**Production of biogas from animal manure for rural household**

**Climate change**
The United Nations Intergovernmental Panel on Climate Change (IPCC) estimates that the steady warming of the Earth's surface temperature will lead to for example to the displacement of tens of millions of people in low-lying areas; a decrease in agricultural productivity in the tropics and sub-tropics. In particular, parts of Africa would be under additional stress, where an estimated loss of 10-30% of cereal production during the next several decades would make it even more difficult to attain the Millennium Development Goals (MDGs) of halving hunger by 2015.

**Brief description of the project**
Sudan is characterized by high dependence on biomass energy (firewood, charcoal, and agricultural residues), it constitute 78% of total energy consumption. It is composed of 69% fuel wood (firewood and charcoal) and 9% residues. Households consume about 60% of total energy consumption and 72% of total biomass energy. Sudan is facing real environmental degradation due to combine factors (drought, desertification, over-grazing expansion of agricultural land, firewood/charcoal production, etc) and depletion of forest resources.

Biogas can be produced on a very small scale for household use, mainly for cooking and water heating. For small scale applications the farmer typically contributes to financing the digester with payback periods depending on the price of otherwise purchased firewood/kerosene, as the digester has zero fuel costs, only water and dung or leafy biomass material need to be collected.
**Brief description of the technology to be employed and its current use in the country**

Domestic biogas plants convert livestock manure into biogas and slurry. This technology is feasible for small holders with livestock producing 50 Kg manure per day, an equivalent of about 3 cows or 20 small ruminants. This manure has to be collectable to mix it with water and feed it into the plant. Toilets can be connected. The by-product is sludge. Digested sludge is a nitrogen fertilizer with side effect on erosion-prone surfaces. Switching from traditional biomass resources or fossil fuels to biogas improves security of energy supply as the feedstock can mostly be acquired locally, The release of methane is avoided thus contributing to climate mitigation. A single, small scale biodigester reduces between **3 and 5 tCO2-eq./year**, 

**Sector background**
The policy the government of Sudan for the energy sector promotes energy efficiency and renewable energy resources and to protect the environment. The General Directory for Energy Affairs (GDEA), Energy Research Institute (ERI) and National Energy Administration (NEA), evaluated the Chinese Biogas units installed in different parts of Sudan during 1992 and 1994. They recommended that government policy towards environmental health and sanitation has to encourage the adoption a combination of biogas digester/latrine that will contribute towards improving the present deplorable sanitary situation in the poor urban sector as well the vest rural area.

**Area of study**
The area of study area is Abu-Hamid locality (Lat 18° 30’ and 22o, longitude 32° 32’ and 34° E), Northern state. In most areas agriculture is characterized by very small farms of from 1.25 to 1.55 ha growing a diversified mixture of high-value cash crops and staple food crops. Constraints include high production costs, particularly fuel and spare parts, river flooding, weak agricultural services, desert creep, damage
by birds, insects and weeds, low availability and high cost of
improved seeds, limited fertilizer use, expensive credit and
difficulties with marketing produce. Livestock population is about
345948 head in 2008 dominated by goats (186,483) followed by sheep
(125,706), cattle (1,948) and camels (1,470) in a descending order. Abu
Hamad is the home of the most productive types of Sudan Desert
sheep that are raised along the banks of the River Nile under mixed
crop/livestock system. The target beneficiaries who are willing to use
the biogas as cheap technology are 86 villages constituting 26,000
households (90,000 heads).

**Implementation Plan:**
The aim of the project is to distribute the biodigestors across the
locality in order to meet the general requirements of the local
population. The agricultural technology transfer society (ATTS) will
be responsible for the procurement, installation and after-sales
service of the biodigester. The operation of the biodigester will be
carried out by the beneficiary, and training or instructions on how to
operate and maintain the biodigester will also be given by the ATTS.
The ATTS will follow a monitoring plan and keep track of the
biodigestors sold to beneficiaries. The ATTS will also be responsible
for storing data so that the monitoring reports can be prepared each
year.

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