

Report  
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# TOWARDS SUSTAINABLE ENERGY SERVICES FOR HOUSEHOLDS AND SMALL BUSINESSES – BARRIERS AND RECOMMENDATIONS



## Report by:

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## 1 BACKGROUND

Today households and small businesses in developing countries are often dependent on using traditional bio-energy solutions such as cooking on open fire. This not only provides a minimum of life-supporting energy services, but may also represent a high financial cost, a strong negative effect on human health, and added stress on the environment. Traditional solutions often comprise relatively low efficiency and much of the energy input is wasted.

There is an immense dormant demand for energy services among households and small businesses in developing countries. Better energy services are seen to be necessary for improved standard of living, facilitate development and to reduce environmental impact. The improvement will consist of making traditional use patterns more efficient, and to bringing new and renewable energy resources into play.

The International Energy Agency (IEA), the European Commission and other international organisations state that energy efficiency is the quickest and most cost-effective way to reduce greenhouse gas emissions. The benefits of energy savings can be enhanced by using renewable energy sources such as solar power and biomass instead of fossil fuels. This can enable countries with a weak economy or technological basis to implement more sustainable solutions by technological leapfrogging. Energy efficiency and the use of renewable energy will also improve air quality, advance energy security, encourage new opportunities for cottage industry as well as cultivate green jobs within the renewable energy sector itself.

In developing countries a large number of people lack access to adequate energy services, and 1.6 billion people have no access to electricity. The right to economic development, eradication of poverty and increased energy consumption is essential to assist leapfrogging to bring about a more sustainable future in developing countries. 'Leapfrogging' is a term used to describe the possibility for developing countries to bypass inefficient, polluting, and ultimately costly phases of development by jumping straight towards sustainable human development and a better quality of life. For example, "leapfrogging" is seen in the use of solar energy in rural areas where unreliable or limited sources of energy previously existed. Leapfrogging can be effectively assisted by promoting an awareness of energy efficiency coupled with support to implementing services based on renewable energy instead of fossil

fuels. Unfortunately, there seems to be distinct barriers to the implementation of energy efficiency and renewable energy solutions. Currently, both the speed and the volume to bring about a visible change are much lower than could be expected. This is based on estimates made by IEA about the potential for more sustainable energy services by way of energy efficiency and renewable energy solutions.

## 2 SCOPE OF THE REPORT

This report looks at barriers to improved energy efficiency and to increasing use of renewable energy for households and small businesses in developing countries (see Terms of Reference in chapter 7.1). The development goal in question is establishment of sustainable energy services. This is when the end users are able to cover their main energy service needs in an efficient and responsible way by introducing measures for improved efficiency or based on renewable energy resources.

With energy efficiency we are thinking of energy utility per unit energy consumed. So with improved energy efficiency we are referring to a reduction in energy consumption for a specific location, task in the household or production cycle. We are thinking specifically about efficiency gains through modernization of traditional energy uses such as improved cooking stoves. In addition, increased efficiency may be achieved through improvements in energy delivery through the existing grid.

When we speak of renewable energy in this report, we are thinking of energy that is accessed through decentralized and small-scale technologies that are environment and climate-friendly. We are thinking of electrification through off-grid solutions and the implementation of technologies that make use of new, local, renewable sources, i.e. sun, biogas/-fuel, wind and micro-hydropower stations. We will not, however, go into detail with respect to the various renewable energy technologies and solutions.

Sustainable energy services is a wider notion than energy efficiency and renewable energy (see the text box below). A sustainable energy service has to be sustainable in the ecological, economical and technical sense. Economical and technical sustainability is often as hard to obtain as ecological sustainability, especially for many electrification projects.

## SUSTAINABLE ENERGY SERVICES

An energy service is the useful work provided by energy, such as lighting, heating, cooling, motive power, transport and telecommunication. These services can be provided by a range of different energy sources and technologies.

Here we introduce three criteria for how a sustainable energy service ought to be provided:

- 1) **Efficiency:** An energy service can be delivered through different technologies and with different efficiency. A typical example is electrical light that can be produced by a traditional bulb or a more efficient compact fluorescent bulb. The light is the same, but the heat loss is substantially reduced, resulting in 75 % reduction in energy consumption.
- 2) **Right energy for the job:** The service has to be made with an appropriate form of energy. Different forms are able to deliver different types of work (exergy). Solar thermal can heat water and even boil it under sunny conditions. With wood it is possible to boil water and cook food. Biogas and oil can do the same, and may also be used in engines. Electricity is a high quality energy form that can be used for most purposes above, but also purposes like melting metal and to run electronics. It is important to use the low quality energy sources where they are useful and limit the high quality sources to purposes where it is requisite. Energy with high quality is, due to losses in transformation, more expensive to generate and associated with more environmental problems than most other energy types.
- 3) **Renewables:** Finally, the remaining need for primary energy input should come from renewable energy sources, such as sun, wind, water and biomass.

This report is mainly based on inputs received from nine NGOs in developing countries that are working on energy solutions for households and small businesses (see chapters 7.2 and 7.3). Their activities can be broadly categorised as improved utilisation and efficiency, fuel switch, and introduction of new energy services. Each approach may necessitate a different set of technologies and strategies for implementation. Some of the NGOs are working in several of the activity areas as well as addressing policy issues. A brief literature review is also made.

The report highlights barriers, as addressed by the NGOs and mirrored in the literature, to provide adequate energy services with efficient use of renewable energy resources (chapter 3). We have seen that households and small businesses face similar barriers, henceforth we address them together. On the basis of chapter 3 a discussion is presented in chapter 4. Finally, the report presents recommendations for the stakeholders to contribute to overcoming the main barriers (chapter 5).

For the scope of this report, we consider the main stakeholder groups in developing countries and their role to be:

- **The end users** (households and small businesses) are the foremost stakeholder group in this report. It is the underlying objective for this report to look at how sustainable energy services can play a more prominent role to meet the energy needs of households and small businesses.
- It is the role of **Governments** (local, regional and national) to provide enabling frameworks to facilitate more efficient and possibly more sustainable energy services.
- **Businesses** engaged in the energy sector endeavour to make products and services available to the end users whilst generating a profit from the sales of energy services.
- **NGOs** can play an important role in promoting and facilitating a shift to more sustainable energy solutions, especially when other stakeholder groups have a weak performance. NGOs may also assist other stakeholder groups and/or make them accountable to facilitate involvement and implementation of sustainable energy services. Within the energy sector in developing countries there is little need for transfer of complex technology, but an urgent demand for capacity building on simple technologies, exchange of information and transfer of knowledge. This makes it a suitable sector for NGO support and intervention, and also makes it less interesting for big, commercial actors.
- Finally, **Governments, businesses and NGOs in Norway** may also to be considered key stakeholder groups in this context. Their role is primarily to give support by way of knowledge and technology transfer, encourage and shore up on good governance, capacity building and financing to the above mentioned stakeholder groups in developing countries.

### 3 BARRIERS

A barrier refers to the presence of an obstacle of physical, financial, cultural, sociological or political character. Factors which are blocking, complicating or delaying the desired development of energy efficiency (EE) and renewable energy technologies (RET) limit the development of renewable energy resources unless special measures are enacted to overcome the barriers.

We have processed and present the barriers in various ways, to highlight the complexity and to give the reader several entry points to the total material.

- In chapter 3.1 the barriers are arranged by stakeholder group
- Based on this table and sources like development aid representatives, business and literature, we have made a more general description of the various categories of barriers.
- A mind map that shows the causal links between the barriers (Not included in the printed versions due to technical limitations).
- Table 2 (chapter 4) shows the most important barriers that the various stakeholder groups have to overcome.

