.

Background

The workshop was open to energy sector stakeholders interested in rural electrification by grid-extension and off-grid systems. It took place during half a day and aimed to present recent empirical research and initiate in-depth discussion on (1) drivers and barriers to rural electrification, (2) the potential for productive uses of electricity and (3) private sector involvement in Tanzania and Mozambique.

The workshop was organized by PhD candidate Helene Ahlborg from the STEEP-RES research program at Chalmers University of Technology, Sweden and facilitated by Jacqueline Senyagwa, Stockholm Environment Institute, SEI Africa center, Dar es Salaam. Professor Cuthbert Z. M. Kimambo from University of Dar es Salaam was the workshop moderator. The program included a presentation by Ms. Ahlborg of results and key findings, small group work and round table discussion. Results from the small group work and notes from the round table discussion have been compiled afterwards by Ms. Ahlborg.

List of participants

Name	Organization	Area of specialization
Cuthbert Z. M. Kimambo	College of Engineering and Technology, University of Dar es Salaam	Energy Engineering
Jacqueline Senyagwa	SEI Africa	Bioenergy and household energy
Emanuel R. Alfred	SEI Africa	Law
James L. Ngeleja	NEMC	Energy and Environment Management
Leo Msanga	SEDC/TaTEDO	SEDC Coordinator
Leonard Pesambili	TaTEDO	Rural Electrification and Renewable Energy

Name	Organization	Area of specialization
Emeline Manase	SEDC/TaTEDO	Administrator and Field Staff
Alice Michelazzi	ACRA	Project Management
Joel F. Mushi	Dar es Salaam Institute of Technology	Electrical Engineering Department
Godfrey G. Mushi	Dar es Salaam Institute of Technology	Renewable Energy and Electric Energy Systems
Omari J. Bakari	COSTECH	Technology Transfer
Hanna Sand Lindskog	Chalmers University of Technology	Rural Electrification and Social Change
Helene Ahlborg	Chalmers University of Technology	Rural Electrification and off-grid Renewable Energy Systems

Results from group work: rating of drivers and barriers to rural electrification

The full compilation of results are found in Table 1 and 2, last in this document. Here follows a summary of what drivers and barriers are thought to be most important. Participants in the workshop have been presented with two lists: one with drivers and one with barriers that have been identified through earlier interviews (Ahlborg and Hammar 2012). The list has been discussed in small groups but each participant has individually rated each driver and barrier according to perceived importance.

Each driver or barrier is rated as:

1. Important
2. Of some importance
3. Not a driver/barrier

Drivers for RE

The drivers considered most important by participants are:

- *Governmental policies promoting RE*
- *Use of subsidies or pro-poor policy increasing nr. of rural customers*
- *Local entrepreneurs taking initiative*
- *Mobilization at grassroots level*
- *Feed-in tariff for off-grid generation*
- *Donor push and support*
- *Off-grid RE creates demand and a customer base for grid-extension*

- *Need of increased reliability in the national grid.*

These received 10, 9 or 8 rankings as Important (out of maximum 10). Most participants do not consider *Political election campaigns* to be drivers for rural electrification, they are rather seen as problematic. 12 new drivers were added to the list of 19 drivers.

Barriers to RE

The barriers considered most important by participants are:

- *Low institutional quality*
- *Lack of human capital*
- *Tariff system and connection fees*
- *Lack of local engagement/capacity*
- *Low access to required materials*

Each receiving 10 out of 10 rankings as Important.

The following barriers receive 9 or 8 rankings as Important:

- *Lack of private sector involvement*
- *Top-down management in energy sector*
- *Lack of co-investments in rural development*
- *Donor dependency*
- *Low productive uses and income generation*
- *Lack of funds*
- *Poverty and low household affordability*
- *Lack of access to skilled personnel*
- *High costs of diesel a barrier to off-grid diesel systems*
- *Insufficient financial institutions*
- *Lack of consistency between RE projects*
- *Lack of local entrepreneurship/reluctance of local entrepreneurs to invest*
- *Scattered population;* and *Limited rural infrastructure.*

12 barriers are added to the list of 32 barriers.

The exercise shows interesting results for other drivers and barriers as well and is worth studying in detail (see Table 1 and 2). Unfortunately, two key actors in Tanzania, REA and TANESCO could not attend the workshop. Their input on these results is wished for by participants. There is also a wish among participants to take the analysis further. They see a need for solutions from different levels. Therefore, the next step would be to have drivers and barriers identified for each societal level, and discuss measures to strengthen positive aspects and find ways to overcome important barriers. The workshop concludes that analysis needs to continue.

