Alternative Energy and Green Economy Project

Concept Note
31/5/12

This concept note describes the alternative energy and green economy project developed by the Ministry of Environment, Forestry and Physical Development, the United Nations Environment Programme and the United Nations Development Programme. It has been consulted with partners, notably:

- The Forests National Corporation (FNC, within the MEFPD),
- The Energy Research Institute (ERI)
- UN-HABITAT
- UNIDO

1. Background

Sudan is facing environmental challenges related to the sustainable management of its natural resources. Integrated natural resource management is needed in order not to hamper development and use resources sustainably as well as making development climate change proof. Management of forest resources is one of the priorities in Sudan’s integrated resource management as no country in Africa has lost more forest; the north central states have lost 70% of their forest cover since independence.1 Deforestation since July 2011 has risen to 2.2% per year. Addressing forestry challenges, however, cannot be successful without addressing the energy challenge of Sudan at the same time.

---

1 Post Conflict Environmental Assessment (http://www.unep.org/sudan/).
Biomass fuels, mainly wood and charcoal, still represent 62% of Sudan’s energy balance. The domestic sector ranks as number one consumer of biomass fuels with 95% of biomass energy consumed, mainly for cooking; a major source of deforestation. Additionally, the high dependence on unsustainably harvested woodfuel products and the fact that they are burned in inefficient stoves entails devastating health effects such as immature deaths among women and children and respiratory diseases. Two options are usually pursued: Either people collect firewood nearby their homes and use it directly or sell it on to local traders. The rapid urbanization in Sudan is not changing this dynamic and rather fuelling the process of deforestation in areas close to major towns. This is particularly the case in areas where IDP and refugee camps are located. In IDP camps, this means that women who used to find wood for preparing the family meal within 15 km around the camp are now forced to walk up to 75km, increasing their vulnerability to violence. As this is usually not feasible, food rations are sold in order to purchase the needed firewood on the local markets.

Commercial and industrial sectors further fuel deforestation and add to the energy challenge. Brick kilns fired with wood are the second largest consumer of biomass energy driven by the recent building boom in major towns. The large presence of international organizations heavily adds to this statistic. Thus, brick making increased in all three Darfur State capitals with Nyala leading with an increase from 2 million up to 130 million bricks annually. This is equal to over 52,000 trees-worth of wood (not including the timber for construction) across Darfur.²

Electricity is another challenge. For many people, lighting at night stems from kerosene lamps which have similarly negative health effects as wood based stoves. Only 36% of the population, mainly in urban areas, have access to electricity. Bringing electricity to 90% of the population by 2030 is the goal of the National Electricity Corporation (NEC). That means, it will require serving 10% of the population with decentralized power solutions. Electricity demand, similar to other goods, faces an increased demand with increased population growth; in Nyala electricity demand from households has risen 13% between 2006 and 2009.

At the same time that challenges are augmenting, international financial mechanisms are established through the fight against climate change in order to facilitate access of developing countries to modern clean energy. The United Nations in Sudan has developed a common vision document which

lists alternative energy promotion as a priority in the light of climate change. However, Sudan is not benefitting yet from international mitigation and finance measures to the extent possible. One of these mechanisms is the Clean Development Mechanism (CDM) which also opens the road to the Green Economy. As of June 2011, according to UNEP Risoe, out of 7614 projects that are in the project pipeline only two are proposed for Sudan.

2. Goal

UNEP’s overarching programme goal is “To assist the people of Sudan to achieve peace, recovery and development on an environmentally sustainable basis”. The purpose of the programme is: “To improve sustainable and equitable governance, management and productive use of environmental resources”.

3. Approach

UNEP’s experience in the promotion of alternative energies in Sudan is based on the engagement in facilitating the uptake of Liquefied Petroleum Gas (LPG). In December 2010, UNEP acted as a catalyst for the workshop “LPG – demand, supply and future perspectives” jointly organized by the Ministry of Environment, Forestry and Physical Development, the Ministry of Petroleum, DFID, UNDP and UNEP. This workshop resulted in a joint vision statement by all parties involved outlining the way forward. This positive experience guides the work on alternative energy. Different stakeholders stated during the LPG workshop a lack of coordination. This is UNEP’s comparative advantage and the reasoning behind the following concept note.

