August, 2007

Colofon

Contact details:
Biogas team, www.biogasafrica.net

Photographs:
SNV, AGAMA and Winrock International

Graphic design:
www.vormaat.nl

Useful websites:
www.snvworld.org (click ‘practise areas/ biogas’)
www.bspnepal.org.np (biogas programme in Nepal)
www.biogas.org.vn (biogas programme in Vietnam)
www.idcol.org (biogas project in Bangladesh – click ‘projects’) 
www.biogasafrica.net
www.biogasafrica.org
Biogas for Better Life

Business Plan: 2006 - 2020

Dignity, Health and Trust
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBO</td>
<td>Community Based Organisation</td>
</tr>
<tr>
<td>CDM</td>
<td>Clean Development Mechanism</td>
</tr>
<tr>
<td>EIRR</td>
<td>Economic Internal Rate of Return</td>
</tr>
<tr>
<td>ESAMI</td>
<td>Eastern and Southern African Management Institute</td>
</tr>
<tr>
<td>FIRR</td>
<td>Financial Internal Rate of Return</td>
</tr>
<tr>
<td>GTZ</td>
<td>German Agency for International Cooperation</td>
</tr>
<tr>
<td>MFI</td>
<td>Microcredit Finance Institute</td>
</tr>
<tr>
<td>SNV</td>
<td>Netherlands Development Organisation</td>
</tr>
</tbody>
</table>
## Contents

1. **Launching of the initiative**  
   1.1 Vision  
   1.2 Aims of the initiative  

2. **Present biogas situation in Africa**  
   2.1 Introduction  
   2.2 Technology: how do biogas digesters work?  
   2.3 Supporting evidence: health, economic development, market potential  

3. **New approach**  
   3.1 Introduction  
   3.2 Lessons learnt: from top-down technology push to bottom-up marketing  
   3.3 Partners in the Initiative  
   3.4 Branding, Promotion and Communication  
   3.4.2 Promotion  
   3.4.3 Communication  
   3.5 Capacity Building  
   3.5.1 Biogas Market Promotion Programme  
   3.5.2 Financial assessment of household credits  
   3.6 Gender: women in the driving seat  
   3.7 R&D programme  

4. **Project Cycle**  
   4.1 The five phases  
   4.2 Guiding principles for national promotion programmes  

5. **Organisation of the initiative**  
   5.1 Introduction  
   5.2 Organisational structure  
   5.3 The Trust Fund Manager  

6. **Financing model**  
   6.1 Introduction  
   6.2 Options for grant funding  
   6.3 Typical financing models  
   6.4 Loans private sector (entrepreneurs)  

7. **Planning**  
   7.1 Technical Potential  
   7.2 Planning of the Initiative  
   7.3 Annual grant fund requirement for the Initiative (US$ millions)
The initiative was prepared by a group of 22 developing partners in 2006/2007 and further developed and launched during a conference in Nairobi in May 2007.

The conference marked the first step in launching the Biogas Initiative. At this conference, the rationale, opportunities and a draft business plan for the initiative were discussed. Further steps were discussed and agreed with representatives from African countries. The conference was attended by 140 people from 37 countries out of which 27 were African.

1.1 Vision

The “Biogas for Better Life: an African Initiative” vision is to create a successful market-oriented partnership with governments, private-sector organisations, civil society agents and international development partners in African countries. It aims to provide two million households with biogas digesters by 2020, offer business opportunities and improve household livelihoods (good health, sanitation, food security, environment and new jobs). It offers households opportunities to own, control and operate sustainable energy for their own kitchens at affordable costs. The technology is safe, reliable and manageable for every household in Africa.

Women are at the core of the Initiative: it is about better lives for women - less health hazards associated with cooking, less time spent on collecting fuel-wood. It is also about the dignity of women and therefore we intend to integrate women into the initiative, for example Hauwa Ibrahim is nominated as an ambassador (see Section 5.2) for the Initiative. In our marketing drive, we will start from the needs of women: this means carrying out feasibility studies that ask women what they need and it means consulting women on how to proceed when preparing marketing programmes.

The Initiative will copy many aspects of the successful Nepalese biogas programme and close cooperation is planned with the people and organisations involved.

1.2 Aims of the initiative

Specific achievements to be reached by 2020:
- Two million fully functioning biogas plants.
- Clean cooking energy for at least 10 million Africans.
- Establishment of 800 private biogas companies and 200 biogas appliance manufacturing workshops.
- Creation of at least 100,000 new jobs.
- Development of comprehensive quality standards and quality control systems.
- An operational rate of more than 90% across all constructed biogas plants.
- One million toilets constructed and attached to biogas plants.
- Eighty percent of the bio-slurry utilised as organic fertiliser.
- Agricultural production increased by up to 25%.
- Improved health and living conditions for women and children, reducing women and children deaths by 5,000 per year.
- Reduced drudgery by saving 2 to 3 hours per day per household in fetching wood, cooking and cleaning pots.
- Reduced health costs of around 80 to 125 US$ per family per year.
- Savings of 6,400 tons of fossil fuel per year.
- Savings of 3 to 4 million tons of wood per year.
- Reducing greenhouse gas emissions annually by 10 million tons of CO equivalent.
2 Present biogas situation in Africa

2.1 Introduction

Improving the health and the living conditions of women and children, reducing the use of firewood, increasing soil fertility and agricultural production, reducing emissions of greenhouse gasses, creating new jobs and a new business sector - all these benefits from a single biogas initiative! Is this just a dream or can it really be done?

Experience in Asia has shown that this is possible. In Nepal, such a business sector has been developed and more than 170,000 households use domestic biogas. More than 95% of the digesters are in daily use and 12,000 people have found employment in the sector. A similar programme started in Vietnam in 2004 and, so far, more than 35,000 installations have been built and are operational. The Vietnam programme won the 2006 Energy Globe Award. China has more than 20 million biogas digesters, India around 4 million.

2.1.1. Background to biogas in Africa

Experience with biogas dissemination for domestic use worldwide has been limited, with successes being recorded in China, India and Nepal. In Africa, however, with the exception of Tanzania which has recorded modest success with biogas, most biogas projects have been disappointing, being marked by abandoned bio-digesters and failed units. Despite the generally high failure rate, it is important to note that there have been successful applications and adoptions of the technology at the household level, and this adds credence to the potential effectiveness and suitability of the technology for the African context.