Notes from round table discussion

Following group work on drivers and barriers, participants spent half an hour discussing the following four questions in small groups before addressing them all together in a round table discussion, chaired by moderator Kimambo:

1. What can be done to integrate measures for enhanced productive uses of electricity in RE projects?

2. What investments and strategies are needed to enhance private sector actors in their roles as service providers and productive users of electricity?

3. How can cross-sector integration take place in practice to a higher degree?

4. Are there gaps of knowledge that research should address?

Many interesting and important points were made, summarized below.

Question 1: *What can be done to integrate measures for enhanced productive uses of electricity in RE projects?*

- There is need to enhance agro-processing for agricultural products and small manufacture of local goods. We must link agro-processing in the rural communities with financial institutions, micro-financing and enterprise development in the communities. Micro-financing is an important question. Where does the source of fund come from?

- It is also a necessity to link the existing production to available markets so that people can know that there is a buyer. The national markets have a certain standard which is higher than the local standard, so producers need help to reach this standard in order to sell to national markets.

- It is a precondition to do market assessments and analysis of value chains. Through a social market survey one can specify the local energy needs by looking at the market for services needed in the locality. The needs and production potentials differ between places. Are there public commercial centers? What activities are there? Related to for example irrigation and water, harvesting, processing, grinding etc. one should also identify actors willing to be involved for provision of the services. Are there local financial institutions to provide investment capital?

- Identification of productive uses of electricity should be part of projects. There is need for commercial awareness about the agricultural – renewable energy development link and access to microfinance for spread of RETs.

- There can also be potential for cogeneration and hybrid systems for combined heat and power production. There may be a bioenergy potential in the area making it possible to use more than only one energy resource.

- There is need for measures at different levels and some must be addressed by policy makers. Policy makers should help local people to form associations so that there are plenty of resources available for investors to be attracted to investing in processing machinery.

- There is need for capacity building on accessibility and use, for what and how electricity can be used. Access is needed to technologies that are linked to electricity, especially technologies for agricultural practices and there is need to increase the understanding of electricity as income generating.

- It can be good to focus on activities rather than a sector, if we look at a specific case instead of e.g. the agricultural sector, we can see what is needed and address that.

- A conclusion is that identification of productive uses, needs and market potentials comes first in the process, to then be linked with a suitable source of electricity.

Question 2: *What investments and strategies are needed to enhance private sector actors in their roles as service providers and productive users of electricity?*

The above question immediately leads to discussion requiring clarification as it contains the implicit assumption that there is need for more involvement from private actors, in their roles as service providers and productive customers. What do we mean by private sector involvement and what has it meant in the past? The government has been the key actor for rural electrification for all years but the international donors and the World Bank have brought in the issue of privatization, it is a push from outside for reviewing policy and legislation. Privatization has been implicating large-scale companies running generation and sometimes distribution commercially. However, the World Bank (ref) has acknowledged that privatization of the energy sectors in most African countries has partly been a mistake. Mozambique's decision to halt privatization was based on an evaluation of what happened in other African countries where in fact the results have not been the expected positive ones. For clarification, Ahlborg explains the framing of the question by saying that what is in focus in the workshop, is the **consumer and service provider sides of electrification** and not generation. It is also the **small- and medium-scale activities and actors** that are in focus and not large-scale private companies. She thinks RE requires long-term public investments from the state, but also more actors in a bottom-up process. Private sector includes **local people and domestic businesses** taking part in the local, national and international economy, generating incomes and employment in rural areas.

- There is a role for the government to work as the facilitator, while private actors can be the implementers. It is the government's role to create conducive environment for private sector to invest. To have private actors engaging is also about a sense of ownership, if I own a company selling solar home systems it becomes part of my daily life and I will care for it and take responsibility, instead of everything coming from the state and having nothing to do with my own actions.

- There are also the pension funds that are in fact public money. We (NEMC) have been pressing for money to not only be invested in real estate in urban areas, but also in investments in the rural villages.

- Also, we need to understand the private sector, we assume that they know about RETs but maybe they don't know the opportunities that are there. Also, it is about the capability of private sector to apply for the money, REA is having that problem that very few apply for the REF.

- Therefore, earlier we (NEMC) invited the banks and the saccos to discuss and learn about rural electrification.

- For local investors there is the issue that they need to be ensured invested capital will be recovered and policy makers are crucial for reducing financial risk and give such assurances.