#### 3.1 Barriers arranged by stakeholder group

The barriers below are identified through the interviews with the nine environmental NGOs.

##### 3.1.1 Barriers for and with end users

Awareness of the problem and potential

- Energy alone is not considered a primary problem for the respondents. However, the focus for households and small businesses seem to be on the problems it is causing (health, food, environment, time consumption etc).
- Most end users seem to only recognise the problems linked to access to the energy carrier (electricity, wood, gas, liquid fuel) and are not aware of the source and end use efficiency.
- Hard to imagine that energy efficiency and renewable energy has a big potential.
- Smoke from inefficient wood burning is not linked to health problems.

- Daily energy services are more important than local environmental effects (deforestation).
- Global climate change is irrelevant.

Access to information and practical examples for households

- Lack of trained personnel in efficiency (stove construction etc) and new technologies.
- Little understandable information (local advisors, video, radio/TV, education).
- Few local entrepreneurs, energy shops, service suppliers, skilled workers.
- High transportation cost.

Attractiveness and priority of the offered solutions

- Energy for households has low priority (in family and society).
- Gender issue. Benefits for women – low priority for male decision makers.
- Missing empowerment / training for women.
- Traditions /cultural barriers, food taste best cooked on char coal, local culture, use patterns and design elements.
- Mental pictures of development different? Offered solutions different from what is seen on TV.

Cost and finance are important barriers for some solutions

- User not familiar with up-front investment, as needed for Energy efficiency and renewable energy.
- Size of the cost / investment too high - lack of financial instruments.
- Modern commercial energy/equipment is subject to tax (unlike char coal etc).

##### 3.1.2 Barriers for promotion (NGOs)

Awareness of the problem and potential

- Many NGOs do not see lack of energy/unsustainable use of energy as a problem, only what it is causing.
- Energy is often seen as a difficult, technical, high level issue for specialists.
- Hard to imagine the big combined potential of Energy efficiency and renewable energy.

Skills for promotion of technical/practical solutions and mobilization

- Few NGOs with skilled manpower on Energy efficiency and renewable energy.
- Hard to find skilled and experienced persons in simple and new technologies, lack of trainers.
- Hard to find good motivators /change agents able to link new technology, education, involvement and social processes.
- Low skills in mass communication/promotion.

Capacity for change

- Lack of financing for internal capacity building.
- Change requires commitment, time and long term financing.
- Lack of tradition and possibilities for using modern mass communication.
- Few organisations work on both practical measures and policy.

### 3.1.3 Barriers in governmental policy

Awareness of the problem and potential

- Energy is a household issue, low priority, gender problem. No formal training of women in energy (or anything).
- People and many NGOs do not see lack of/ unsustainable use of energy as a problem, they see only the problems they are causing.
- Hard to see that the existing energy resources has a much bigger potential than is realized today.
- Plans / goals for development focus on big scale production, grid extension and industrialization.
- Production side has priority over end users efficiency.

Organisation based on national level and national solutions – centralized decisions

- Energy policy and investment is not tagged to poverty reduction.
- More focus on industrialization than on benefits to the families.
- Limited interest from the government & others to work directly with inhabitants. Energy plans / policies are

promoting projects (big plants) rather than development schemes.

- Only central Ministry with energy responsibilities, nothing on regional/local level.
- Only visible lobby groups are big energy companies – not development and environmental interests.

Taxation and framework

- Energy subsidies always given to the supply side to keep energy prices low, instead of support to end use efficiency measures to keep the need low.
- Modern commercial energy/equipment is subject to tax (unlike char coal etc).

## 3.2 Barriers arranged by category

In the following sections the following categorisation of barriers has been chosen:

- Institutional
- Awareness/Information
- Financial and Economic
- Market
- Technical
- Training and capacity development
- Social/community interest
- Policy

Each category of identified barriers to sustainable energy services is further defined.

### 3.2.1 Institutional

Legal and institutional frameworks often provide inadequate support for the development and implementation of sustainable energy services. Institutions are commonly set up to support larger national and regional fossil fuel and grid based energy solutions, mainly addressing the interest of industry. In addition, production of new energy is given priority instead of improving energy efficiency with and for the end users.

Institutional barriers may be a result of insufficient regulatory frameworks, along with ineffective or poor institutional infrastructures and inadequate governmental planning frameworks. For many places, inadequate institutions are coupled with a lack of transparency in project allocation, as well as

unfavourable macro-economic policies for development of sustainable energy services.

Deficient institutional support or ineffective agencies, which are unable to oversee and accompany sustainable energy services through to implementation, are often attributed to a conservative approach to management of economic and energy resources. In most countries, institutions are typically set up to cater for and build on grid solutions and fossil fuel based energy resources. What is more, governmental institutions that are responsible for energy issues do often only exist at a national level, and are rarely set up to address regional and local needs. Within this framework, there is little or low recognition of the potential for sustainable energy services and the opportunities that renewable energy may bring about in rural areas and for households and small scale businesses. There seems to be a shortage of governmental institutions with the mandate to promote sustainable energy services.

### 3.2.2 Awareness / information

Very often end users do not see sustainable energy services as plausible solutions to tackle challenges related to deficient, instable or costly energy services. This attitude is also reflected within NGOs and government structures. Moreover, lack of public awareness of renewable energy technologies coupled with low access to information, are frequently noted as barriers to encourage a wider uptake of sustainable energy services. Depending on the circumstances, this may be related to inadequate information to stakeholder groups, weak dissemination strategies, poor follow-up of the implemented projects, and a lack of a systematic approach for awareness raising and capacity building about sustainable energy services. As a result, many organisations bring their attention to the secondary effects of energy needs and consumption by the households and small businesses.

We observe that communities are inclined towards grid based energy, and less interested in local and off-grid solutions. “Conventional wisdom” is that modern energy means centralised grid systems. However, many renewable energy solutions that may be deployed in developing countries are either non-electrical or supply off-grid electricity. The GNESD study (2007) points out a selected range of such ‘niches’ for renewable energy technologies, such as wind-driven water pumps, improved stoves, solar pumps, water heaters, photovoltaic systems, and biomass gasification.

Low awareness of sustainable energy services also

seems to reinforce other barriers. There seems to be a deficient level of information for planners, developers, professionals, technicians and for actual and potential users, both in terms of quantity and quality. This poses a challenge for stakeholders within business and communities to understand their rights and responsibilities.

### 3.2.3 Financial and economic

This refers to inadequate financing arrangements (local, national, international) for sustainable energy services projects, unfavourable costs, taxes (local and import), subsidies and energy prices.

Unequal government subsidies and taxes are a common challenge. Conventional energy technologies such as nuclear and fossil-fuel technologies often enjoy the advantage of government subsidies. Besides, governments are often reluctant to introduce environmental taxes on some energy products because they want to protect their national industry. This makes it difficult for renewable energy technologies to establish themselves in the market. A study coordinated by UNEP and RISØ National Laboratory (Painuly and Fenhann 2002) pointed to the fact that solar photovoltaics (PV) were seen as a luxury product in Egypt and therefore charged a very high import duty. On the other hand, the same study found that in certain cases where there are subsidies or tax exemptions for sustainable energy technology projects, this might kill the commercialisation drive of the private sector.

There are high investment costs for many renewable energy technologies. Combined with the reluctance of the financing institutions to grant loans and the often modest ability of poorer households and small businesses to pay for them, makes it difficult to invest in and disseminate renewable energy technologies. Moreover, the knowledge of where and how to gain access to financing may not be available to the end users.

For a program or project to be financially sustainable in the long term, it should be able to finance itself based on demand. However, as the initial costs are often considerable, seed money is often required.