Some of the first biogas digesters in Africa were set up in the 1950s in South Africa and Kenya. In other countries, such as Tanzania, biogas digesters were first introduced in 1975 and in other areas even more recently (South Sudan in 2001). To date, biogas digesters have been installed in several sub-Saharan countries*. Biogas digesters have been installed in various situations including commercial farms (such as in chicken and dairy farms in Burundi), a public latrine block (in Kibera, Kenya), prisons (in Rwanda), health clinics and mission hospitals (in Tanzania and Zimbabwe) and collective cooking houses in Addis Ababa.

However, the household biogas digester, fed with domestic animal excreta, remains by far the most widely attempted concept. The biogas produced from these household systems has been used mostly for cooking, with some lighting use.

Biogas is particularly suited to meeting small-scale energy needs, can contribute to sanitation and hygienic improvements and is simple enough to avoid production limitations in rural Africa. Globally, biogas technology seems to have outpaced the diffusion of other decentralised energy technologies, with a reported 25 million units installed worldwide. The next most common technology is solar PV, with slightly more than 2 million units installed worldwide. The reverse is true for Africa: solar PV installations far outnumber biogas ones.

The technical viability of small-scale biogas technology has been repeatedly demonstrated in many field tests and pilot projects, but mass dissemination has not been achieved. Problems include the fact that animals must be penned for effective collection of animal dung, farmers must own a sufficient number of livestock to fuel the digester, and the initial installation

costs for many may be a deterrent. Linking to human latrines has often failed due to cultural barriers.

Although several variants of biogas technology have been tried in Africa, the most common approaches are based on the Indian Floating Drum and the Chinese Fixed Dome types. Plastic digesters have also been tried in a bid to reduce the unit cost and varying degrees of success have been recorded with the various technological options.

Biogas extension attempts in Africa have mainly been through government programmes. The main actors tended to be governmental agricultural or energy research institutions. Across the continent, there has been a failure to develop deep-rooted operational and managerial know-how and commitment.

In most cases, biogas was introduced through a pilot or demonstration project for a few households. The underlying logic was that once people were exposed to the working and the advantages of biogas technology they would take it up and it would grow organically into a market. This approach has proven ineffective.

From the foregoing experiences, the following box summarises the lessons that can be distilled from the wide and varied biogas experiences in Africa:

### LESSONS

- Despite the wide failure rate, there are cases that demonstrate the effectiveness of the technology and its relevance to Africa.
- The demonstration effect hoped for through one-off pilot interventions has not materialised pointing to the need for a long and sustained market-oriented promotion effort.
- The technological option most widely adopted and recommended is the fixed dome type due to its ease-of-construction and its reliability.
- Biogas projects in Africa require the intimate involvement of a project promoter to seed the early successes.
- A high quality of work and sticking to a regular and rigorous operation and maintenance routine are key in protecting the image of the technology and building the confidence of end-users.

### 2.1.2 Implications for the Future

Biogas Technology as local knowledge has not been institutionalised in many parts of Africa. Therefore, expectations should be realistic and modest in the initial introductory phase of the new initiative.

Convenience is the key to ensuring long-term operation and functionality, and this has to be a key design and installation feature. Key areas include slurry handling and application in fields, and cow dung mixing. The distances between cattle stable/pen and plant and source of water are important factors in running a successful biogas plant.

Plant Size and Subsidy: The larger the plant the less likely that it will operate under optimum conditions and therefore consideration should be given to offering most support to smaller plants.

Design Adaptation: There may be a need for minor design adaptations between Nepal and Africa because of the different physical and cultural contexts: capacity, materials, family land area, etc.

### 2.2 Technology: how do biogas digesters work?

The process mainly involves feeding the installation with a mixture of dung and water. Biogas digesters can convert animal dung, human excrement and other organic materials into combustible biogas. The biogas can then be used in simple gas stoves for cooking and in lamps to provide illumination. The process also produces a bio-slurry which can be easily collected and then used as an effective organic fertiliser to improve crop yields.

Various types of biogas digesters have been developed including floating drum, fixed dome and plastic bag designs. Depending on the context, all types are potentially applicable. Most of the plants so far disseminated worldwide are of the fixed dome type. These are made of masonry and/or concrete and, generally, most of the plant is below ground level and built in a family’s yard. Daily tasks include feeding the installation with a mixture of dung and water; and for farmers with livestock on site and access to water this should not take more than 20 to 30 minutes per day. Generally, the fermented material (the bio-slurry) is displaced automatically and discharged into a compost pit or channel.

The robust design of fixed dome biogas plants ensures a lifetime of over 15 years. Maintenance is limited
to occasional checking and, when necessary, repairs of pipes and fittings; the installation itself, provided it is operated properly, needs little care. Investment costs range from less than US$ 300 in Asia to US$ 800 - 1,000 in Africa.

Typically, a farmer with two cows, or seven pigs or 170 poultry could generate sufficient gas to meet the family’s basic cooking and lighting needs. Using the same basic design, different plant sizes can be constructed to match the actual livestock holding and biogas requirements of a family.

Automatically feeding the manure from animal stalls into the digester avoids waste littering the farmyard and instantly improves the hygiene situation for the family. Similarly, the family’s own toilet can be connected directly to the installation, significantly enhancing the poor sanitary arrangements.

The obvious advantages of domestic biogas plants is that they provide clean energy for cooking and lighting in households, and avoid many of the parasites found in unconnected latrines. Replacing the need for conventional cooking materials, usually fuelwood, briquettes or dung cakes, digesters not only save money, they also reduce the workload of women and girls. Equally importantly, the indoor air pollution caused by cooking on inefficient woodstoves is virtually eliminated. The generally improved hygiene will also reduce waterborne diseases.

The bio-slurry discharge from the digester retains all the nutrients present in the original feed material and forms an excellent organic fertiliser. The bio-slurry can either be used directly on the land or composted with other organic farm residues. With correct application, the slurry has been shown to provide higher yields than comparable fertilisation with manure, and provides a viable solution to the nutrient depletion seen in many agricultural soils in developing countries.

Biogas installations reduce the demand for fuelwood, and so mitigate deforestation. Applying bio-slurry as an organic fertiliser closes the nutrient cycle and checks soil degradation and erosion. In addition, since the biogas process is carbon neutral, switching to digesters contributes to a global reduction in greenhouse gas emissions.

