



Kenya National Domestic Biogas Programme

An initiative under the Africa Biogas Partnership Programme

PID

Programme Implementation Document

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Integral

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Kenya National Domestic Biogas Programme

KENDBIP

2009 - 2013

- **Funded by the Dutch Ministry of Foreign Affairs**
- **Managed jointly by Humanist Institute for Co-operation with Developing Countries and Netherlands Development Organisation SNV**
- **Supported by the Government of Kenya through the Ministry of Energy**
- **Implemented by Kenya National Federation of Agricultural Producers.**

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EXECUTIVE SUMMARY

The Kenya National Domestic Biogas Programme (KENDBIP) is a component of ABPP (Africa Biogas Partnership Programme), funded by the Directorate General for International Cooperation (DGIS) under the Netherlands Ministry of Foreign Affairs. ABPP is part of a broader objective of DGIS targeting the provision of sustainable energy to 10 million people by the year 2015. It is being supported by DGIS through two Dutch development NGOs, the Humanist Institute for Cooperation with Developing Countries (Hivos) and the Netherlands Development Organisation (SNV).

The overall objective of the Programme is to contribute to the achievement of the Millennium Development Goals (MDGs) through the dissemination of domestic biogas plants as a local, sustainable energy source through the development of a commercially viable, market-oriented biogas sector. ABPP targets to facilitate the construction of about 70,500 biogas plants in the six participating countries, providing about half a million people access to a sustainable source of energy.

The objective of this Programme Implementation Document (PID) is to outline the approach being taken by the Kenya National Federation of Agricultural Producers (KENFAP), in its capacity as the National Implementing Agency (NIA) for KENDBIP. Sector development implies the close collaboration of all relevant stakeholders – Government, Non-Government and private sector, at all levels: micro, meso and macro. In this process, KENFAP is not just a player amongst others, but acts as the “*sector leader*” tasked with the stimulation of commercial interaction between the biogas households (potential customers), Biogas Construction Enterprises (BCEs) and Biogas service providers. This will be achieved through capacity building, coordinating, facilitating and monitoring sector functions and supporting the technical, financial and institutional architecture necessary for development of the domestic biogas sector in Kenya.

This PID proposes that KENDBIP be implemented based on private sector market oriented principles, but relying on governmental support for a favourable regulatory and policy environment, as well as general buy-in promotion and extension. KENDBIP will stimulate the installation of 8,000 domestic biogas plants country wide, largely of 6m³ to 12m³ capacity, over a period of 4½ years (July 2009 to December 2013). It will establish biogas plants through over 100 biogas-related enterprises engaged in construction, appliances and parts.

The programme adopts and customizes the approach to biodigester dissemination developed by SNV – the ‘multi-stakeholders sector development approach’. This approach, which has been successfully implemented in Asia, is based on the establishment, over time, “of a market for domestic biogas installations and accessories, in which a well-informed demand side – i.e. in which clients who know what they want, recognize quality and value for money – links up with an equally capable supply side that provides the market with quality products at competitive prices and with adequate after sales services. Such a market should be able to reach a volume that allows a significant number of constructors and credit providers to maintain an economically sound and profitable level of turnover. In the process towards market development, the government, civil society organisations, and other players in the public and private domain have a role to play in addition to the main actors in the market.”¹

KENFAP will operationalise a ‘Biogas Office’, which, once set up, will go through a participatory envisioning process to ensure effective delivery of goods and services under KENDBIP. The Biogas Office will be responsible for among others, promotion and marketing, training of Users and Contractors, research & development, construction of biogas installations, provision of micro credit, monitoring and evaluation, quality assurance, sector coordination and subsidy management. Depending on the need, existing organizations or institutions will be identified by KENFAP to take responsibility for the sound execution of these functions.

¹ Africa Biogas Partnership Programme Proposal to DGIS, August 2008

KENDBIP biogas installations will be financed by a combination of ABPP funds, government leverage, financial facilitation by SACCOs, MFIs, banks, formal and informal groups, and end-users' capital from savings, current income, donations, family remittances, etc.

Promotion and dissemination will prioritise high potential regions identified by the Kenya Biogas Feasibility Study². Rural development NGOs as well as governmental and private agricultural and livestock extension services are integrated in the programme plan.