- There is already the Standard Power Purchase Agreement in place for projects below 10 MW. Now the commercial banks are being urged to reduce their interest rates from 19-20%, which is very high. There has also been a discussion that the eight years period for return on investments for energy projects should be longer (considering the large investment and long implementation time and lifetime of systems). Bank seems to think there is no market, but it is a question of doing research, there are opportunities.

- There is a need for private sector actors in Tanzania. In the government they have general rules but private actors can be more specific. It is good for the sustainability of the projects as they do it as a business and the government can get taxes, business funds etc… the government can facilitate private sector implementation.

- There is need of financial capacity and capacity building and training in entrepreneurship.

Question 3: *How can cross-sector integration take place in practice to a higher degree?*

- In fact, the linkages are there on paper and in the legislation. At national level, there is supposed to be integration between sectors. What we miss perhaps are the people who are implementing in an integrated way and linking between issues in practice. It can be an issue of organizational culture and a lack of people doing integration.

- There is a need of finding the tools to make networks at the local level and between the national and local level.

- We (COSTECH) have been discussing a TIC – Tanzanian Investment Center as a focal point for information sharing regarding RE.

- Tanzania also needs positive showcases and we do not have that many yet. The hydro project in Mawengi (implemented by ACRA) is such a positive showcase where issues are being integrated.

- This is also an issue of donors way of working which stops integration. They need to report to their own communities what results they have produced so they don't coordinate between themselves. This creates a problem by making it difficult to integrate between development projects.

- People in the agricultural sector are not aware of the potential for energy production from biomass, there is need for education and increased awareness to help interventions. Networking is an important issue here as it can facilitate cross-sector integration. There is some sort of resistance among public institutions to assist with sharing of information and data to someone from another institution, even when the documents are public.

- The National Bureau of Statistics is now working with REA to produce reports for the purpose of planning. NEMC is in the rural energy working group, working with cross-sector integration.

- The major problem is how people work. The information to the local level and how the implementers affect the implementation are key issues.

- The role of media is important in order to create knowledge and awareness.

Question 4: *Are there gaps of knowledge that research should address?*

- One important area is the climate based funding and CDM which is of interest for Tanzania. We need to understand the energy needs at household level, the carbon footprint from household level and up in order to access the carbon financing. Climate based funding is a difficult area that needs more research, how can Tanzania attract such projects and funding?

- There are also technical issues of implementation and management, after installation there can be problems if there are no persons knowledgeable there to attend to it. Also on the consumer side, people lack knowledge on how to calculate their investments. When these challenges are turned into research questions we ask: how can we transfer knowledge and skills to end-users? How can it be disseminated? What model can we have?

- The model could also include the willingness to pay and the profitability of investments.

- There are questions regarding how to do technology transfer and good payment models so that local people can afford electricity. There is not one model for all areas and a model cannot simply be copied. But we need to learn from successful countries.

- From an engineering point of view there are questions to solve regarding metering and tariffs in relation to technological complexity or simplicity, are remote control and intelligent metering options for rural areas?

Table 1. Factors working as drivers for rural electrification in Tanzania

Result compiled from stakeholder workshop on rural electrification in Dar es Salaam, 23 April 2012. Participants in the workshop have been presented with the list of drivers based on research by Ahlborg and Hammar (2012) and in small group discussion each participant has individually rated each driver according to perceived importance. Participants have sometimes chosen to comment on a driver, sometimes to not rate the driver at all. Participants have also had the chance to add drivers that they considered to be missing. Ten participants have carried out the exercise. *n* equals the number of ratings. Researcher Ahlborg was present during the exercise to answer questions and has compiled results afterward.

Drivers	Rating	*n*	Comments
Policy related drivers and poverty mitigation ambitions			
Governmental policies promoting RE	Important	10	- Provide directives on RE (policy statements) - Very important - Very important. It is the central issue in RE. It creates enabling environment for the development of RE - To create enabling environment - Existing policy is outdated - First policy made in 1990 and amended in 2003
	Of some importance	-	
	Not a driver	-	
New legislation	Important	7	- Provide regulations, duties and rights on the proper utilization, maintenance and control of RE - Need for specific legislation for domestic and productive energy - Energy Act is not sufficient - Legal framework needs to be in place. - Specific act on rural electrification - Need for RE law
	Of some importance	1	- Rural electrification act is in place - We need specific act for domestic or productive use
	Not a driver	1	- Improvement of what we have and rather on enforcement/implementation
Feed-in tariff for off-grid generation	Important	8	- There is a need of differential tariffs for each generated electricity - Even though not actively implemented in Tanzania - It could be of very big impact in RE - Need for RE feed in tariff – differentiated tariff for different energy source - Stimulates private sector investment