2.3 Supporting evidence: health, economic development, market potential

Health
Positive effects of biogas plant installations on health have been widely reported. Biogas installations improve health by cooking taking place in a cleaner environment. This avoids respiratory and eye diseases caused by the black smoke inherent with traditional ways of cooking, with women being the most likely to suffer eye diseases.

Typically with a biogas plant, that manure is directly fed into the plant. This results in a cleaner farmyard and a further improvement is possible if latrines are connected to the digester. However, cultural taboos will play a key role here. In Nepal, very few households were initially interested in connecting their latrines but today more than 60% of digesters are connected to a working latrine.

Economy
The Initiative has carried out a financial and economic analysis of biogas digesters. The outcome is positive, but strongly depends on the price of fuelwood. While it is a very attractive option for national economies it less so for households. At the macro-level, biogas programmes can be profitable even taking into account all the overall programme costs. The EIRR is estimated in the Rwandan situation to be more than 20%. Additional financial benefits arise from improved health, reduced labour in fuel collection, income from emission credits, workload reduction (especially women) and increased agricultural production.

Potential market for biogas digesters
An initial analysis of the market in Africa has been made based on the availability of domestic cattle, presence of water, scarcity of fuelwood, population density and temperature. The study shows a technical potential of some 18.5 million installations spread over various regions in Africa (see also Section 7).
3.1 Introduction

The “Biogas for Better Life: An African Initiative” conference in Nairobi marked the first step in an African initiative that offers investment and business opportunities with committed partners. This initiative should lead to:

- Local companies producing and selling biogas plants to households who are willing to buy.
- Households enjoying better health, greater comfort and more time to engage in opportunities for their benefit.
- New jobs.
- A cleaner environment and sustainable use of natural resources.

The initiative’s programmes will focus on countries and provinces in Africa that provide the best market opportunities, in “pockets of opportunity”. The programmes will be implemented by operating agents who will provide liaison with governments and maintain close contacts with the business community and operators of finance schemes. The ultimate aim is to develop a sustainable, commercial biogas sector and so enable households to have better lives.

The management of the overall initiative will be small and lean. It will provide leadership, facilitate knowledge exchange, mobilise partnerships, stimulate innovations and market research and provide a funding channel for national promotion programmes.

3.2 Lessons learnt: from top-down technology push to bottom-up marketing

Experience with biogas in Africa has been one of failures and very few success stories. Very few installations have been built, most of which have fallen into disuse over time. Renewable energy dissemination initiatives in Africa have followed the top-down project approach and the main lesson learnt is that a technology that is driven from an engineering and capacity-building point of view does not automatically succeed. Nepal and Vietnam have shown that a market approach, focussing on suppliers and consumers, is the way forward. In Nepal, biogas digesters have been sold to more than 170,000 households of which over 95% are still in daily use.

Past experience with biogas in Africa is likely to lead to pessimism: a small number of installations have been built, most of which have fallen into disuse. Conversely, optimism is the feeling that arises from experiences in Asia: especially from Nepal and Vietnam, but also from India and China. It might be argued that the circumstances in Africa differ from those in Asia. Yet, differences within Asia are as big as the differences between Asia and Africa and within Africa. There do not seem to be any fundamental reasons why dedicated marketing programmes should not work in Africa.

The main difference between the current initiative and the past is the strong market orientation which it is believed can lead to large volumes being sold. This justifies a substantial promotional programme and long-term commitment. An initial technical market survey has indicated a market of around 18.5 million households in Africa. These numbers justify a dedicated initiative targeting two million digesters.

“NEVER GIVE AWAY A PRODUCT” is one of the lessons learnt from the past and, therefore, the approach is to focus on a targeted market and to employ a light touch in overall management. The initiative will not embark light-heartedly on new programmes in Africa without taking on board past lessons and incorporating the success factors found in Asia. Guidelines and criteria derived from the successes in Asia will be applied rigorously throughout the initiative. The management team of the biogas programme in Nepal has offered all the help they can give and are willing to share their knowledge and experiences with colleagues in Africa. Field missions to Nepal, and support from Nepalese and foreign experts to African countries are just two of the possibilities for cooperation. Experts from India and China with long experience have similarly offered support to the Initiative.

3.3 Partners in the Initiative

The core of the initiative will consist of programmes focussed on specific geographical areas: countries or regions of countries, provinces, large irrigation schemes, etc. Programmes will be of a manageable size. The programmes will be facilitated, enabled and run
by operating agents – dedicated local development organisations with experience in biogas and with a proven performance orientation. Transparency will be the main guiding principle in partnership building and marketing operations. The operating agents can be assisted by external experts if required. Operating agents can carry out a range of tasks including providing institutional support, advising, delivering complete marketing programmes including feasibility studies, capacity-building support, promotion, development of local businesses, liaison with donors and funders and liaison with microcredit agents, national and local governments and civil society organisation stakeholders.

Governments will play the appropriate public role for a market-oriented approach by creating an enabling environment for the market, providing grants and tax breaks, drawing up standards and legitimising the programme. Governments will not have a role at the operational level. Special attention will be given to cross-sectoral issues with special reference to social and cultural issues, the role of women and family livelihoods since the initiative addresses such diverse policy fields as health, employment, regional rural development, social welfare, job creation, attitude change, livestock breeding, agricultural production and reducing greenhouse gas emissions.

The public (national and international) contribution to the Initiative amounts to US$ 800 million spread over a period of 10-14 years. It is anticipated that these financial resources will be made available by national authorities and the international donor community. It is also possible that some of the resources will be provided by the voluntary carbon market and/or CDM. Local development banks, international credit providers and household cash contributions will finance the investment component.

Local organisations will play specific roles in promoting, effectively maintaining, sustaining and mobilising consumer trust, service delivery and household confidence and interest.

Local businesses (contractors, manufacturers, dealers in appliances and spare parts) will be crucial in developing the market. Their role will be to mobilise the supply side. Effective and transparent local governance of entrepreneurship will assure sustainable and commercially attractive local biogas businesses. One aspiration is that local women entrepreneurs will operate viably in the biogas market.

3.4 Branding, Promotion and Communication

A communication strategy is a key factor in successfully promoting and branding the overall Initiative. The national programmes will separately develop and implement their own communication strategies to reach out to their national stakeholders. The overall communication strategy will pay special attention to women since improving the living conditions of women is at the core of the initiative. Further, in implementing the communication strategy, women will play an important role.