Finally, a lack of long term commitments by a development partner (donor) often undermines implementation of projects for sustainable energy services. The Centre for Rural Technology in Nepal pointed out that what is required are long term development partner commitments that transcend

government changes and their attendant development assistance priorities. What is more, governments and NGOs on both the donor and the recipient side may change policy and withdraw from a project, and NGOs may even cease to exist, all resulting in ceased funding.

### 3.2.4 Markets

So far renewable energy technologies only play a minor role in energy markets. It is symptomatic that renewable energy technologies still have limited access to international markets, and there is only modest involvement in renewable energy technologies within the commercial energy sector. It seems as if energy markets in general are not prepared for renewable energy.

The existing energy infrastructure has been established to facilitate the best utilisation of conventional energy sources (fossil fuel and nuclear). This is true for the electricity infrastructure as well as the gas infrastructure and to some extent district heating systems, according to a study conducted for IEA (Kofoed-Wiuff et. al. 2006). Although the report focuses on Europe, it is likely that the same is true for most developing countries.

Current market mechanisms make it beneficial to develop energy infrastructures based on economies of scale; in short the market is biased towards mass production and consumption. The Union of Concerned Scientists points out that as long as few units are produced the price will be high, which in turn restrains demand. Hence, implementation of off-grid renewable energy solutions faces the challenge of competitiveness in a conventional marketplace.

According to the IEA study, liberalisation of energy markets can bring both new opportunities and barriers for renewable energy technologies. On the one hand, profit driven energy producers may be reluctant to investing in renewable energy technologies because of the economic and financial barriers described above. On the other hand, liberalisation could provide access to new actors, technologies, and introduce new sources of capital.

Furthermore, it was pointed out at the Stakeholder workshop to the IEA Implementing Agreement on Renewable Energy Technology (RET) deployment, held in Brussels in March 2006, that renewable energy technologies are deployed at different markets (electricity, heat, fuel, gas), each with its own set of conditions and market barriers.

### 3.2.5 Technical

Limited technical knowhow and institutional capacity to promote and put renewable energy technologies into practice seem to be quite common both in the public and the private domains. The obstacles of technologies are closely linked to a shortage of awareness about available solutions. Renewable energy technologies can contribute significantly to sustainable development by introducing local and low-tech solutions. Different energy resources demand dissimilar levels of technological knowhow, e.g. introducing rural electrification by way of solar power vs. introducing an energy-efficient biomass stove. We recognize that lack of access to the technology, inadequate maintenance facilities, and bad quality of products are key obstacles for introduction to and application of renewable energy technologies. In addition, some of the products are not very appropriate to the local conditions in developing countries and not targeted towards the very poor.

Examples from Egypt concerning solar water heating systems and photovoltaic systems, show that bad quality and maintenance facilities are often a concern. There is also low availability of spare parts and poor after sales service.

Standardisation of equipment is another issue which is becoming ever more important, especially as renewable energy technologies are increasingly sold on global markets. The absence of standards leads to low quality, and it also causes renewable energy technologies to be perceived as unreliable, and therefore an unattractive investment option.

### 3.2.6 Training and capacity development

Technical barriers are closely coupled with a lack of know-how and skills about sustainable energy services. Donors or external partners may wish to introduce the best technology in the world, but if they do not provide training to the people who are supposed to install, operate and use the equipment on a day-to-day basis, the project is flawed. In addition it is important to design training that addresses emerging technologies to empower users and technicians to implement and apply multiple sustainable energy services.

In general, all stakeholder groups are affected by the lack of people experienced within new technologies, education, promotion in a social setting, and mass communication, among others. Besides, there is a lack of training opportunities within the same fields.

There seems to be inadequate standards and quality assurance for renewable energy technologies. As standards are key to provide benchmarks and for training and implementation of sustainable energy services, it weakens the chance of success when standards are poor or unclear. What is more, there is a direct linkage between institutional framework, technical standards and training.

The Indian NGO Development Alternatives (DA) pointed out that with the exception of a few organisations that have in-depth, although mainly theoretical knowledge, most of the project developers at the grass root level are not exposed and trained on energy efficiency and renewable energy. Similar conditions are found in other countries. The RISØ study found that in Zimbabwe, there are emerging small and medium scale industries within renewable energy, but capacity building is needed.

Knowledge development is weak within this field, as there is limited research and development, baseline studies and evaluation.

### 3.2.7 Social/ community interest

Besides sheer ignorance of renewable energy technologies and their benefits, cultural and psychological factors may pose a significant barrier to the adoption of renewable energy. People's mental picture of what characterizes development may differ from the solutions they are offered. Grid electrification and fossil fuel-based solutions may be what people see as the answer to their needs, while some of the renewable energy solutions are seen as backward. Though people are generally positive towards renewable energy, it challenges an existing system and this may be a source of conflict. This may also be as a consequence of deficient social acceptance and local participation. Moreover, gender also plays a critical role in the views on various tangents of sustainable energy services and in particular to the energy solutions for cooking and lighting. For example, a husband may consider it to be off the point to introduce a solar cooker for the household, as he is perfectly content with the taste of his food, and may fail to recognise that gathering of fuel wood as well as the very procedure of cooking inside the house may cause a major strain on his wife both in terms of the time it takes to collect the wood as well as the stress of exposure to indoor air pollution from the fire.

In daily life, end users may see climate change mitigation and stress posed on the local environment, such as deforestation, as less pertinent than securing

immediate energy needs. Interest and awareness of a community can be increased through a planned mobilisation process, but delays in project development and implementation may dilute communities' collective interest.

### 3.2.8 Policy

Among the policy barriers are unfavourable energy sector policies and unwieldy regulatory mechanisms. There is often a lack of coherent long-term policies, including those defining a specific role for renewable energy technologies, and energy policy and investment are not linked to poverty reduction.

Energy subsidies are often given to the supply side to keep energy prices low. Contrary, support could have been given to end users to introduce efficiency measures to curb demand. For example, the Indian government gives subsidies to renewable energy generation if it is fed to the grid. The subsidy is not available for distributed power generation and consumption.

## 3.3 Barriers arranged by causality

In order to analyse the barriers causal links, the authors developed a mind map. By following a particular strand from the centre of the mind map, the next element explains why the former element is a barrier. The further away from the centre you go on each strand, the closer you come to the root causes of the main problem.

Such a mind map may be used to identify where to focus efforts in resonance with each actor's ability to make a change. Technical limitations prevent us from publishing the mind map in the printed version of this report.

## 4 DISCUSSION

Based on the information reviewed, we have identified what we observe as the main barriers by stakeholder group, related to the adaptation and implementation of sustainable energy services (table 2). Each barrier contributes to blocking the efficient development of sustainable energy services. All stakeholder groups are facing various barriers and the barriers are commonly of different importance for each stakeholder group. In addition, barriers experienced by one stakeholder group may have been caused by another stakeholder

group, while other barriers have their origin in the perception, assumptions and social context of a group of stakeholders. Finally, the gender aspect should not be discounted here. Among users, women and men will typically have very different perceptions and experience of what is a necessary energy service, as well as of the barriers to introducing this service in the

best possible way. However, it is clear that women play a special role in the provision and management of energy services for households and cottage industry. Unfortunately, their perceptions are not always adhered to when it comes to realising the implementation of a more sustainable energy service.