To reduce the investment cost barrier of domestic biogas installations, the programme will provide an investment subsidy, with each biogas plant under KENDBIP being allocated a subsidy at a flat rate of KES 25,000 (about EUR 240), irrespective of the size. The subsidy is critical in order to achieve the right balance between cost of biogas plants and forecasted demand. Having a flat rate subsidy will ensure that users of smaller biogas plants achieve a proportionately higher subsidy-cost ratio.

In addition, financial institutions will be encouraged to partner in the programme to provide loans to the end users and the government will be approached to offer investment incentives. Bio-slurry application in agriculture will be used to enhance economic benefits.

End users will be protected against construction errors through a Code of Ethics for Biogas Contractors and documented biogas plant performance warranties and appliance guarantees lasting up to three years. A quality control protocol will be put in place to ensure that 100% of complaints and requests for repairs are solved during the first 5 years after completion and that 97% of biogas plants are still in use when the programme terminates.

KENDBIP will utilise a total budget of EUR 10.443 million, out of which EUR 5.049 million or about 48% will be contribution from end users, and EUR 4.939 million from ABPP (Hivos: EUR 3.498 million in funding; SNV: EUR 1.441 million in the form of technical assistance). Kenya Government will be approached to provide leverage of EUR 454,806 or more. Funds from Hivos will have three components: management costs, programme funds and subsidy funds.

It is expected that KENDBIP will lead to savings of 37,388 tonnes of fuelwood, valued at KES 194.4 million³ (about EUR 1.9 million) and 13,460 tonnes of charcoal, valued at KES 250.3 million⁴ (about EUR 2.4 million). An estimated 73,623 tonnes⁵ of CO₂ equivalent emissions will be avoided, and the health of over 15,000 men and women and over 38,800 children will be significantly improved. Approximately 15 to 18 million⁶ hours per annum (equivalent to about 2,000 person-years) will be saved for women and children fetching firewood and other biomass sources for cooking and heating. In addition, effort will be saved in cooking, warming food and water and cleaning cooking pots for about 7,760 households, representing over 15,000 men and women and over 38,800 children⁷. Employment will be realised for 366 Kenyans working as Biogas Masons, and 49 as field supervisors, in addition to other direct and indirect employment in extension, promotion, credit, microfinance, etc. – mostly targeting youth and incorporating women.

2 Sponsored by Shell Foundation in 2007

3 Price of fuelwood in Kenya as at 31 July 2009 = KES 5,200 per ton

4 Price of charcoal in Kenya as at 31 July 2009 = KES 18,600 per ton

5 Under optimal construction and utilization, domestic biogas plants reduce GHG emissions by approx. 4.6 tonnes of CO₂ equivalent per annum

6 Kenyan women and children spend approximately 4-5 hours per day searching for traditional fuels

7 Average family size in Kenya is 5- National Health Study

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Abbreviations and Acronyms

AAs	Activity Agreements
ABC-K	Association of Biogas Contractors–Kenya
ABPP	Africa Biogas Partnership Programme. A tri-partite public-private partnership between the Ministry of Foreign Affairs of the Kingdom of the Netherlands, Stitching Hivos and the Netherlands Development Organisation SNV, established to support the large-scale dissemination of domestic biogas plants in Kenya, Burkina Faso, Ethiopia, Senegal, Tanzania and Uganda.
ACD	Accounts Department
ADM	Administration Department
BCE	Biogas Commercial Enterprises
CBO	Community Based Organisation
CDF	Constituency Development Fund
CDM	Clean Development Mechanism
CPPMU	Central Planning and Project Monitoring Unit
DGIS	Directorate General for International Cooperation
EPDD	Electrical Power Development Department
ERC	Energy Regulatory Commission
FIN	Finance Department
FIRR	Financial Internal Rate of Return
GDP	Gross Domestic Product
GED	Geo-Exploration Department
GHGs	Greenhouse Gases
GoK	Government of Kenya
Hivos	Humanist Institute for Cooperation in Developing Countries
IAP	Indoor Air Pollution
JC	Job Card
JDs	Job descriptions
JKUAT	Jomo Kenyatta University of Agriculture
JO	Job Order
KAM	Kenya Association of Manufacturers
KBCE	Kenya Biogas Centre of Excellence (KBCE)
KBFS	Kenya Biogas Feasibility Study
KEBS	Kenya Bureau of Standards
KENBIC	Kenya National Biogas Committee
KENBIM	Kenya National Biogas Model
KENDBIP	Kenya National Domestic Biogas Programme
KENFAP	Kenya National Federation of Agricultural Producers
KenGen	Kenya Electricity Generating Company Limited
KEREA	Kenya Renewable Energy Association
KES	Kenya Shillings
KIRDI	Kenya Industrial Research and Development Institute
KNFU	Kenya National Farmers Union
KPC	Kenya Pipeline Company Limited
KPLC	Kenya Power and Lighting Company Limited
KPRL	Kenya Petroleum Refineries Limited
KUSCCO	Kenya Union of Saving and Credit Cooperatives
LPG	Liquefied Petroleum Gas
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MoA	Ministry of Agriculture
MoE	Ministry of Energy
MoF	Ministry of Finance
MoLD	Ministry of Livestock Development
MoU	Memorandum of Understanding
MT	Metric tones
MW	Mega Watts
NEMA	National Environment Management Authority
NGOs	Non Governmental Organisations
NIA	National Implementing Agency
NPK	Nitrogen, Phosphorous and Potassium