Markets respond to demands, especially to demands that are expected to last over a long period. These trigger the private sector to invest not only for the demand of today but also for that of years to come. The biogas industry is an infant industry in most countries and will therefore require public support until it becomes established. Market development activities, particularly promotion, are expensive and usually require action at both local and national levels.

Promotional activities will create demand for the product. Product availability and turnaround time is therefore critical. The ability to run promotional activities may be hindered by a lack of digesters or trained masons, or the inability to explain the benefits of biogas to prospective users without proper marketing/promotion tools.
3.4.1 Branding the Initiative

Branding is a proven marketing tool, if used correctly it will generate brand loyalty. Branding is much more than just the labelling of an initiative. It has to be underpinned by strong value associations and the brand alone should create a sense of commitment to quality and engender trust in the consumer or end-user. As an example, the use of a consistent set of posters, logos, calendars, training materials, marketing tools etc. has been evident throughout Nepal. The uniformity has served to make the brand even stronger.

The use of the Biogas for Better Life: An African Initiative logo should be associated with trust, a healthier lifestyle for the family and dignified living conditions. This level of trust and positive associations can only be achieved through an integrated process involving the masons (contractors), financial institutions (if needed) and the implementing agency.

The most important aspect in branding the Initiative should be to project it as a symbol of progress. This association can be positively created by the calibre of the early adopters and using their images as leaders and trailblazers.

3.4.2 Promotion

**Word of Mouth**

This will be the biggest promoter of biogas in Africa. A successful digester that actually improves living conditions will be the most powerful tool when promoting the initiative. Equally, negative images and reports will be detrimental and it can take a very long time to repair brand damage. The need to ensure quality when building and maintaining the digester cannot be stressed enough.

**Events**

Ceremonial openings of new biogas plants, with local dignitaries present trigger positive words of mouth. They can also provide positive media images and, with the customer’s permission, photographs can be taken for promotional use.

**Incentives**

Encourage excellence by creating prizes in various categories. Have annual bonuses and penalties for contractors (masons). National school programmes can help educate young people about the benefits of biogas. National level promotions could include a schools competition such as the “Best use of Slurry”.

**Advertising**

Well-positioned poster billboards in high-density locations, identified in national business plans, can communicate biogas messages and be a useful tool.

Rural areas very often rely on the radio as their only link to the outside world. Care should be taken to create “edutaining” (educating and entertaining) programmes, public service announcements and radio mini-dramas. Community radio stations are often the most credible and affordable medium when communicating at the grassroots level.

The benefits of TV educational shows should not be discounted, and television can be used as a very effective tool when trying to change behaviour. People tend to copy what they see on screen. This option can be very costly but its benefits have been proven.

3.4.3 Communication

The word communication suggests a two-way interaction. In this case, we envisage the customer and the service provider locked in a discourse that ultimately results in a quality service or product. Such exchanges could take place through NGOs, Community-Based Organisations (CBOs) or government agencies. Women’s groups, hosting talks at clinics and community radio station talk shows with a live audience are ideal platforms for this type of two-way communication.

Once a customer has purchased a biogas digester, after-sales user surveys can be used to monitor the ongoing quality of the digester. In Africa, one should not forget oral traditions. If one is to instil trust and encourage behavioural change then care should be taken not to alienate the user with too much information.
Communicating the positive aspects of biogas can help overcome the social taboos.

Key Messages:

Slurry Benefits
Promote the benefits and use of slurry upfront. If not, the opportunity can be lost and will be difficult to add later.

Poverty Reduction
The Nepalese initiative shows that focussing on improved household livelihoods (good health, sanitation, jobs, food security) is an effective way to address poverty issues.

The Role of Women
In Nepal, women play a key role in managing and maintaining the digesters and in repaying the biogas household credits. Again, an important issue worthy of attention in Africa.

Better Health
Less wood smoke in the house from cooking, leads to better health.

Reduced Drudgery
Cuts down the time consumed on cooking-associated tasks (fuelwood collection, cooking, cleaning) by women empowering them to do other things with their time i.e. become more active in the community, adult education programmes, more time to herself.

Encourages Education
Biogas provides a safer, brighter light for children to do school work at night.

Communication Strategies

The following aspects will function as guidelines in drawing up communication strategies for Feasibility Studies and National Promotion Plans.

Structuring National Communications Policy
• A national communications policy for biogas promotion is needed that will protect the interests of the target community and engage government, the public, the private sector and civil society.
• The information distributed should be relevant to the livelihoods of the community; a sound policy can protect the community against exploitation (from banks, contractors or other opportunistic marketers).

Identify Capacities
• Define who best to partner at the national level when communicating Biogas for Better Life: An African Initiative.

Monitoring and Evaluation Mechanisms
• Clear indicators should be developed.
• As biogas rolls out from country to country one should set benchmarks and establish communication best practices, this can be achieved through monitoring and assessing interventions.
• Effective feedback from users will be a key factor.
• This can be used as a quality control mechanism and is vital for “word of mouth” promotion.

Identify Local Champions (early adopters of Biogas) such as:
• Village Chiefs
• Sports Heroes
• Politicians
Identify credible information channels
- Civil Society Organisations & Community Based Organisations, NGOs
- Print (consider literacy rates)
- Religious Organisations and Churches
- Cultural and Traditional Organisations
- Youth Organisations
- Women’s Organisations
- Private Sector, Business and Trade Organisations

Language and Social Factors
- Number of languages prevalent
- Parochial or Permissive Society (i.e. open to change)
- Matriarchal or Patriarchal
- Gender norms

Identify Effective Communication Channels
- Public (telecommunications, radio, TV, research, existing advisory or information services)
- Private (advisory services, radio, TV, mobile phones)
- Community media
- Word of mouth

3.5 Capacity Building

As part of this initiative, the Eastern and Southern African Management Institute (ESAMI) has developed two draft training courses aimed at building capacity for the development and management of a market approach to disseminating domestic biogas plants. These courses will be further developed with ENDA. The two courses cover the ‘Biogas Market Promotion Programme’ and ‘Financial assessment of household credits’. Vocational and practical training, which is essential if one is to ensure quality biogas digesters, will be a key part of the national and regional programmes.