Drivers	Rating	*n*	Comments
	Of some importance	2	- This is linked to global warming, climate change. But Tanzania and Mozambique need modern energy
	Not a driver	-	
Use of subsidies or pro-poor policy increasing nr. of rural customers	Important	9	- Proper planning in order to regulate and not to affect financial system - Subsidies in the first four years - Ensures affordability and accessibility to the majority - Should be well planned in order not to affect financial performance of utility company
	Of some importance	1	- Focus on use of electricity in rural area is more important
	Not a driver	-	
Promotion by REA	Important	6	- Promoting and supporting energy access to rural people
	Of some importance	3	- Needs to collaborate better with TANESCO. As it is now REA is of some importance - If the Agency could be effective in promoting RE then it could be an important driver for RE - Role to be made more effective/supportive
	Not a driver	-	
Political election campaigns	Important	2	
	Of some importance	1	- It can also be a barrier as it does not allow to prioritize according to needs but according to political influence, friendship, kinship connections (for what concerns where/when to implement RE projects)
	Not a driver	7	- Very unsustainable, it is more of a reaction - Not a driver because RE is not a political issue or agenda but a national agenda and need to involve all stakeholders - It can distort - Could become driver if implemented

Drivers	Rating	*n*	Comments
Donor push and support	Important	8	- Important to overcome the financial barriers - It has both positive and negative sides - This can have positive and negative impact - Should be demand driven - Donors are very important as they support rural electrification for both NGO and government - CDM
	Of some importance	1	- However the national and local agencies need to be sure they can manage themselves in long-term perspective
	Not a driver	-	
Pushing from individuals in government agencies	Important	6	- This is how changes at national level can actually happen - Very important - For example support for IEA - Should be viable and sustainable
	Of some importance	2	- It will depend with the aims of the organization otherwise he/she may find himself outside the organization objectives
	Not a driver	1	- May not be a strong driver because individual agendas need very strong push/support
Need of increased reliability in the national grid	Important	8	- Fulfilling Millennium Development Goals - For any viable investment to happen
	Of some importance	-	
	Not a driver	2	- Very small proportion of rural population is connected - It is a driver where national grid is present but it is not a driver where there is no national grid
Local initiatives for RE			
Local entrepreneurs taking initiative	Important	9	- They can lay a stable ground for local sustainable development - It is important with business initiatives to get power
	Of some importance	-	
	Not a driver	-	

Drivers	Rating	*n*	Comments
Churches installing own systems	Important	5	- Also NGOs installing own systems - Churches might not see the implications for market extension - Churches may only use electricity to provide hospital services for treatment - Depending on management, size, maintenance etc. of course - However it will depend with the policy objectives and tariffs
	Of some importance	4	
	Not a driver	-	
Industry installing own systems	Important	7	- Need for regulations for pro-poor policy - They can have milling machines to benefit from RE - It will depend with the policy objectives and tariffs - Depending on management, size, maintenance etc. of course
	Of some importance	2	
	Not a driver	-	
Mobilization at grassroots level	Important	9	- Because they are the one who will benefit from RE - If there is a high will to get electricity the sustainability will be there - Need for support from government stakeholder for access to knowledge/technology
	Of some importance	-	
	Not a driver	-	
Local demand			
Increasing demand in rural areas (industry, households)	Important	7	- No demand, no driver - Need support for access to appropriate technology
	Of some importance	1	
	Not a driver	-	
Productive uses drive RE	Important	7	- Economic value of project can be realized if this is met
	Of some importance	1	
	Not a driver	-	

Drivers	Rating	*n*	Comments
Off-grid RE creates demand and a customer base for grid extension	Important	8	
	Of some importance	-	
	Not a driver	-	
Factors driving off-grid RES			
Promotion of renewable energy globally	Important	7	- We will not be able to rely on fossil for too long - It decreases prices of RETs (e.g. solar)
	Of some importance	1	
	Not a driver	-	
High costs of diesel	Important	6	- Too expensive and also not good for the environment - Connected to above at global level - This will enable the government or private sector to think of another alternative for generating energy
	Of some importance	2	
	Not a driver	-	
High cost of grid extension drives off-grid	Important	7	
	Of some importance	1	
	Not a driver	-	
Other drivers that you would like to add			
Rural Energy Fund		2	
Environmental conservation factor		3	
Simplified carbon trading Carbon emission market		4	
Energy security		3	
Energy efficiency		3	