O&M	Operations and Maintenance
PID	Project Implementation Document
PM	Programme Manual – templates and guidelines of the PID
PSDA	Private Sector Development in Agriculture
PV	photovoltaic
QC	Quality Control
R& D	Research and Development
RE	Renewable Energy
REA	Rural Electrification Authority
SACCOs	Saving and Credit Cooperatives
SACDEP	Sustainable Agricultural Community Development Programme
SNV	Netherlands Development Organization
SBE	Senior Biogas Engineer
TA	Technical assistance
TOR	Terms of Reference

Notes and acknowledgements

Preparation of this PID: Acting on behalf of the Kenya National Biogas Committee (KENBIC), the Lead PID Facilitator and author of this document is Mr. Ashington Ngigi, Director, Integral Advisory Limited (www.integral-advisory.com), a consulting firm active in Energy, Environment, Agriculture, Health and education in East Africa.

During the preparation of this report, the Facilitator worked closely with local support staff and associates of Integral Advisory. In order to maintain objectivity in preparation of this PID, an attempt had been made to utilise data that is as current as possible, sometimes based on expert views and best estimates, as well as non-published data from official sources. For purposes of the domestic biogas baseline for Kenya, significant input has been drawn from the Kenya Biogas Feasibility Study (KBFS) dated 18 October 2007. A wide range of literature was sourced and collated for raw data and authoritative information. Literature identified and reviewed includes Vision 2030, energy and poverty eradication policy documents, financial sector reports, donor project reports, financial and fund models reviews, regional and country studies undertaken in the past. The contents of this report are well aligned to the objectives of notable biogas sector initiatives in Kenya, specifically the aspirations and activities of private sector Biogas Contractors.

Clarifications: This report is for use by KENFAP in its implementation of KENDBIP 2009–2014. All clarifications and questions on the implementation and participation in KENDBIP should be directed to KENFAP, in its capacity as the implementing agency: Chief Executive Officer, Kenya National Federation of Agricultural Producers, P.O Box 43148-00100, Nairobi, Kenya; Tel: +254 2 608324, 600355; Fax: +254 2 608325; Email: producers@kenfap.org

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PID and the Programme Manual: The programme documents are divided into two: this document, the “PID”, and a separate Programme Manual (referred to herein as the “PM”).

Kenya Shilling Exchange Rates: As at 01 October 2009: 1US\$ = KES 74.8214; 1 EUR = KES 109.0347. The agreed base exchange rate for implementation of the project is 1 EUR = KES 105.

PART I — INTRODUCTION AND BACKGROUND

1 Programme Background

1.1 Origins of the Kenya National Biogas Initiative

Plans for the implementation of a national domestic biogas programme in Kenya began on 23rd May 2007, when a number of stakeholders met and founded the Kenya Biogas Task Force. The spirit of this Kenyan initiative resulted from the May 2007 Biogas for Better Life Conference. Representatives from 27 countries in Africa met in Nairobi to formally discuss how to carry forward the objectives of an Africa-wide biogas initiative with the support of the Directorate General for International Cooperation (DGIS) under the Netherlands Ministry of Foreign Affairs. On 25th June 2008, the Kenya Biogas Task Force reconstituted into the current broad based Kenya National Biogas Initiative Committee (KENBIC), chaired by Kenya's Ministry of Energy (MoE). It's main objective is realisation of a national biogas programme for Kenya.