3.5.1 Biogas Market Promotion Programme

Objectives
This course is aimed at building the capacity needed for a market approach to the dissemination of domestic biogas systems. The market approach is seen as an effective vehicle for developing a vibrant biogas sector for the wide market-driven promotion and dissemination of domestic biogas plants in Africa. Participants following the programme will be equipped with knowledge about how to design, implement and market an effective biogas programme.

Target Group
- Government officers
- Biogas programme managers
- NGO officers
- Biogas consultants
- Development agencies
- Financial institutions

3.5.2 Financial assessment of household credits

Objectives
Having completed this course, participants will be able to design a credit scheme for biogas that will provide small credits to households taking into account the required collaterals, subsidies and client contributions.

Target Group
- Credit officers from relevant organisations (financial institutions, national biogas programmes)
- Government officers involved in biogas promotion
- Officers from development/donor agencies
- NGO development officers
- Biogas consultants
- Civil society organisations (community-based organisations (CBOs), churches, etc.)

3.6 Gender: women in the driving seat

The core of the initiative is improving the living conditions of women and, therefore, women will be at the core of the business. Women will figure heavily in the public presentation of the Initiative, and feasibility studies will be based on an understanding of the needs of women and households. In the overall struc-
ture, a group has been formed, led by an African woman who is an expert on both energy and gender, to monitor and advise on gender issues, and the Initiative’s research efforts will focus on the needs and positions of women.

3.7 Resource & Development programme

The Initiative has large but realistic ambitions and in developing the biogas sector it requires, besides the development of a sustainable market, a clear R&D programme to support these developments. The supporting activities would cover design development, marketing strategies, impact assessment, needs and position of women, use of slurry in agriculture, opportunities for large scale application of biogas (schools, hospitals etc), and cooperation with knowledge institutes in Asia and Europe. The current thinking is that a consortium of universities and technological institutes in Africa should take the lead in developing and implementing appropriate R&D programmes in Africa.
The Initiative specifies five phases that are described below. Each phase may be tendered for using a set of clear selection criteria. Success by a company or an organisation in completing one phase will not mean that it will automatically be allotted the next phase.

4.1 The five phases

1. Desk study
This study will focus, in a given region or country, on a limited number of key criteria such as the availability of cattle and water, scarcity of wood fuel, accessibility to credit programmes and the energy policy of the regional and/or national government. Each desk study should take approximately two weeks to complete provided the necessary data are available.

2. Feasibility study
The Terms of Reference established for a feasibility study will be based on the outcome of the desk study. The feasibility study will identify the physical areas with high market potential (the easiest markets), how to develop the market, the partners to be involved in developing that market and in client promotion and communication. In particular, the feasibility study will focus on the needs of women and households and on the needs and positions of women. Furthermore, the study will calculate the Internal Rate of Return for the national economy (EIRR) as well as for the households (FIRR). The study will also indicate any need for a subsidy to trigger the household market and create a substantial one that would interest business partners, and the level of subsidy required. A feasibility study will take two to four months to complete.

3. Implementation document for a market programme (both demand and supply sides)
Based on the outcome of the feasibility study, negotiations with interested partners and individuals will start on the roles and responsibilities of those to be involved in a regional/national programme. The document should also describe the role and position of women in the implementation and how this reflects their inputs during the previous phase. The implementation document will clearly state the financial involvement of all partners. An implementation document will cover a period of 4-5 years. The preparation and negotiations for an implementation document may take anything up to 12 months depending on scale and complexity.

4. First phase of a Market/Sector programme
The first phase of a Market/Sector programme will last four to five years and involve the construction of 15,000 – 25,000 biogas digesters. The first year will have the characteristics of a pilot phase: training, informing organisations, developing marketing materials, communication, consulting local development banks and see the installation of perhaps only 500-1000 digesters.

5. Second phase of a Market/Sector Programme
The lessons from the first period will be taken into account in designing the second phase. This phase has the objective to develop a mature and sustainable market. The target will be to construct a further 30,000 to 50,000 digesters. An independent biogas development agency and a matured biogas private sector will be fully established during this period as part of the sustainability efforts.

Summary
The proposed market and sector programme will last approximately 10 years and consist of five phases. These phases have to amount to a continuous process in order to keep the momentum going, generate commitment and build confidence among partners. In all five phases, every effort should be made to ensure that women have leading, high profile roles as they are at the heart of the business.
4.2 Guiding principles for national promotion programmes

A national promotion programme will clearly indicate the partners in the programme, their roles and responsibilities, communication lines and decision-making structures. A national promotion programme will be built upon the feasibility study. Such a programme will address the following factors:

**Social Factors**
- Ensuring the participation of women at all levels
- Target will be established rural households with some cash income
- Ownership/land rights linked to households
- Improving environment and health aspects
- Favourable social/cultural conditions
- Improved agricultural production
- Job creation
- Gender differentiation in household expenditure decisions

**Market Factors**
- Scarcity and/or high fuelwood prices
- Cost of alternative cooking fuels
- Adequate demand density for cost effective management of programme
- Effective private sector
- Demand for services that can be delivered by the technology
- Develop a marketing and awareness strategy

**Financial/Economic Factors**
- Transparent and direct subsidies lowering the costs to the end-user and linked to quality control
- Equity (contribution from own funds in cash and/or kind) - initial investment by households should be about 20%
- Credit availability (at affordable rates, with or without collateral through MFI arrangements)

**Institutional Factors**
- (Good) rural extension system (government or NGO)
- Good rural banking/credit system
- Established private sector rural masonry enterprises
- Support by traditional and/or local institutions
- Active participation of stakeholders

**Technical/Resource Factors**
- Robust and tested biogas digester standard designs that meet local needs and conditions
- Availability of biogas appliances (valves, stoves, lamps) at low cost
- Availability of after-sales service

**Political Factors**
- Stable and secure rural areas
- Transparency
- Commitment by government and private sectors
- Initial programme subsidy supported by government and donors
- Linking up with existing policy frameworks in energy, health, agriculture and sanitation

**Communication Factors**
- Structuring National Communications Policy
- Identify capacities
- Monitoring and evaluation mechanisms
- Identify local champions (early adopters of Biogas)
- Identify credible information channels
- Language and social factors
- Effective branding strategies

All the above factors will be elaborated in the feasibility study. While a national promotion programme will be based on the outcome of a feasibility study, it will also address and further specify, through a participatory process involving stakeholders, the roles, responsibilities, decision-making processes and flow of resources.
5.1 Introduction

The organisation for the overall initiative will be small and lean. Its activities will be limited to what is needed to coordinate the Initiative, and will add value for those aspects that it is impossible (or it is difficult) to address at the national level. It will be concerned with issues such as funding channels for grants, knowledge exchange, networking, Research and Development, promotion and funding national promotion programmes. As stated, women will be the focus of the business. This should also be reflected in the organisation of the initiative: women will take on key positions within the organisation of the initiative.