Moreover, until now, UNEP’s energy engagement was largely focused on Darfur. Following the request of various stakeholders, governmental and non-governmental, UNEP is going to expand the activities nationwide. This will come along with an adjustment of the work from purely humanitarian aspects towards stronger development work to assist Sudan on its road to a Green Economy.

To assist in coordination and facilitate the work of other partners, UNEP will focus on research, pilot projects and advocacy. The implementation of activities will be with its partners. The topics proposed below will serve as a basis for discussion and were suggested by the participants of the LPG workshop and by partners in bilateral discussions.

All stakeholders will be reunited again in an energy roundtable in July 2012 for the launch of the synthesis report following the LPG workshop. At this occasion, the Joint Environment Task Force currently being established by the Ministry of Environment, Forestry and Physical Development (MEPFD) and UNEP will be launched with a sub-task force on alternative energy. This forum provides the ideal platform to coordinate projects and funding among the stakeholders, including the relevant ministries, the Ministry of Petroleum, the Ministry of Finance, the Higher Council for Environment and Natural Resources (HCENR), the Energy Research Institute and others.

It has to be stressed that even though data collection, capacity building and awareness raising will be integrated in all activities, several particular aspects are highlighted below.

4. Objectives

The alternative energy project’s objective is to increase and facilitate cross-sectoral policy coordination, promote energy management and governance and raise awareness for alternative energies and Green Economy in Sudan. Based on the status quo described above and the respective

---

3 Climate change vision document (http://climatechange.sudanct.net/).
4 The vision statement is currently with the Government for endorsement.
comparative advantages of the stakeholders involved (see below), the following topics will be priorities.

1. National energy assessment and data collection
2. Capacity building
3. Awareness raising
4. Liquefied Petroleum Gas (LPG)
5. Sustainable Household Energy (SHE)
6. Sustainable Construction Technology (SCT)

### 4.1 National energy assessment and data collection

Data is crucial for the development of alternative energy projects and policy making. Particularly on household level, the available data dates back to 1999 and further which is not providing the necessary information for today’s energy sector; few is known about energy consumption and customer’s preferences as it has been indicated by various stakeholders throughout the LPG workshop. However, the Government of Sudan is currently conducting research and consultations for the third national energy assessment.\(^5\) This provides an opportunity for UNEP to assist with technical expertise if requested. At the same time, this data will feed into developing the alternative energy project as the newly available data will help to tailor the project. One possibility for UNEP’s to contribute data are household energy assessments proposed under UNEP’s forestry and energy project.\(^6\)

### 4.2 Capacity building

Capacity building requests have been received from all levels, the government, the civil society and the private sector and will be at the core of promoting alternative energies in order to make it a sustainable effort and strengthen the capacity within Sudan. In particular, three areas are going to be explored in consultation with the respective stakeholders besides the capacity building activities mainstreamed in the proposed activities below.

The Clean Development Mechanism (CDM) will be explored as a possibility to finance scaling up clean energy in Sudan to become an example in Africa of Green Economy. Training for CDM project proposals is one option to be explored to increase Sudan’s participation in the CDM. Consultations with the CDM Committee of the Government including other relevant bodies such as the MEFPD, HCENR and the Energy Research Institute (ERI) of the Ministry of Science and Technology are going to take place to determine if and which trainings are helpful. One possible partner to conduct these trainings is UNEP’s Risoe Center for CDM projects in Denmark (with support from the EU Energy Initiative for projects in Africa).

Moreover, best practices and lessons learned from elsewhere in Sudan but also abroad need to be disseminated widely. Based on UNEP’s experience in the water sector that conducted two study tours of senior government officials to South Africa and led to an active collaboration of South Africa and Sudan, this model will be replicated in the alternative energy sector. Study tours will be organized for key stakeholders from the federal and state governments, the research community and the civil society to enable dialogue and regional cooperation. Also, government counterparts indicated a need for young staff to be trained outside of Sudan (training which was common in the past). This option will be explored with the Government and national research bodies.

---

\(^5\) The national energy assessment is required by law every ten years. The last fully fledged national energy assessment dates back 20 years and was funded by USAID. A light update of the national energy assessment dates back eleven years with extrapolated data from the first assessment.