1.2 The Africa Biogas Partnership Programme

In December 2008, DGIS approved a proposal – the Africa Biogas Partnership Programme (ABPP) – as part of a broader objective of DGIS targeting the provision of sustainable energy to 10 million people by the year 2015. ABPP will facilitate the construction of about 70,500 biogas plants by implementing national domestic biogas programmes in six⁸ African countries: Kenya, Burkina Faso, Ethiopia, Senegal, Tanzania and Uganda, as shown in the tables below.

Table 1: ABPP Summary Budgets and Targets

ABPP six country programme proposal

	Ethiopia	Uganda	Burkina Faso	Kenya	Tanzania	Senegal	Total
Technical potential	1,000,000		200,000	100,000	276,000	400,000	
Financial Potential	500,000	216,000	110,610	65,000	102,000	175,000	
Number of Plants Proposed	14,500	20,000	10,050	10,000	8,000	8,000	70,550
Plant Model Proposed	SINIDO	GGC 2047	TED	KENBIM	CARMATEC	GGC 2047	
Plant Sizes Proposed	6m ³	8m ³	6m ³	6m ³ - 12m ³	6m ³ - 8m ³	4m ³ - 10m ³	
Plant Cost in EUR	600	770	686	800	700	630 - 900	
Investment Incentive Proposed	EUR 193	EUR 200	10 - 30%*	100	160 - 240	150 - 300	
Total number of project beneficiaries: +/-							350,000

* as a proportion of total biogas plant cost

Six country programme proposal Summary of country budgets:								Euro	
	Ethiopia	Uganda	Burkina Faso	Kenya	Tanzania	Senegal	Supra-national	Total	
Farmers costs	5,737,697	10,400,000	7,950,000	5,049,255	8,111,411	365,880	-	37,614,243	
Credit costs	1,253,508	2,052,000	1,260,000	-	1,955,914	4,358,554	-	10,879,976	
Investment Subsidy	2,590,303	2,100,000	1,875,202	1,938,095	2,084,502	2,063,792	-	12,651,894	
Programme costs	4,461,334	3,046,371	2,716,498	2,014,251	3,147,733	2,484,559	1,938,025	19,808,771	
Technical Assistance	1,903,500	1,326,152	1,232,000	1,441,200	1,087,798	1,251,421	806,000	9,048,071	
Sub-total programme costs	15,946,342	18,924,523	15,033,700	10,442,801	16,387,358	10,524,206	2,744,025	90,002,955	
Farmers contribution	6,991,205	12,452,000	9,210,000	5,049,255	10,067,325	4,780,207	-	48,549,992	
Government Contribution	1,277,637	680,000	645,000	454,806	1,357,851	665,948	-	5,081,242	
TA provider contribution SNV	1,903,500	1,607,390	1,480,300	1,441,200	1,087,798	1,251,421	315,000	9,086,609	
Sub-total contributions	10,172,342	14,739,390	11,335,300	6,945,261	12,512,974	6,697,576	315,000	62,717,843	
Requested from DGIS for country budgets	5,774,000	4,185,133	3,698,400	3,497,540	3,874,384	3,826,630	2,429,025	27,285,112	
Numbers in Italic are subject to change All TA costs will be in the 6 countries									
Government contributions of Burkina Faso, Kenya, Tanzania, Uganda and Senegal are expected to become explicit before the end of 2009									

⁸ The ABPP country programmes as at the time of preparation of this PID are as follows: Ethiopia: launched in 2008 with a budget of EUR 16.6 million (ABPP support of EUR 8.4 million), and a target of 14,000 biogas plants in 5 years; Tanzania: launched in 2009 a budget of EUR 16.7 million (ABPP support of EUR 4.6 million), and a target of 12,000 biogas plants in 5 years; and in Uganda, Burkina Faso and Senegal preparation of PID is ongoing, launch expected in 2010.

DGIS is providing €30 million to cover part of the total estimated programme costs shown in the table above and has entrusted the implementation to two Dutch development NGOs, the Humanist Institute for Cooperation with Developing Countries (Hivos) and the Netherlands Development Organisation (SNV).

1.3 SNV Biogas Programmes in Asia

Structured domestic biogas programmes have in recent years registered notable success, specifically in Asia, with SNV programmes in Nepal (more than 200,000 installed) and Vietnam (over 40,000 installed). The Vietnam programme received the Energy Globe Award 2006, demonstrating growing international attention to biogas. In China, over 20 million biogas plants are in use, while in India there are approximately 4 million installations. This forms the background for a domestic biogas programme in Kenya with SNV support.