The organisation at the national level will be managed and coordinated by independent national implementing agencies.

The proposed governing structure outlined below will be further discussed and possibly amended at the next workshop in West Africa in May 2008.

5.2 Organisational structure

In the long term the Organisation & Institutional Structure of the Initiative, to be located in Africa, will consist of:

Biogas Ambassador(s) for the Initiative
The Ambassador(s) will embody the high-level support and function as the figurehead of the Initiative. The Ambassador(s) will promote the Initiative.

Independent Board
The Board will consist of three to five individuals, selected for their knowledge, their experience, their integrity and their wisdom. The Board will take decisions based on the Guidelines and Criteria for the Initiative and provide guidance to the Fund manager.

Final responsibility resides with the Board. The Board will:
• Set the Policy Guidelines and Focus for the Biogas Initiative
• Supervise the Biogas Initiative Host Organisation
• Set the guiding principles for the Initiative
• Approve all new country promotion programmes and budgets
• Select and appoint the Trust Manager, Advisory Committee, Auditor, Ambassador
• Approve annual plans and reports of the Host Organisation

Advisory Committee
The Advisory Committee will consist of experts from national programmes, governments, business communities, consumer associations and donors. It will convene annually. The Committee will advise the Board on the orientation of the initiative, not on individual proposals for country programmes. It will function as a brainstorming and feedback group.

Africa Leadership Group
The Africa Leadership Group will consist of individuals with high-level relevant skills and experience. They will promote the Initiative on this basis rather than as representatives of organisations, national bodies or governments. The Advisory Committee and African Leadership Group will advise the Board on the orientation of the Initiative at policy level and not at the national operational level.

Trust Fund Manager, Coordinator of the Initiative
The Trust Fund Manager will be responsible for financing, accounts, providing support services, management, procurement regulations, reporting, approving feasibility studies and national implementing initiatives. The Trust Fund Manager is the institutional, organisational and financing centre of the Initiative. The Trust Fund Management may be incorporated within an existing organisation or, alternatively, a new organisation could be established for this specific task.

Quality control
Expert organisations will be appointed to screen desk studies, feasibility studies, implementation plans.

Risk management
Rather than install a complex and bureaucratic risk management structure, which would go against the Initiative’s aim of having a lean management core, some level of risk will be accepted. For example; a feasibility study may fail; a country programme may achieve a somewhat smaller number of installations than anticipated.
Organisational & Fund Management Structure

BIOGAS BOARD
- Policy guidelines, Funds Approval

ADVISORY GROUP

AFRICAN LEADERSHIP GROUP

TRUST FUND
- (Transaction / Accounting)
- Account Manager

BIOGAS INITIATIVE COORDINATION
- (Coordination / Management / Quality control)

operation agents

Pre-Feasibility Study
Feasibility Study
Implementation plan

National / Regional marketing programmes

- Independent National Implementing Organisation
- Private Sectors / Businesses / Marketing Agents
- Contractors
- Builders
- Training Agents
- Auditors
- National Government Agents
- Banks (Credits, Loans, Subsidy)
- Support Activities
- Household Beneficiary

DONORS
- (Financing)

AMBASSADORS
- (Promotion)
The Nairobi conference has asked for more time to work out the fund management structure. In the short term, the Initiative will start on a pragmatic basis with an account manager.

For the time being, the governing structure will be that of a silent partnership amongst donors involving:

- Two Biogas Ambassadors
- Biogas Team
- Biogas Technical Advisors
- Web Manager
- Account Manager

5.3 The Trust Fund Manager

The Trust Fund Manager will apply stringent rules for tendering and awarding contracts, and will provide professional advice, monitoring, quality control, capacity-building support and auditing to national promotion programmes. The Trust Fund Manager will implement a governance structure that satisfies sponsors, apply stringent rules for tendering and awarding contracts and provide for professional auditing.

Main tasks of the Trust Fund Manager:

- Business negotiations with donors: grant agreements.
- Business negotiations concerning Carbon Credits
- Implementation of Business Plan
- Identifying potential participating countries and securing their agreement to participate.
- Business negotiations with operators of marketing programmes: contracting, monitoring progress, disbursement of funds.
- Formulating and implementing an information/best practices dissemination plan.
- Preparing for meetings of the Board, meetings of the Advisory Committee, and of Ambassadors.
- Preparing Annual Report.
- Launch annual calls for desk studies, feasibility studies and market promotion programmes.

Major decisions taken within the Trust Fund Management will be guided by the annual plan

- Market promotion programmes (Trust Fund Manager and the Board)
- Feasibility studies (the Trust Fund Manager)
- Implementation Plans (the Trust Fund Manager)
- Supporting activities on research and communication (the Trust Fund Manager)

Within the Trust Management organisation, two levels will be identified:

- Director with the final responsibility for the operation and for taking major decisions as indicated below.
- Fund management staff carrying out the tasks indicated below.

Criteria for selection of Trust Management Organisation

- Strong African focus, experience and mandate
- Organisation with international experience
- Sound organisational governance, accountability and transparency
- Experience in fund management
- Broad acceptance by consumers, donors, business community, NGOs, Governments
- Demonstrable experience in dealing with high-level representatives of governments and local/ international financial institutions
- Minimum of 15 years of working in development
6 Financing model

6.1 Introduction

Two million domestic biogas installations within 10-14 years is the ambitious aim of the initiative. At a total cost of US$ 800-1,000 per installation, the total investment requirement is of the order of US$ 2,000 million. This includes all the costs of construction, manufacturing, support to consumers and suppliers, sector development, promotion, monitoring and management.

Microcredit, loans and cash contributions will make up US$ 1,200 million of this total. A grant of US$ 800 million will be used to finance the down payments on purchasing costs, promotion, training, quality control, promotion and management.