Table 1: The most important barriers facing the main stakeholder groups

<b>Users</b>	<b>NGOs</b>	<b>Business</b>	<b>Governments</b>
The problem is not clearly articulated and connected to energy	The focus is on projects rather than creation of a sound framework for sustainable energy services	Household energy is outside (formal) business structures	Insufficient focus on energy's role in households and poverty reduction
Lack of relevant information and practical examples	Lack of evaluation and monitoring. Weak learning, information exchange and strategies	Insufficient entrepreneurship and business support	Ministries and financial institutions established to assist large-scale and conventional energy projects
Many can't finance the investment. Household energy lacks priority (a gender issue). Financing schemes are not well developed	Lack of skilled staff (technical and mobilization) and of capacity (human resources, finance)	High initial investment, risks and financial return do not meet profitability expectations	No research and development support

In contrast to a public-private partnership, which is a type of project collaboration between a private enterprise and a public institution or organisation, a public-private-person partnership builds on local capacities whilst speaking to the needs of individuals within a community, both by way of process and as a product. A public-private-person partnership might be particularly interesting in overcoming barriers to implementation of more sustainable energy services in that its very structure aims to assure implementation of the community interests and to support improved welfare. Moreover, when managed properly it can facilitate suitable planning (e.g. information), resources (e.g. financing and technology) and implementation (e.g. training) as called for by the community.

For a partnership to be successful, it is vital that all key stakeholders are represented. The responses from the organisations point to a partnership for sustainable energy services between local and/ or national governments, local businesses and local communities, which can be called a public-private-person partnership. It is the role of governments to provide favourable frameworks for secure and sustainable energy services.

This may include incentives such as tax rebates, full cost accounting, initiate and support micro-financing schemes, and subsidies. Moreover, private investment in renewable energy also plays a key role in ensuring the launch and implementation of sustainable energy services. Finally, the communities are the primary users of energy services, and hence need to have a say in shaping the services, habits and practices that bring about resource efficient and more sustainable patterns of consumption.

It is far easier to double the efficiency of the energy use than to double the energy production. Efficiency measures are by far the cheapest (actually often profitable) and the most effective way of reducing GHG emissions and saving energy, a conclusion which is also highly applicable in developing countries.

A doubling of global energy efficiency would reduce the CO<sub>2</sub> emissions by about 55 %, while a doubling of the production of new renewable energy may reduce the emissions by about 10 %<sup>1</sup>. In most of the African

<sup>1</sup> Total commercial energy worldwide is made up of 80 % fossil fuel, 10 % nuclear and 10 % renewables. By doubling the share of renewables, the fossil share will be reduced to 70 % of the total. By doubling the efficiency, the

countries south of Sahara, the main energy consumption consists of traditional biofuels, e.g. fuels made from biological material such as wood, straw, crops etc. If the efficiency of the traditional consumption of biofuels could be doubled, many households would be able to reduce their overall energy consumption by half, and still get the same energy services, e.g. light, heat, cooking, etc .

The UN's Climate Convention and the Kyoto Protocol state clearly that the developing countries must have the possibility to increase their energy use in order to develop. In most of these countries the main energy consumption consists of traditional and inefficient biofuels. If the efficiency of the traditional consumption of biofuels could be doubled, many of these countries would be able to reduce nearly half of their total energy consumption, and still get the same energy services (e.g. light, heat, cooking), or keeping the same energy consumption and doubling their energy services. Efficiency measures are also easier, cheaper and more efficient than producing new energy. With a huge increase in efficiency, renewable energy should be able to cover the total energy needs, at least in the long run (Braend, 2008).

If you ask politicians in the developing countries, or the man in the street, they most likely will express a wish for the same level of energy services that most people in industrialized countries enjoy. Due to the current path of development, in the short and medium term, it may be impossible to avoid an increase in the use of fossil fuels in developing countries. In many cases increased fossil fuel consumption is the only viable alternative.

## 5 RECOMMENDATIONS

To facilitate energy service improvement for households and small businesses it is necessary to work with improved efficiency to limit primary energy demand, with enhanced utilization of local renewable sources and with supply of additional resources, where necessary.

Energy is essential for development and it is an energy component in all activities. Nevertheless, it seems reasonable to present the recommendations for improved energy service provision for households and small businesses in four sub-headings. The first group of

recommendations (5.1) is related to the policy level. The second group (5.2) is related to general development activities where new energy services are a part of a broader development, not a main element in itself. The third group (5.3) is related to the existing market for energy. And finally the fourth group (5.4) reflects recommendations to what NGOs (national/ local and Norwegian) can do to promote sustainable energy services in developing countries. For the sake of making clear recommendations energy has been addressed as one aspect more or less in isolation from other issues. However, we recognise that a transformation from traditional and often inefficient solutions to modern, more efficient and clean fuel takes place in a competitive market.

### 5.1 Policy recommendations

The policy recommendations are based on the recommendations in Norges Naturvernforbund Report 02/2009 (Byakola et al., 2009).

#### 5.1.1 Financial and institutional

- Establish policies, institutional frameworks and legislative measures that enhance the development of SMEs, and translate them into action
- Address high capital costs and facilitate access to financing (long-term low interest loans, grants and subsidies through joint efforts from government, donors and financial institutions; give in-depth, evidence-based information to financial institutions on costs and benefits of investments in clean energy technologies, to reduce their perception of the rural energy business as being risky)
- Develop functional energy markets (explicit national policies and procedures; financial and fiscal incentives including micro credits, soft loans and tax exemption to stimulate public-private sales outlets and support services; hire purchase schemes, targeted subsidies, consumer credits, incentive packages)

#### 5.1.2 Awareness and social considerations locally

- Identify community needs in co-operation with local partners
- Increase participation regarding energy issues, especially of end-users like women and other disadvantaged groups
- Invest more in decentralized energy systems, to reduce vulnerability and costs

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non-fossil sources will cover 40 % of the total consumption. To provide the remaining consumption only 37,5% will be needed of the original fossil consumption. CO2 emission will be reduced accordingly.

- Take account of local variations in energy planning, to adapt the energy solutions to the local needs, opportunities and constraints
- Focus on technologies that can be provided through the use of local materials and know-how
- Focus on technologies that have the possibility to increase income generating activities for the households

### 5.1.3 Increase the capacities of stakeholders

- Increase knowledge and capacity among the stakeholders (give key persons at the local level the technical, economical and socio-cultural skills needed to increase the use of new alternative renewable energies; communicate the benefits of clean energy, the link between energy and development, availability and application of the various technologies, potential business opportunities; more energy-related education in schools and high schools)
- Apply innovative strategies for dissemination of new renewable energy technologies
- Energy projects and programmes to work closely with national governments, financial institutions, NGOs and development organizations to ensure that sustainable regulatory mechanisms, policies, financing, adequate skills and manpower are continuously developed and strengthened
- Strengthen research on relevant energy options, with the aim of improving their efficiency and supply

## 5.2 Improved energy services as a part of (other) important development activities

### 5.2.1 Traditional cooking

Special attention has to be focused on more efficient and healthy ways of cooking. This does not only involve every family, but it also represents the biggest energy-consuming activity in the households. Traditional cooking on open fires is mostly done by using non-commercial fuel. Wood is the dominating source, but dried dung from animals and other agricultural waste are important additional sources.

Although representing the biggest energy demand in many developing countries, the traditional cooking is just as much a general development issue as an energy issue. First and foremost it is a huge health issue.

Smoke from open fires is one of the most widespread causes for health problems. Especially women and children are exposed to smoke. A detailed study from Kenya shows that there is a direct link between the time of exposure to smoke and respiratory infections (Ezzati, M. and Kammen, D., 2001). Every year, indoor pollution from cooking with solid fuels is responsible for 1.5million deaths (WHO 2006). Open fire also represents a danger of burns for small children. An open fire needs much fuel for cooking and collection of wood is in many places a hard and time-consuming activity.