Drivers	Rating	*n*	Comments
Gender and equity		3	
Employment Employment for young generation		3	- Increase in nr of Engineering graduates - Introduction of RE subjects in new curriculum - Green jobs
Bioenergy value chain		3	- For example production of biogas and electricity from *Sisal* etc
Equal social and economic growth between rural and urban area		1	
Rural energy service centers (institutional support)		1	
Millennium Development Goals (MDG)		1	
Clean Development mechanism (CDM)		1	

Table 2. Factors working as barriers to rural electrification in Tanzania.

Participants in the workshop have been presented with the list of barriers based on research by Ahlborg and Hammar (2012) and in small group discussion each participant has individually rated each barrier according to perceived importance. Participants have sometimes chosen to comment on a barrier, sometimes to not rate the barrier at all. Participants have also had the chance to add barriers that they considered to be missing. Ten participants have carried out the exercise. *n* equals the number of ratings. Researcher Ahlborg was present during the exercise to answer questions and has compiled results afterward.

Barriers	Rating	*n*	Comments
Weak institutions and organizations			
Low institutional quality	Important	10	- This is due to educational curricula which we follow to train our students - No interconnection, networking, knowledge - Lack of networking and information sharing (govt/local level) - Lack of education - Poor knowledge and skills on energy - Lack of clear policy and strategies on RE - Policy and decision makers have inedequate kwnowledge and skill in RE
	Of some importance	-	
	Not a barrier	-	
Lack of private sector involvement	Important	9	- High risks involved - Subsidies from central government - Has negative effect since its availability can assist diffusion - Low purchasing power of consumers
	Of some importance	1	
	Not a barrier	-	
Top-down management in energy sector	Important	9	- Needs to be locally adapted = bottom-up management - Government efforts are on hydropower generation not on RE - Most decisions are top-down - Made gap between top and local management
	Of some importance	-	
	Not a barrier	-	
Lack of human capital	Important	10	- No human capital = no electricity and customers - This barrier goes hand in hand with lack of capital and investment in human capital - Few people involved, more experts are needed - New sector in Tanzania, it is currently developing
	Of some importance	-	
	Not a barrier	-	

Barriers	Rating	*n*	Comments
Inadequate planning capacity	Important	7	- There is a lack of tools to implement plans (plans are good)
	Of some importance	2	
	Not a barrier	-	
Lack of co-investments in rural development	Important	9	- This will depend on political will of the government to invest in rural areas - Conflict of interest and priority differences - Need of investments in order to support market development → users
	Of some importance	-	
	Not a barrier	-	
Incompatible donor policies	Important	6	- Differences in priorities of focus areas - Duplication rather than incompatibility, need more organization - Donors networking
	Of some importance	2	- This should not be a barrier but might of course be…
	Not a barrier	-	
Economy and finance			
High costs of diesel a barrier to off-grid diesel systems	Important	8	- It is also a driver as it boosts research for more environmentally friendly solutions
	Of some importance	-	
	Not a barrier	2	- How is diesel related to RE? Can we use alternative source of fuel to generate electricity, e.g. biomass?
Donor dependency	Important	9	- Not locally adapted and not sustainable - We should think of a way to accumulate capital for our own investments - We need to think of ways to raise capital, it is a barrier to depend on donors
	Of some importance	-	
	Not a barrier	1	
Low productive use and income generation	Important	9	
	Of some importance	1	

Barriers	Rating	*n*	Comments
	Not a barrier	-	
Lack of funds	Important	9	- Due to high dependence on donors - Lack of funds for feasibility studies and investors - The initial connection is too expensive, need creative ideas to bring it down - Initial investments
	Of some importance	1	
	Not a barrier	-	
Tariff system and connection fees	Important	10	- It is a barrier, tariffs and connection fees are expensive - High price of internal wiring makes it difficult for most rural households to connect - It's a current barrier which needs to be sought out immediately - High tariffs and fees → less connections and people may loose access
	Of some importance	-	
	Not a barrier	-	
Subsidized tariffs	Important	7	- An important barrier, the tariffs need to be differentiated according to the source of energy - Maybe necessary to subsidize for social services
	Of some importance	1	- It will depend on the tariff system of the country
	Not a barrier	2	- Not worth investing
Insufficient rural financial institutions	Important	8	- In rural areas this access is not there - For local people and small entrepreneurs to invest
	Of some importance	1	
	Not a barrier	-	
Compensation (for land acquisition)	Important	6	- Lack of tools to work on the for non-profit organisations - Land issue is a constitutional right which must be protected
	Of some importance	2	
	Not a barrier	1	- It was not an issue initially but now has to be thought about