The overall cost per installation and the proposed sources are as follows:

1 Market promotion and management costs estimated at US$ 200 to 250 per installation - to be met from the grant fund.
2 Initial down payment of US$ 150-250 per digester. This will be met from the grant fund to bring biogas costs down to a level attractive to households.
3 Balance of digester costs of US$ 450-550 per installation to be met by the end-user through microcredit arrangements in combination with a cash contribution.

A grant fund will cover the costs detailed under 1 and 2 above and amount to some $ 400 per installation/household. The individual contributions (mentioned under 3) will come from existing financing mechanisms with the possibility of additional loans from international credit providers.

The grant contribution towards the digester costs is required to make biogas financially attractive at the household level. The Economic Internal Rate of Return (EIRR) in Africa is typically of the order of 20% or more, while the Financial Internal Rate of Return (FIRR) for households is in the order of 10%.

However, low-income households do not see such FIRR s as attractive. Experiences from agriculture have shown that low-income farms/households only became interested in investing at a FIRR of 30%. The level of financial contribution will be set with this figure in mind and may well differ from country to country. The feasibility study will provide the basic information to decide on the level of subsidy.

The initiative will focus on areas where good market opportunities are expected. The grant funding modality will correspond with this approach. The initiative requires funding that is not attached to specific countries but to the most promising market opportunities. This requires sponsors that are willing to contribute to a fund that is then allocated to regions/countries where opportunities have been identified and partnerships agreed upon.

6.2 Options for grant funding

- Foundations such as the Shell Foundation, HIVOS, etc.
- Gas distribution companies looking for opportunities for ‘greening’ their operation.
- Voluntary carbon compensation schemes need further investigation
- US Millennium Challenge Account
- Bilateral donors, EC, African Development Bank

In order to allow the initiative to start and to achieve some initial successes, some US$ 6.0 million has been estimated as the necessary budget to undertake desk and feasibility studies and to elaborate marketing plans for promising markets. Implementation has already started in Rwanda, in the second quarter of 2007. Feasibility studies are now ongoing in Ethiopia, Senegal, Kenya, Sudan, Zambia, South Africa, Mali, Tanzania, Burkina Faso and Uganda. Desk studies are now underway in Ghana, Malawi, Lesotho, Swaziland, Nigeria and the West Africa Region. Other countries are likely to be identified in the months to come.
6.3 Typical financing models

Model 1: High potential area, e.g. Rwanda

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic Digesters (thousands)</td>
<td>1.0</td>
<td>2.5</td>
<td>3.0</td>
<td>4.0</td>
<td>6.0</td>
<td>8.0</td>
<td>10.0</td>
<td>12.0</td>
<td>12.0</td>
<td>70.5</td>
</tr>
<tr>
<td></td>
<td>Subsidy $200</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1.2</td>
<td>1.6</td>
<td>2.0</td>
<td>2.4</td>
<td></td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>$150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>International</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.7</td>
<td>0.6</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>National</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>Voluntary market</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$40/household</td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>1.0</td>
<td>1.4</td>
<td>1.8</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Household Loans $400</td>
<td>0.4</td>
<td>0.1</td>
<td>1.2</td>
<td>1.6</td>
<td>2.4</td>
<td>3.2</td>
<td>4.0</td>
<td>4.8</td>
<td>4.8</td>
<td>28.2</td>
</tr>
<tr>
<td></td>
<td>Households Cash $150</td>
<td>0.2</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.9</td>
<td>1.2</td>
<td>1.5</td>
<td>1.8</td>
<td>1.8</td>
<td>10.5</td>
</tr>
</tbody>
</table>

(amounts in million dollars)

Model 2: Average potential, e.g. Ethiopia

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic Digesters (thousands)</td>
<td>0.5</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td>5.0</td>
<td>6.0</td>
<td>7.0</td>
<td>8.0</td>
<td>44.5</td>
</tr>
<tr>
<td></td>
<td>Subsidy $200</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td></td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>$150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>International</td>
<td>0.6</td>
<td>0.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>National</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Voluntary market</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$40/household</td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
<td>0.3</td>
<td>0.4</td>
<td>0.6</td>
<td>0.9</td>
<td>1.1</td>
<td>1.5</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Household Loans $400</td>
<td>0.2</td>
<td>0.4</td>
<td>0.8</td>
<td>1.2</td>
<td>1.6</td>
<td>2.0</td>
<td>2.4</td>
<td>2.8</td>
<td>3.2</td>
<td>17.8</td>
</tr>
<tr>
<td></td>
<td>Households Cash $150</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.9</td>
<td>1.1</td>
<td>1.2</td>
<td>6.7</td>
</tr>
</tbody>
</table>

(amounts in million dollars)

6.4 Loans private sector (entrepreneurs)

In order to develop a market, local private biogas companies need to be established. Entrepreneurs will need to invest in purchasing tools, building materials and to employ people. Such investment should come from loans provided by the private banks or microcredit institutions.
7.1 Technical Potential

SNV has completed a study for a first assessment on the technical potential for biogas digesters in Africa. The numbers of potential installations in various countries are presented in Table 7.1. The table includes most of the countries with a technical potential above 100,000 units and gives a total potential of approximately 17.5 million biogas digesters. Including countries with a technical potential below 100,000 units brings the total number to 18.5 million.

The countries in the table are seen as offering the best opportunities for a good start. Within the Initiative, these are the countries that should have priority when preparing desk studies, feasibility studies and the formulation of national promotion programmes.