Smoke-free and energy-efficient stoves have been promoted for years. Although this is important for the improved efficiency and reduced burden on scarce forests, stove dissemination probably should focus mainly on health benefits. Women care greatly about the health of their children and any project that aims to improve health is of interest. Monitoring and design development in co-operation with the local community is important in order to make such activities as well-accepted and energy-efficient as possible. Support should therefore be given to entrepreneurs who make energy efficient stoves (for wood, charcoal or pellets) at a high rate of efficiency compared to an open fire or a traditional stove.

### 5.2.2 Modern service in education and health care

Education, administration and health care are public services that require small but reliable energy service in order to perform well. Schools and other public service places can be good demonstration plots for efficient and renewable energy technologies. In addition to providing energy services to the public service centre, school projects can also focus on other technologies that can increase the possibilities for income generating activities for the households. For example by focusing on school projects that aim at increasing the capacity in the utilization of solar energy to dry crops and clean water. Other technologies like focusing on project involving low cost efficient hand tools for agriculture activities and water pumps could be of great interest for the local community (Karekezi et.al., 2002). Involving students in the installation, operation and maintenance of the energy system installed and demonstrated also increases the capacity of the households in the local community. Development assistance in order to reduce investment for modern renewable and efficient end use appliances will ensure low operation cost for the institutions.

### 5.3 From low efficient and fossil fuel to more sustainable solutions

Most small energy enterprises deal with kerosene, charcoal and Jikos (stoves for charcoal). This is because charcoal and kerosene are the most traded energy sources and most consumers believe that these are the cheapest. The experiences of “The Developing Energy Enterprises Project” (DEEP) have estimated that 80 % of the energy business in East-Africa, funded by micro-financing, deals with charcoal and kerosene. It is a challenge to make more sustainable solutions attractive for the market.

#### 5.3.1 Efficient fuel for cooking, phase out charcoal

Charcoal is a common fuel for cooking, mainly in urban and semi-urban areas. It is a commercial fuel that in many countries represents “big” business. From an environmental and energy efficiency point of view, use of charcoal is problematic. It represents an extremely inefficient fuel chain with typical energy losses of 75 % or more in the conversion from wood to charcoal. This makes the primary energy use for a family cooking on charcoal as high as 15,000 kWh annually (similar to total household energy use of a family in the north).

- Involve the charcoal traders and producers in projects that aim to transfer the use of charcoal to more efficient bio-energy fuels, for example briquettes or wood (possibly also LPG)
- Pay special attention to cooking in urban/sub-urban areas, where every stakeholder in the current charcoal chain should be involved in the transition into more efficient fuel use and fuel types. Support development of local production and distribution of supplementary fuel as biogas, bio briquettes from agricultural residues and solar cookers

#### 5.3.2 Electricity instead of kerosene for light

Electric light offers an important improvement compared to kerosene (light quality, health, environment and economy). Electric light can be delivered in many ways and with different business models, like solar lanterns (individual or rental systems), solar home systems and different grid solutions. Although the investment costs are a challenge, (solar) electrical systems normally deliver improved service at a lower cost than kerosene.

#### 5.3.3 Solar, charge-in or mini-grids instead of non-rechargeable batteries

Existing battery-operated devices (radios, phones, flashlights, etc.) can be powered or charged at a much lower power price than with non-rechargeable batteries. As for light, solar systems will be able to provide cost-efficient solutions for small electric equipments. The total electricity need for light and some small electric equipment can be covered by a small amount of electricity (50-200 kWh per household annually). The traditional grid infrastructure will normally be far too costly to be paid for when demand is low. Electrification of household systems, charge-in stations or mini-grids can be suitable alternative solutions.

#### 5.3.4 Stable electrical supply to phase out the use of diesel generators

Diesel generators may be a viable solution as a back-up for hybrid systems. However, in cities and areas where there is grid connection the money spent on electricity from diesel generators should be directed to increase the quality of the electric power system and avoid the black outs.

The success of the generators in cities is a symbol of the failure of the development of a public energy system. A generator is expensive for the users, but being a victim for the poor service of the local energy company is seen as an even more expensive alternative. Those who can pay for a generator will also be able to pay for regular power production and distribution. It is not a matter of price, but of organisation. Focus should be on stable electrical services where there will be no need for the normal user to have a diesel generated backup.

Many grid systems operate with subsidised prices and without an ability to collect tariffs from all its legal and illegal costumers. With access to cheap electricity new possibilities will quickly be explored, with more and more costumers connecting TV, fridge, air-condition etc. Without real prices paid by all users this will soon kill any distribution system.

#### 5.3.5 Motors for businesses – new productive use

Pumps, mills, mechanical workshops, tourist facilities and many kinds of business activities are able to pay for modern energy services. Normally they will need energy supply with higher effect than typical household solutions can provide. This can be provided by multifunctional platforms (can be fuelled by biogas or

bio-oil) or bigger solar PV installations. If possible, grid connection is a good option.

- Grid extension must be based on business use
- The grid operator must ensure minimal energy losses and non-payment
- Price policies and other measures must cover real production cost in order not to prevent end-use efficiency

### 5.3.6 Nega-watt – the forgotten source

Although under-consumption of energy service often is the case in developing countries, the energy efficiency of the services finally delivered is often very low. This can result from old, not optimal equipment and lack of awareness and knowledge by the user. Generally lack of capital, competence and quality is important barriers for energy efficiency, especially in developing countries. Low energy prices, high prices on imported quality equipment and lack of governmental regulations and standards make this situation even more difficult. Developing countries have the possibility to start right off on the energy efficient path, instead of building an inefficient energy infrastructure which is the case in many developed countries.

In most existing grid systems, or when new areas are to be provided with power, demand-side management will give a better service for the end users as well as make additional power (Nega-watt) available for new services.

- Improved grid operation must be the main priority should be introduced before investment in additional generation capacity
- Increase the quality and control of products regarding energy efficiency, e.g. minimum standards and energy labelling (with reference to successful experiences in India)
- Focus on effective equipment for air conditioning
- Ban/phase out of incandescent lamps
- New initiatives to improve end-use efficiency (prices, information, competence)

## 5.4 Contributions from NGOs

NGOs (national/ local and Norwegian) can:

- Demonstrate the possibilities by carrying out practical pilot/ demonstration projects and simple research and development activities.
- Build awareness and disseminate information at all levels, from villages to national and international authorities.
- Bring stakeholders together (for coordination, cooperation, information exchange), e.g. public-private-person partnerships.
- Participate in planning processes and analysis of needs, possibilities and challenges.
- Give advice and inputs to national and international authorities, influence on policy development.
- Cooperate with commercial actors (local and national).
- Strive for acceptance of proposed solutions that are sustainable and poverty reduction-oriented, and influence the local authorities from below.
- Establish networks, databases and websites for sharing of practical experiences.
- NGOs do not have any economical gain or interests of promoting certain brands of energy service equipment and therefore provide unbiased advice.

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## ANNEXES

### Annex 1: Terms of reference

#### Background

The International Energy Agency (IEA), the European Commission and other international organisations state that energy efficiency is the quickest and most cost-effective manner of reducing greenhouse gas emissions. The benefits of energy savings can be enhanced by using renewable energy sources such as solar power and bio mass instead of fossil fuels. This can enable countries with a weak economy or technological basis to implement more sustainable solutions by technological leapfrogging. Energy efficiency and renewable energy will also improve air quality and energy security.

In developing countries a large number of people lack access to adequate energy services. 1.6 billion of the population have no access to electricity. The right to economic growth, and poverty eradication and increased energy consumption is fundamental for developing countries. But this can be combined with environmental concerns by energy efficiency and renewable energy instead of using fossil fuels. The technology is available, but still the implementation takes not place in the speed and volume it could be expected.