1.4 History of ABPP's support to the Kenya National Biogas Initiative

In January 2009, Hivos and SNV convened a workshop in Nairobi to sensitise stakeholders on the aspirations of ABPP and enhance local ownership. KENBIC was consequently mandated and supported by ABPP to establish the three pillars of the implementation plan:

- i. Selection of the most appropriate biogas technology: Through a process facilitated by KENBIC and supported by ABPP, Kenya biogas sector stakeholders in April 2009 endorsed the Kenya National Biogas Model — acronym “KENBIM” as the official technology and design for KENDBIP.
- ii. Selection of the National Implementing Agency (NIA): In June 2009, KENFAP was competitively selected by KENBIC to become the NIA responsible for rolling out KENDBIP.
- iii. Preparation of this Programme Implementation Document (PID).

2 KENDBIP operating environment

2.1 The Kenya Biogas Feasibility Study (KBFS)

In 2007, in the context of Biogas for Better Life, the Shell Foundation commissioned and funded a feasibility study to examine the potential for a national domestic biogas programme in Kenya. The study “Promoting Biogas Systems in Kenya” dated 18 October 2007, was carried out by ETC UK, in collaboration ETC Energy, ETC East Africa, and local consultants Integral Advisory Ltd. It gives a comprehensive analysis of Kenya and the biogas sector.

While recognising the potential to install an estimated 65,000 biogas plants in Kenya in just over 10 years, the KBFS characterised the current market for biogas in Kenya as immature, with sluggish albeit NGO and private sector-led sales, driven by a small number of pioneers. It was noted that the stakeholders have limited capacity to generate the level of activity that would spur absorption of the inherent but untapped demand. The market leader for household plants was estimated to install only about 30 systems a year, with total market activity at around 100 systems per annum and cumulative installations of about 2,000⁹.

2.2 Biogas in Kenya

Despite this potent demand, development of a vibrant biogas market has been elusive. The operational status of existing biogas plants is believed to be average to poor, even though

⁹ Kenya Biogas Study: No national census of biogas plants existed at the time of the study, but 1,500 to 2,000 is believed to be the number of working systems – whether optimally or rudimentarily

data on the same is incomplete.¹⁰ Research¹¹ shows that 30% of biogas systems may not be in working condition, the notable causes being poor design and construction, low end-user awareness on system management, lack of standards to govern the sector, poor water supplies and poor development of the dairy industry. National and international organizations (both Government and NGO), as well as the private sector, have promoted, trained technicians, and given technical support to the biogas industry over the last 50 years though in a fragmented approach. Most biogas plants installed currently are on cash basis, even though some are supported by grants and/or financing by donors.

A survey on biogas carried out in 1997 by MoE and results from the KBFS (2007) both identify several challenges facing the promotion and uptake of biogas technology in Kenya:

- 2.2.1 *High costs of installing the systems:* Attributed mainly to high cost of labour and materials, dispersed settlements and undeveloped rural transport infrastructure.
- 2.2.2 *Systems failures:* Caused by poor construction; in some cases, unproven technology has been used for example the tabular design.
- 2.2.3 *Inadequate or lack of post installation support;* Most commercial Biogas Contractors do not allocate adequate time to train end-users.
- 2.2.4 *Poor management and maintenance:* Many competing uses for rural farm labour; households are content to get 'acceptable' and not 'optimal' levels of production; lack of 'ownership' and unmet expectations from donated plants led to slack system management.
- 2.2.5 *Inadequate or lack of technology awareness:* Many potential users of the technology are not aware of the technology; many have not even seen it, or those who have are ignorant about how it operates/works and its benefits and personal relevance to them.
- 2.2.6 *Scarce and fragmented promotional activity:* Local Biogas Contractors have low financial capacity to finance promotion, marketing and extension work.
- 2.2.7 *Standards:* No quality control; poor appliances used, gas leakage common. Scarcity of good building materials and appliances – hence technological barriers and high cost of training.
- 2.2.8 *Constrained growth of the sector:* General lack of capacity to install high volumes of biogas plants, coupled with lack of finance for end users.