Table 7.1 Technical potential

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Potential (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>278</td>
</tr>
<tr>
<td>Angola</td>
<td>322</td>
</tr>
<tr>
<td>Benin</td>
<td>254</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>876</td>
</tr>
<tr>
<td>Cameroon</td>
<td>488</td>
</tr>
<tr>
<td>Chad</td>
<td>213</td>
</tr>
<tr>
<td>Egypt</td>
<td>980</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>916</td>
</tr>
<tr>
<td>Ghana</td>
<td>278</td>
</tr>
<tr>
<td>Guinea</td>
<td>255</td>
</tr>
<tr>
<td>Kenya</td>
<td>1259</td>
</tr>
<tr>
<td>Madagascar</td>
<td>678</td>
</tr>
<tr>
<td>Mali</td>
<td>839</td>
</tr>
<tr>
<td>Mauritania</td>
<td>100</td>
</tr>
<tr>
<td>Niger</td>
<td>264</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2241</td>
</tr>
<tr>
<td>Rwanda</td>
<td>140</td>
</tr>
<tr>
<td>Senegal</td>
<td>439</td>
</tr>
<tr>
<td>S. Africa</td>
<td>579</td>
</tr>
<tr>
<td>Sudan</td>
<td>1784</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1781</td>
</tr>
<tr>
<td>Uganda</td>
<td>1314</td>
</tr>
<tr>
<td>Zambia</td>
<td>341</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>794</td>
</tr>
<tr>
<td>Total</td>
<td><strong>17,413</strong></td>
</tr>
</tbody>
</table>
In order to achieve the envisaged two million plants, the following numbers of studies and programmes will have to be implemented:

### Phase 1: Desk study

<table>
<thead>
<tr>
<th>Number of desk studies</th>
<th>Potential total of biogas digesters</th>
<th>Expected success rate (percentage of studies that will qualify for a feasibility study)</th>
<th>Number of studies that qualify for feasibility study</th>
<th>Total potential biogas digesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>4,400,000</td>
<td>70%</td>
<td>50</td>
<td>3,100,000</td>
</tr>
</tbody>
</table>

### Phase 2: Feasibility study

<table>
<thead>
<tr>
<th>Number of feasibility studies</th>
<th>Potential biogas digesters</th>
<th>Expected success rate (percentage of studies that will qualify for a market/sector programme)</th>
<th>Number of studies that qualify for a market/sector programme</th>
<th>Number of potential biogas digesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3,100,000</td>
<td>90%</td>
<td>45</td>
<td>2,800,000</td>
</tr>
</tbody>
</table>

### Phase 3: Implementation document for a Market/Sector (demand plus supply side) programme

<table>
<thead>
<tr>
<th>Number of implementation documents</th>
<th>Potential biogas digesters</th>
<th>Expected success rate (percentage of studies that will qualify for first-phase market programme)</th>
<th>Number of studies that qualify for a market/sector programme</th>
<th>Number of potential biogas digesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>2,800,000</td>
<td>90%</td>
<td>40</td>
<td>2,500,000</td>
</tr>
</tbody>
</table>

### Phase 4: First phase market/sector programme

<table>
<thead>
<tr>
<th>Number of Phase 1 market/sector programmes</th>
<th>Potential biogas digesters</th>
<th>Expected success rate (percentage of installations realised)</th>
<th>Number of programmes that qualify for a 2nd phase market/sector programme</th>
<th>Number of potential biogas digesters (including 600,000 installed in this phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>2,500,000</td>
<td>80%</td>
<td>40</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>

### Phase 5: Second phase market/sector programme

<table>
<thead>
<tr>
<th>Number of Phase 2 market/sector programmes</th>
<th>Potential biogas digesters</th>
<th>Success rate</th>
<th>Number of programmes successfully implemented</th>
<th>Number of biogas digesters installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>2,000,000</td>
<td>100%</td>
<td>40</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>
### 7.2 Planning of the Initiative

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of digesters (thousands)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual production of biogas plants</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>20</td>
<td>50</td>
<td>120</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>20</td>
<td>200</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accumulated production</td>
<td>1</td>
<td>3</td>
<td>10</td>
<td>30</td>
<td>80</td>
<td>200</td>
<td>450</td>
<td>700</td>
<td>950</td>
<td>1,200</td>
<td>1,450</td>
<td>1,650</td>
<td>1,850</td>
<td>2,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Studies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calls for Desk studies</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desk studies finished</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Calls for feasibility studies</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility studies finished</td>
<td>5</td>
<td>7</td>
<td>15</td>
<td>20</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Formulating national promotion programmes</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Calls for promotion programmes</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start of Phase 1 national promotion programmes</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Start of Phase 2 national market programmes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 7.3 Annual grant fund requirement for the Initiative (US$ millions) (not including investments from existing financing mechanisms)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Studies</strong></td>
<td>1.0</td>
<td>1.5</td>
<td>1.5</td>
<td>1.0</td>
<td>-</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td><strong>Research</strong></td>
<td>0.2</td>
<td>0.6</td>
<td>0.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.0</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td><strong>Knowledge Management</strong></td>
<td>0.2</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td><strong>Model I country programmes (10x)</strong></td>
<td>2.0</td>
<td>5.4</td>
<td>9.4</td>
<td>13.4</td>
<td>16.4</td>
<td>20.0</td>
<td>24.0</td>
<td>28.4</td>
<td>30.0</td>
<td>29.1</td>
<td>21.9</td>
<td>12.2</td>
<td>4.8</td>
<td></td>
<td></td>
<td>217</td>
</tr>
<tr>
<td><strong>Model II country programmes (30x)</strong></td>
<td>2.1</td>
<td>6.5</td>
<td>15.6</td>
<td>27.8</td>
<td>36.8</td>
<td>45.0</td>
<td>53.0</td>
<td>59.4</td>
<td>63.0</td>
<td>66.0</td>
<td>58.4</td>
<td>44.8</td>
<td>24.0</td>
<td>4.0</td>
<td></td>
<td>506</td>
</tr>
<tr>
<td><strong>Fund Management / Board</strong></td>
<td>0.2</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6.2</td>
<td>15.9</td>
<td>29.4</td>
<td>45.2</td>
<td>56.4</td>
<td>68.1</td>
<td>80.1</td>
<td>90.4</td>
<td>94.9</td>
<td>97.0</td>
<td>82.1</td>
<td>58.0</td>
<td>29.8</td>
<td>4.9</td>
<td></td>
<td>759</td>
</tr>
<tr>
<td><strong>5% contingency</strong></td>
<td>0.3</td>
<td>0.8</td>
<td>1.4</td>
<td>2.3</td>
<td>2.9</td>
<td>3.4</td>
<td>4.0</td>
<td>4.6</td>
<td>4.8</td>
<td>4.9</td>
<td>4.1</td>
<td>2.9</td>
<td>1.5</td>
<td>0.3</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td><strong>Total with contingency</strong></td>
<td>7</td>
<td>17</td>
<td>31</td>
<td>48</td>
<td>59</td>
<td>72</td>
<td>84</td>
<td>95</td>
<td>100</td>
<td>102</td>
<td>86</td>
<td>61</td>
<td>31</td>
<td>5</td>
<td></td>
<td>797</td>
</tr>
</tbody>
</table>