The report “Approaches and Financial Models for Scaling up Norwegian Development Assistance to Clean Energy” (NORAD, 2007) lists a number of bottlenecks to power project development. The report constitutes a basis for analyzing the specific barriers in the various countries.

#### Scope

The purpose of the project is to identify barriers against implementation of energy efficiency and decentralised renewable energy solutions for households, service and small scale businesses. The critical barriers are probably different from country to country, and the project shall discuss the importance of the various barriers identified in the countries and regions the project will address.

The project can start in 2008 and be finalized in the beginning of 2009.

#### Methodological approach

The project should be carried out as a survey based on a questionnaire and supplemented by interviews. Overall number of respondent will be about 20. Respondents in the first phase will be the NGOs covering the following countries/ regions: India, East Africa, Central Africa, Southern Africa, and Eastern Europe/ Central Asia. Based on the answers from the NGOs, some local communities, investors Norwegian Embassies will be asked in the second phase.

A draft final report will be presented for selected Norwegian stakeholders at a workshop.

#### Outcome

The project shall give an overview of which relevant barriers and bottlenecks the respondents perceived against implementation of energy efficiency and decentralised renewable energy in India, one or two African countries. The result should, together with additional information, make a basis for discussion of the barriers, and recommended policy actions to overcome the barriers.

#### Deliveries

The result of the survey, the discussion and the recommendations shall be summed up in a report with the questionnaire and minutes from the interviews attached. The experiences of Friends of the Norway in Eastern Europe and Central Asia are presumed to be included in the report.

#### Time limits

The project shall be carried out within 31 December 2008.

#### Budget

NOK 100.000 included MVA

**Project responsible**

Norges Naturvernforbund/ Friends of the Earth Norway

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**Annex 2: List of respondents**

<b>Name</b>	<b>Organization</b>	<b>Country</b>
Lumin K. Shrestha	Center for Rural Technology	Nepal
Raymond Myles	Integrated Sustainable Energy and Ecological Development Association	India
Farida Hussain	All India Women's Conference	India
	Development Alternatives	India
Mamour Ba	INFORSE member NGO	Senegal
Sena Alouka	Young Volunteers for the Environment	Togo
Oscar Lema	Tanzania Traditional Energy Development and Environment Organisation	Tanzania
Roque Pedace	Friends of the Earth	Argentina
Mauricio Deliz	World Changers	Bolivia

**Annex 3: Minutes from the interviews****Centre for Rural Technology, Nepal****1. Interest / awareness / capacity in the communities**

In Nepal there are many people with low educational background, especially in the rural areas.

Poor people are often not exposed to the outside world of renewable solutions.

Shrestha also points out tradition and culture as a barrier to creating awareness.

- It often takes a lot of time for people to get used to new technologies.

He says that the technology often is at place, but socializing and social mobilizing is needed before implementation can take place, and that may take some time, maybe one or two years.

He wants to have programs that last for decades.

- A problem is that many of the programs are ranging over too short a period. Many of the programs are in need of up-scaling and have to be more continuous.

Shrestha says that they are considering the gender issue - for instance in their stove program. He thinks that women have to take part from the beginning. They also want feedback on the projects, especially from women.

**2. Level and quality of promotion activities**

NGO's need to build technical, institutional and manageable capabilities. Many NGOs have collapsed over the last years. It is difficult for an NGO to survive, because they need to provide service to the people, donors and the government at the same time. If it doesn't provide that service, the NGO will often cease to exist. Therefore they need to have people who work full-time with people in the rural areas, and know what their needs are.

**3. National policy and institutional frameworks**

Shrestha thinks that it is difficult to get people in the Nepali government aware of the rural parts of the country. The bureaucracy is also working rather slowly.

He thinks that technology trading from south to south works faster than technology trading from north to the south.  
- South to south tech trading is also more adapted to the local communities.

He thinks it is a problem that very little money goes directly to helping the poor and that decentralized support is coming slowly along.

Another barrier is the change of government, both in the receiver country and the country providing the help.

- For instance Denmark has a project in Nepal, and they have a change in the government, and the new government says that they don't want to do that sort of project.

#### 4. Information, availability and market

His organization has a lot of information material, but they need to get it out to the communities.

A particular problem in Nepal is the geographical barrier. There are often bad roads, and it is expensive to transport the goods around.

- If the price for the solar panel is ten dollars, then you have to count in ten dollars in transport as well.

The government of poor countries is poor as well.

#### 5. Cost and financing mechanisms

Shrestha says that funding is important, but many of the organizations don't know how to get funds.

- For instance you could say that the Norwegian government has money for a specific project, but the Nepali organizations wouldn't know how to apply for that money, so they also need training in how to apply for funding.

The problem with financing is that the costs of the new renewable technology are not affordable by the poor people.

And some of the micro-financing institutions are reluctant to loan money to the poorest.

- People will really invest their money if they believe that it is good for their day-to-day life. But this is linked to information and awareness issues.

He sees the need for education, and longer programs.

#### 6. What the Norwegian government and Norwegian NGOs could do

Today the Norwegian government is not working directly with any Nepali organization, according to Shrestha. He thinks that it is better if the donors, local government and NGO's work together.

He thinks it is important to let the NGO go on with what they are doing, if they're doing everything well.

He has done a report financed by the UNDP – case study. Still only at draft stage, but will share it as soon as it is finished.

### **Integrated Sustainable Energy and Ecological Development Association – India**

#### 1. Interest / awareness / capacity in the communities

One of the most important issues is critical awareness. Sometimes people are just not ready for accepting certain solutions.

Myles points out that many Indian people are not able to see energy as a problem.

- They will see health, housing and education as problems, but they are not able to see lack of energy as a problem, which is the cause of a lot of other problems.

A lot of NGOs do not manage to see lack of energy as a problem either.

Myles is also eager to bring in the gender issue.

- Cooking is done by women, collection of food is done by women, but the men have all the money. But men don't invest in energy efficient stoves or other types of energy.

Myles thinks it may be difficult to change the mind-set of the elder males, and thinks they have to work towards the younger males to have a change in mind-set. Myles thinks that the easiest way to create change is through school system and education.

Another barrier for the rural areas is capacity building.

- If a bicycle is damaged, it is no problem to fix it, but if there is something wrong with the solar lantern, then no one will be able to fix it without spare parts and the service which is demanded, says Myles.

Need to have rural capacity building, and NGO's can provide that sort of service.

Example: Centralized energy like coal or hydropower, the user don't have to pay for the investment of the coal plant, they just pay for the energy the plant is producing. But they ask people in the rural areas to invest in their own renewable energy.

- If they want solar cookers they have to pay for them. Those who live in the city don't have to pay for the coal mine giving them the energy.

Material has to be supplied in simple language.

#### 2. Level and quality of promotion activities

The quality of promotion levels is much better from NGO's than from the government. Myles thinks there should be more money to networking, for the NGO's to learn from each other and share on a regular basis.

#### 3. National policy and institutional frameworks

The national policy on renewable energy is OK in India, but Myles doesn't think it focuses on poverty reduction in the rural areas.

The central energy like hydro plants and nuclear plants doesn't go to rural areas, and more decentralized and small scale energy efficiency at village level should be implemented.

Myles also thinks that NGO's should be trained in lobbying for a national policy change.

#### 4. Information, availability and market

Information is available at national level, but there is a barrier getting it to the grass-root level. - But what is needed is information about climate change, environment, energy efficiency and technologies in a simple language. Myles proposes videos, which he thinks can make an even greater impact.

- And the videos need to show how these issues will affect their local community.

#### 5. Cost and financing mechanisms

Myles says that they need help to build micro-finances in the renewable development program and investment money is of great importance, and he thinks repayment in three to five years for instance.