Barriers	Rating	*n*	Comments
Lack of consistency between RE projects	Important	8	- Especially on tariffs
	Of some importance	1	
	Not a barrier	-	
Social dimensions			
Poverty and low household affordability	Important	9	- Productive use is important, if productive use is possible more demand electricity and households can get power for free - Energy needs cannot be addressed due to poverty and affordability - Local people should be empowered for affordability
	Of some importance	1	
	Not a barrier	-	
Lack of local engagement/capacity	Important	10	- Extremely important - Ensure project life span
	Of some importance	-	
	Not a barrier	-	
Gender issues	Important	6	- Lack of engagement in RE in the community - Most of rural area women are the one who are affected by poor RE e.g. colleting firewood etc.
	Of some importance	4	
	Not a barrier	-	
Technical system and local management			
Weak maintenance culture	Important	7	- It is a barrier because some people don't know how to change the bulb if it is damaged
	Of some importance	2	- Participation makes it less important - More involvement can overcome the barrier
	Not a barrier	-	

Barriers	Rating	*n*	Comments
Low generation capacity	Important	4	
	Of some importance	5	- More demand can overcome this, the capacity is there - Low but better than nothing
	Not a barrier	-	
Low access to required materials	Important	10	- Not sustainable - Most of them are very expensive for someone to afford - At local level (available in Dar es Salaam) - Lack of education in how to purchase material
	Of some importance	-	
	Not a barrier	-	
Lack of access to skilled personnel	Important	9	- Not sustainable - Depend on the level of technology and our academic institutions to produce skilled personnel - Skilled personnel does not want to live in rural areas
	Of some importance	1	
	Not a barrier	-	
Low capacity of solar PV systems	Important	7	- Most of solar PV systems are very expensive. Capacity building is needed - Some people can afford, others cannot afford
	Of some importance	1	- According to the use you want to make of it, solar PV systems are fine
	Not a barrier	2	
Technology diffusion and adaption			
Cultural mindset	Important	1	
	Of some importance	6	- Might change with electricity
	Not a barrier	2	- Easy to overcome by information sharing
Lack of local entrepreneurship/ reluctance of local	Important	8	- Capacity building should be conducted to promote local entrepreneurship - This depends on knowledge

Barriers	Rating	*n*	Comments
entrepreneurs to invest	Of some importance	1	- Maybe not a lack of local entreprenuers but rather reluctance of entreprenuers to be involved in the energy investments; attributed to the tariff system, technical capabilities in managing the system sustainably, availability of funds and reluctance of the bank sector to give monetary support to energy investment
	Not a barrier	-	
Rural infrastructure			
Scattered population	Important	8	- Higher costs
	Of some importance	1	
	Not a barrier	-	
Long-distance transmission	Important	7	- Higher costs
	Of some importance	2	
	Not a barrier	-	
Nature reserves and national parks	Important	2	- If Environmental Impact Assessment is conducted it mitigates negative impacts towards the environment
	Of some importance	6	- Technology helps overcome this barrier
	Not a barrier	1	
Traditional houses (electricity prohibited)	Important	4	- But technology should help - We should help the local people first to improve their homes - Electricity should be adapted, not possible for poor rural areas to build new houses before electricity (but maybe later with electricity)
	Of some importance	3	- Can be overcome
	Not a barrier	2	
Seasonal droughts (for hydro)	Important	7	
	Of some importance	2	
	Not a barrier	-	

Barriers	Rating	*n*	Comments
Limited rural infrastructure (roads etc.)	Important	8	- Complicates work
	Of some importance	1	
	Not a barrier	-	
Other barriers you want to add			
Existing feed-in tariff not conducive for all energy sources			
Lack of suitable financing mechanism for RE, including high interest rates			
Poor quality of products (energy equipment and material)			
Barrier faced by private developers are MANY!!			
Limited awareness on other energy sources options			
Limited awareness on bioenergy/biofuel			
Long time procedure for developing carbon trading			
Poor strategic plan for sustainability of the installed energy systems			
Lack strategic planning on involvement of each part (actor)			
Strategic planning in energy is limited			
Cumbersome carbon trading schemes/accessing carbon			- The access to climate based funds is not easy