\(^6\) This is based on the findings of the WISDOM mapping by FAO and UNEP with USAID.
Finally, Green Economy needs private sector participation which is going to be incentivized through UNEP’s Sustainable Energy Enterprise Development Initiative (SEED). A nationwide competition to identify promising energy entrepreneurs can be launched and the winners will receive seed funding for their businesses as well as special capacity building through workshops, access to information and expert advice. Consultations with UNIDO will take place on the possibilities of scaling up these enterprises.

4.3 Awareness raising
In order to sustainably promote alternative energy, awareness of the people on the impact of energy consumption and available alternatives is important. Training material for rural villages will be developed and integrated in UNEP’s work with communities. UNEP’s Community Environmental Action plans (CEAP) provide a platform to reach rural communities. In urban centres, partnerships with education institutions are important, particularly the ones focused on women (such as Ahfad University) as energy supply often is a women task. Potential partnerships with NGOs include the Darfur Reconstruction Agency (DRA), SOS Sahel, the Danish Refugee Council and others. Schools such as Ahlia University in Omdurman with its centre for renewable energy are potential partners to train the technicians needed to maintain and service LPG, solar and other energy appliances.

4.4 Liquefied Petroleum Gas (LPG)
The joint vision statement of the workshop of the MEFPD, the Ministry of Petroleum, DFID, UNDP and UNEP provides the basis for future work on LPG. LPG is a viable alternative for households as well as industries. Relatively much is known already on LPG and, therefore, the focus should be on the implementation. Participants of the workshop stated, however, that coordination, information sharing and evaluation need to improve on which UNEP is able to assist.

On a household level, LPG is able to replace woodfuel, particularly in urban centres such as Khartoum, Wad Medani, Port Sudan, Kassala, Gadaref, Nyala and El Fasher. This entails a poverty alleviation and women empowerment component. Currently, the financial institutions are lacking to make clean energy affordable to everyone. The majority of workshop participants suggested that micro finance is a key priority for the wider uptake of LPG throughout the country (which may not only promote LPG but also solar appliances). Often, however, micro finance providers hesitate to engage in energy activities as it requires an understanding of the energy business and economics. UNEP would be able to assist in communicating these economies and facilitate the engagement of suitable micro finance partners such as the Family Bank (mainly owned by the Central Bank of Sudan) and women organisations.7 Also NGOs such as Practical Action and SOS Sahel are potential implementing partners.

Further research is needed to determine Green Economy projects in the industrial sector which require technical support, potentially in cooperation with UNIDO. Bakeries and tea makers appear to be target groups in previous UNEP study. Most importantly, the brick making industry needs to receive alternative technologies as stated below.

4.5 Sustainable Household Energy (SHE)
During the LPG workshop, participants stated that future projects need to take into account that people rarely only use one fuel in their homes. Thus, more research is needed to identify the appropriate holistic household energy concepts. Numerous studies have been conducted on different topics (biogas, solar, fuel efficient stoves, etc.) but none has provided a comprehensive review and

---

7 The Central Bank announced the authorization of private companies to work in this field but up to date no further information is available.
technical assessment of the viability of integrated energy options (using multiple fuels) for a household or a community.

Priority at the moment is the strengthening of fuel efficient stoves projects and LPG. As outlined in ProAct’s review of fuel efficient stoves programming (sponsored by UNEP), a systematic approach is required in order not to lose lessons learned from previous work. This may include setting up a revolving fund to finance fuel efficient stoves if manufactured on a commercial basis. Another option is the dissemination through capacity building for women. Potential implementing partners to disseminate fuel efficient stoves on a large scale include Practical Action, the Danish Refugee Council (DRC) and SOS Sahel. Moreover, technical specifications are needed on the construction of fuel efficient stoves in Sudan. This may even lead to the possibility to access carbon credits to finance these activities, an option that is currently explored by WFP, also a potential partner.

Based on the findings from the National Energy Assessment and consultations with UNIDO, solar energy options for rural households in Sudan will be further explored. Previous project experience suggested that people do not like solar cookers and are not going to accept these as possible solutions. But solar panels (photo voltaic, PV) offer potential for Sudan to develop a new industrial sector in the Green Economy. PV possibly can be applied in water pumps, solar fridges, lights and telecommunication for health and community centres, schools and households.