- And not only do the people in the rural area need financing, also the NGO's need capacity building in that sort of program. NGO's often don't have that sort capacity, says Myles.

Myles is also requesting long-term support, up to seven to ten years, for those who want to help. He thinks that many grass-root NGO's is in need of more mobility.

- For instance motorcycles, so they can go out in the field and meet other villages.

He thinks the best way of financing is to channel money through an umbrella organization, and they pay the NGO's. Another important subject is to have an exchange in training programs between nations and NGO's.

#### 6. What the Norwegian government and Norwegian NGOs could do

The Norwegian government should help NGOs through funding of projects through an umbrella organization on long term basis, that co-exists with local NGOs.

They should support networks that would be able to share information on various levels, including government level. Myles says that they also need help in creating a database with all the NGOs, and a website where everything can be found.

There should also be available for more NGOs to come to COP / CSD so they can learn new things, and also more lobbying.

### **All Women's Conference – India**

#### 1. Interest / awareness / capacity in the communities

The most important issue is to create awareness, and if people think a new technology is good for the family, they will adopt it.

There are not enough funds for the construction of improved stoves. The NGOs are in need of a lot of manpower, because of the vastness of the country and a wide operating area.

The technological input is not there, it is needed a lot of upgrading, and training and training programs for the personnel.

There are no funds and motivation for solar power, and because there are no funds in it, and because of the lack of funding, nobody cares about it.

She also complains about lack of interest and motivation from the government.

-- First you have to acknowledge the need for sustainable energy, and then you can train teachers and students.

Hussain says that food, health, sanitary, agriculture is dependent on women; therefore sustainable technology also should be aimed towards women.

## 2. Level and quality of promotion activities

The technology that gets to the users is very poor.

Farida sees no motivation from the government, and believes they are more industrially than beneficially oriented. She thinks the youth is not involved because there are no jobs in the renewable energy sector.

-- The problem lies mainly in the educational sector. You first have to train teachers, before you can train students.

Also, there are no courses in sustainable energy in the women's colleges

If the NGOs do not get any funding, they won't be able to do anything.

Without funding there will be no motivation. But the NGOs have a great possibility to create awareness.

## 4. Information, availability and market

There is no information available and not much funds. The smartest thing would be to fund women and environmental NGO's.

The funding should be decentralized, because of India's huge territory and population.

Give technological input to the lowest local government, because one third are headed by women (due to Indian law, according to Hussain).

When it comes to agricultural tools, those who use it should learn more about it. Women are often getting excluded from the development.

Market will always benefit the rich, but the funds should be put back to financing the marginalized people.

## 6. What the Norwegian government and Norwegian NGO's could do

Select a few NGO's who are committed to sustainable development. Then they should fund projects, which emphasise skill upgrading and product upgrading.

There should also be more investment in gender-specific technology, which should be developed and implemented at grass-root level.

## Development Alternatives – India

### Input 1

#### 1. Interest/awareness /capacity in the communities

It has been observed all most everywhere that the targeted community is much more inclined towards (known) grid based energy services. The cheap rate (some time free (legally/illegally/politically)) not only attracts the community but also helps them to take maximum use of this.

It is possible to increase interest and awareness of community through a planned mobilization process but delay in project development/implementation dilutes their collective interest. Tools, techniques and percentage of total project budget used for community mobilization are totally inadequate.

Upfront community contribution (10 percentage of capital, in case of MNRE funded project) is the most unacceptable clause especially in comparison with grid. Community never find a strong logic in this.

It has also been observed that additional responsibility of community, envisaged by most of us (project implementers), are not correctly linked with incentive (financial/social).

#### 2. Level and quality of promotion activities

Though there are several big national and global program initiatives have been well to promote Energy efficiency and renewable energy based DG, but due to the lack of necessary partnership with key players/potential stakeholders, the regional promotion of these programs/projects never took place that intensely. As an impact integrated (multi party and cross cutting development issues based) project development and implementation hardly generated quality result.

In the case of MNRE supported VESP project the role of other possible stakeholders were never communicated to them uniformly. Even though it is communicated, it has been taken mostly as conflict of interest by the concerned parties.

#### 3. National policy and institutional frameworks

Though there is (in India) national policy, but the necessary institutional framework is far inadequate. Quality input is required to strengthen the institutional framework. A policy (regional/state/national level) level initiative will certainly enhance the quality and volume of output.

#### 4. Information, availability and market

All technical, commercial and systematic information along with communication channel, cost of communication and communication agent, should be seen as an integral part of the program. Both formal and informal communication with all possible stakeholders since the inception of the project/program will surely help all stakeholders to understand their role and responsibility.

There is a huge latent demand of energy services, if we can successfully include them as an enterprise. Establishing market for each product/services delivered through those enterprise should be linked with the market, which in almost all cases are grey in nature. This will not only help the renewable energy based DG project to manage the DEMAND side but also enhance/consolidate stakeholders' involvement in this type of project.

#### 5. Cost and financing mechanisms

The cost of every project (for tech and implementation) would reduce to large extent if it being taken as cluster development approach (e.g. 100 village). In such approach the low cost institutional building (cluster wise) component, presently which is missing, would become a strong sustainability factor.

Co-financing, by involving other govt line departments, should be chalked out during cluster wise program development phase itself.

#### 6. What could Norwegian government and Norwegian NGOs do?

Talk to the Ministry of Natural Resources and Energy to formulate a 50 or 100-village renewable energy-based DG program by incorporating various line departments as a pilot. This will not only help the Ministry to meet their target but will give us immense learning to develop region/need specific solution.

#### 7. Other issues

Except from a few organizations having good (mainly theoretical) knowledge, most of the grass root project developers/ implementers are not exposed / trained on energy efficiencies and renewable energy based DG. Cluster (regional) wise training and capacity building initiatives will lead us to better project development, which will drastically reduce implementation and sustainability risk.

A diverse management/ownership style needs to be established during pilot phase, so that the implementer can offer a wide range of choices to different communities. The flexibility of management/ownership model will certainly increase sustainability factor of such project in ever changing socio-political dynamics.

Energy utilization (on day to day basis) for productive purposes is still a challenge. Low/ fluctuating Plant Load Factor (PLF), due to many direct/indirect reasons, reduces profit realization and thus willingness towards developing/maintaining integrated development model. An extendable hybrid (technology wise, e.g. solar-biomass) could be the best known solution to this risk.

### Input 2

#### 1. Interest/awareness /capacity in the communities

Communities are inclined to conventional methods and are generally interested in grid power.

Rural community is not willing to pay higher charges for energy than the rates which utilities are charging which in any case is subsidised by the government.

Communities are not aware of the value of uninterrupted power supply because they are used to living with erratic power.

Community awareness can be increased through education and training programmes. Once people are aware of the benefits of distributed generation, a segregated price structure will be acceptable.

#### 2. Level and quality of promotion activities

Normally government is supporting schemes for self-help for savings, micro-financing, health, insurance, adult education, habitat etc. and normally NGO donors are also limiting to these kinds of activities. There is lack of support for agro based manufacturing activities and use of efficient irrigation systems.

Few working models of distributed power generation for irrigation and agro industries can set the ball rolling.

### 3. National policy and institutional frameworks

As a national policy Indian government is giving subsidy to renewable energy generation if it is fed to the grid. The subsidy is not available for distributed power generation and consumption.

To begin with some grants can be made available to set up some pilot project and then government can be convinced to give subsidy uniformly.

### 4. Information, availability and market

There is lack of information about availability of biomass in various regions and what kind of benefits agro based micro industries can derive by using biomass based power.

Some support can be provided for conducting survey for biomass availability.

### 5. Cost and financing mechanisms

Cost and financing mechanism are not uniform and stabilised because sufficient models for distributed power have not been put in place.

Few working models can be financed to arrive at uniform and stabilised cost and financing mechanism.

### 7. Other issues

Load pattern and energy consumption for irrigation, for agro industries and for rural habitat is different and hence one particular mode of distributed power generation may not be viable

Hybrid models with biomass, biogas and solar power can be designed to meet the challenge.

## **INFORSE member NGO – Senegal**

### 1. Interest / awareness/ capacity in the communities

Awareness is a big problem, because there is not a lot of information in the rural areas. The lack of information is especially present at the community level.

The people in the rural areas do not know of all the solutions, and they need adequate training in the sorts of solutions that will be built.

Ba says that those who know of renewable energy solutions are very much interested, so there is not a problem of interest among the rural people.

### 2. Level and quality of promotion activities

In theory the government is supposed to promote renewable energy in rural areas, but there are a lot of problems.

Often the help doesn't get to those who need it the most. Politicians have strong bases in some communities, and to ensure the bases in the communities, they will give the help to those who votes for the politician. Ba says that some of the funds are being used in that kind of political game.

He is also complaining about the bureaucracy, which goes very slowly.

- The NGO's are doing a good job, but due to inadequate funding the NGO's can not do enough. And the NGO's are doing a much more efficient job than the government.

Ba says that the NGO's have much more motivation. He feels that the government is lacking motivation.

The NGO's are also working closer with the population. He thinks that the government can help supervise the NGO's.

### 3. National policy and institutional frameworks

In making national policy the different bodies are extremely slow, and it is very frustrating for those who want to help, because there is too much bureaucracy.

### 4. Information, availability and market

It is a general trend in poor countries that renewable energy solutions are not affordable. The need is there, but not the availability. Having access to good technologies is difficult because it is too expensive. (Solar panels for instance.)

### 5. Cost and financing mechanisms

People in the rural areas have too low income to finance the investments themselves.

The government is trying to make these solutions available to the people, but they are not quite there yet. Today the

rural electrification is at 14 %, but the goal for 2012 is for it to be at 50 %, says Ba.

The communities are also in lack of investment money.

We are also in need of solutions that help the communities generate income, and generate employment for more people.

#### 6. What the Norwegian government and Norwegian NGO's could do

The Norwegian government can help through telling local governments that they need to be more efficient.

- Sometimes what is decided today is implemented three years later, and sometimes the technologies are outdated at that point.

The Norwegian government and NGO's can also work with the local NGO's in the countries, which is much better than working with the government.

The rural communities are also in need of adequate training.

Another proposition is to train the local decision makers in the local governments on how to make better solutions for the people.

Ba is hoping that the Norwegian government can work with local NGO's to implement projects that create employment and improve people's life. And the solutions must be integrated in their lives.

### Young Volunteers for the Environment – Togo

#### 1. Interest / awareness / capacity in the communities

There is definitely a huge interest among the communities, and they have huge expectations. But there is a problem that most of the technologies are not targeted towards the very poor.

Alouka sees more awareness in the communities, when he is telling people that there are other possibilities of cooking, heating, getting firewood etc.

Alouka wants to have more awareness targeted towards the youth and the children.

- Energy efficiency doesn't have to bring in new technologies, but find new ways for the communities to adapt to them.

The communities can use the energy they already have in a sustainable way, for instance biogas. Many of the people don't realize that their way of life have a huge potential.

#### 2. Level and quality of promotion activities

Because of energy crisis they have the chance to go into energy efficient technologies.

In the institutional framework some of the communities are not in the plans to be connected to the national grid at all.

- They are not in the current plans, and they won't be for the next 20-30 years.

Even the NGO's don't have the capacity needed; many of them are lacking engineers and other technological capacity. Most of the money doesn't go to the rural communities.

-- The government should be in the forefront, but they are not. They are promoting big biogas plants and hydropower plants. They should promote more solar power and biomass in rural areas, Alouka says.

#### 3. National policy and institutional frameworks

-- The national policy is a disaster. Togo has energy plans but are lacking institutional framework, and it is not clear who is in charge of each area. The energy plan says nothing about renewable energy.

#### 4. Information, availability and market

Information is not available. It is at the universities and libraries, but the NGO's need to be more aggressive in getting the information out to the rural areas.

A national network needs to be created.

Alouka believes that there is a huge, unexplored market for renewable energy.

He also believes that if the people see that the new technologies are good for their day-to-day life, they will adopt it, and the marketing strategy should say just that.

#### 5. Cost and financing mechanisms

Everything is too expensive, and the poorest can't afford it.

There should be more money directed towards letting people helping themselves.

Alouka wants to have more micro-financing on renewable energy and tree-planting.  
- We will do the adaptation, you will do the mitigation, he says.

6. What the Norwegian government and Norwegian NGO's could do  
Partnership is very important, and he wants help to build capacity together with African youth.  
The NGO's need to be sure that they have concrete results in one area / village, before they move on to the next.  
Fund African NGO's to do the work  
Help African NGO's in lobbying in changing national policy.

### **Tanzania Traditional Energy Development and Environment Organisation – Tanzania**

The inputs from TaTEDO were given during the preparation of Norges Naturvernforbund Report 02/2009 (Byakola et al. 2009) and presented there.

### **Friends of the Earth – Argentina**

Wants to start saying that they don't have reliable data for the small villages, but it is better in villages with a population over 10.000.

The bigger villages are often linked to the networks / grid

Has seen an increase of energy consumption at all levels

No provision for a decentralized system

Many people served by small or weak grids

#### **1. Interest / awareness / capacity in the communities**

Claiming that there is a lot of interest in the communities

No access to the grids leads people to buying generators, which are both expensive and unreliable. And they need fuel, which is getting even more expensive.

There is a market, and the government is trying to support biogas from animal waste.

#### **2. Level and quality of promotion activities**

The laws at federal level are very weak, especially at implementation.

#### **3. National policy and institutional frameworks**

The NGO's are good at promotion, but not at the technological level, and they are not able to reach all the places (big country).

The laws of wind power have not been updated, and the provincial laws are dependent on the government.

There are very few CDM-projects in the countryside.

### **World Changers – Bolivia/ Norway**

- Change depends on motivated people open for testing new solutions (those who have done something can do more)
- The new solution must be attractive – a part of wanted development direction. Promoting new technologies is a part of promoting life style
- Education & social mobilization hand in hand with technology
- The new technologies must look nice – esthetic is important/linked to local culture/design
- PR needed. NGOs afraid of use modern PR technologies.





**Norges  
Naturvernforbund**  
Friends of the Earth Norway

**Norges Naturvernforbund** (Norwegian Society for the Conservation of Nature) is Norway's largest and oldest environmental organization. The

organization was established in 1914 and is a non-governmental, nationwide, democratic member organization with around 20 000 individual members, 100 local groups, and regional branches in all counties. After more than 90 years with voluntary work for our common environment, for conservation of the extraordinary nature and wildlife we have in Norway, the organization is well known and respected. Although the organization has a national agenda, many environmental questions have proved to have an international or even global character. Development issues, resource allocations and international cooperation are very much parts of our everyday activities.

Norges Naturvernforbund cooperates with environmental NGOs and support civil society development in a number of countries in East and South. The objectives are to strengthen our local partners' capacity and influence in their struggle for a better environment. Environmental Education, Sustainable Energy Solutions and Climate Change are key issues for the cooperation. At the present Norges Naturvernforbund initiate, implement and maintain projects regarding capacity building, energy saving, renewable energy, climate and education in 20 countries in former Soviet Union, Eastern-Europe and Africa.

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