4.6 Sustainable Construction Technology (SCT)

As described earlier, brick making is the second largest consumer of wood and needs to be addressed properly, not destroying livelihoods but promoting sustainable energy sources for a Green Economy at the same time. Two alternatives for brick making are possible: Changing to a more environmentally friendly brick or a more environmentally friendly fuel.

UN-HABITAT is working on the dissemination of Soil Stabilized Blocks (SSB) which are one alternative to fired bricks. Consultations with UN-HABITAT have concluded that three steps are needed in order to foster the uptake of SSBs:

1. SSB production on the individual household and community level in emergency conditions, notably in Darfur, needs machines and training to be provided to the communities.
2. Large scale commercial SSB production (including licences from the government) needs research on best practices for scaling up quantity and quality.
3. Awareness raising among consumers, government and constructors is needed in order to provide the long term conditions for the success of SSBs.

Furthermore, UNEP proposes more research on potential alternative fuels used to fire bricks. These include LPG and petcoke (a by-product from the oil refining process) a field in which the Forests National Corporation (FNC) has previous experience. Capacity building on the use of these alternative fuels and pilot projects are among the needs that brick producers have communicated at the LPG workshop.

---

9 The government has decided to prohibit fired-bricks within six months time according to UN-HABITAT. This opens huge opportunities for SSBs.
5. Outputs
The outputs will be defined in collaboration with the Government, partners and implementing partners once consultations evolve further. Potential outputs include:

- National Energy Assessment provides updated and targeted data
- Household energy assessments conducted
- Workshops with different stakeholder groups conducted
- Best practice study tours on alternative energy led to international cooperation
- Promising energy entrepreneurs identified and supported
- Microfinance scheme for LPG, fuel efficient stoves and other renewable energies in place
- LPG as main energy source in all major cities
- Strategic and technical guidelines and laws for SHE in place
- SCT widely accepted and enforced by law
- Increased awareness on alternative energy in urban and rural communities

6. Project organisation
UNEP will focus its efforts on coordination and facilitation. UNEP will have overall technical and financial responsibility for the project but collaborates closely with its governmental and non-governmental partners. UNEP’s government focal point is the Ministry of Environment, Forestry and Physical Development.

The project will be implemented with a range of government entities such as the Ministry of Petroleum, the Forests National Corporation (FNC), the Energy Research Institute (ERI) and the Ministry of Electricity and Dams.

Collaboration with other UN agencies is envisaged. Potential partners include but are not limited to: UN-HABITAT (environmental friendly construction), FAO (monitoring and fuel efficient stoves), UNDP (green microcredit) and WFP (carbon credits and outreach).

NGOs will be implementing large parts of the programme. Potential partners include but are not limited to: Tearfund, SOS Sahel, Practical Action and DRC

7. Previous experience of partners
- Forests National Corporation (FNC): Besides vast experience in forest management and reforestation projects, FNC conducted several projects to reduce the pressure on forests. FNC conducted projects on:
  - Ethanol production in the sugar industry
  - Fuelwood Development Project including experiments with different charcoal kilns (80s and 90s)
  - The biomass unit’s work on stove improvement
  - Trials on biogas (from sugar factories) and agricultural residues (with other partners)
  - Briquettes from cotton stalks
  - Bagasse (1993-1999)
  - LPG (starting in 2000)
- Energy Research Institute (ERI): The ERI has recently been nominated to be the national research centre on alternative energy (within the Ministry of Science and Technology). Research projects reach from biodiesel from Jatropha over assessment of wind and hydro across Sudan (including mini hydro in Jebel Marra) to training for technicians and knowledge exchange with India and Chad. The French-Sudanese cooperation is currently pursuing a solar thermal project. Moreover, the solar PV manufacturing capacity of the
ERI currently reaches 1MW per year and could be up-scaled to 2MW. The ERI is involved in the presidential initiative of lighting 1 million households. ERI offers a M.Sc. in Renewable Energy (with Omdurman Ahlia University) and weekly presentations to schools.

- UN-HABITAT: HABITAT is the mandated UN agency for housing and shelter with vast experience in all areas surrounding housing and shelter, including energy efficiency in construction and energy efficient buildings.