3 Programme rationale and principles

3.1 Relevance of KENDBIP in Kenya

"Kenya Vision 2030; A Globally Competitive and Prosperous Kenya" is Kenya's current development blue print. Launched in October 2007 by the GoK, as a vehicle for accelerating transformation of the country into a rapidly industrializing middle-income nation by the year 2030, the strategy is anchored on three main pillars namely; economic, social and political, under which flagship projects and other priority programmes will be implemented. The first phase of Kenya Vision 2030 is elaborated in the "First Medium Term Plan" (MTP, 2008-2012), which identifies the key policy actions and reforms as well as programmes and projects that the Grand Coalition Government intends to implement in the period 2008-2012. It includes critical elements addressed by KENDBIP, such as enhanced equity and wealth creation opportunities for the poor; energy; science, technology and innovation (STI); and human resource development. Furthermore, agriculture and livestock are among six priority sectors in Vision 2030, which specifically states (quote): "Several approaches will be implemented to

¹⁰ The Ministry of Livestock Development has undertaken recent censuses in certain parts of the Country.

¹¹ Kamfor Report, 2002

improve livestock productivity...a nationwide livestock census will be undertaken.” The blueprint envisages that, “As incomes increase and urbanization intensifies, household demand for energy will also rise.”

Kenya’s biggest health battles are with HIV/AIDS, malaria and respiratory infection. Statistically, malaria is the biggest killer (estimated to cause 20% of all deaths in children under five (MOH 2006)¹²). Respiratory infections account for 26% of reported deaths, making it the second highest cause of mortality. There is very low awareness of the link between Acute Respiratory Infections and indoor air pollution. Health impacts of Indoor Air Pollution (IAP) include: Acute respiratory infections, eye problems and severe headaches. IAP also exacerbates the condition of HIV/AIDS patients as it accelerates immunity breakdown. According to Vision 2030, “In rural areas, the quality of air is affected mostly by over-reliance on wood fuel, agricultural activities and poor housing. The poor quality of air is responsible for most cases of acute respiratory infections and accounts for 18.4 per cent of infant mortality.”

In line with MoE’s mandate of energy policy formulation and implementation, MoE has prepared a new strategic plan aligned to Vision and priorities to the Kenya Vision 2030.

3.2 Technical and economic potential of domestic biogas in Kenya

When the KBFS was undertaken, in 2007, there were 71¹³ administrative districts in Kenya, which have further been subdivided into 254 districts; the study concluded that biogas technology was technically feasible in at least 35 of these original 71 districts. According to the MoE, the technical potential for biogas is highest in the high population density areas where zero grazing is practiced.

3.3 Justification for KENDBIP and its strategy

Justification for undertaking a biogas programme is based on the need to intervene and influence positively the two key factors that drive the decision-making process for choice of biogas as a fuel of choice at the household level. These are: (i) Non-economic considerations – social, health, environment and (ii) Economic considerations – cost savings and revenue generation. While making the case for biogas benefits to support these considerations, it is important to note that the extent to which a potential owner of a biogas plant is attracted by the overall proposition depends on (i) Perception of the benefits and (ii) Realism or ability of the benefits to be converted into tangible value addition to the user’s social and economic sphere (iii) Ease of participation – how achievable the threshold or entry point is.

3.3.1 Non-economic considerations include: Social – time for leisure, comfort, convenience and impact on social standing (status); health – incidence of diseases associated with indoor air pollution and impact on longevity; and Environmental – climate and impact on livelihoods.

3.3.2 Economic considerations include: Cost savings – fuel substitution, reduced fertiliser purchases and reduced purchase of foodstuffs; revenue generation – sale of foodstuffs and carbon credits.

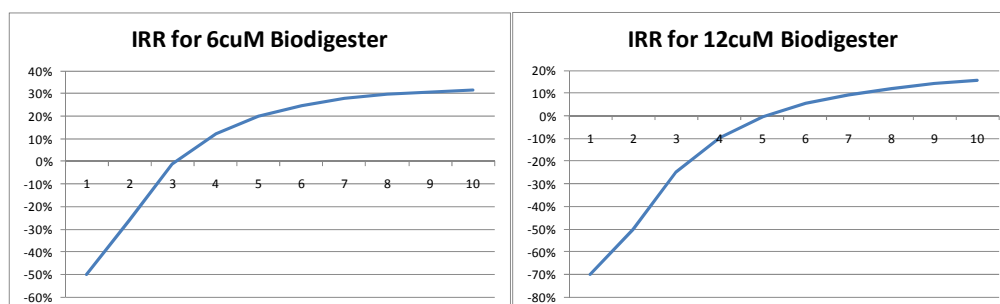
3.4 Product Rationale

3.4.1 KENDBIP proposes to promote (i) KENBIM Model, a fixed dome biodigester design and (ii) On average, the 6M³ to 12M³ biogas plant size. The smaller biodigester size rationale is comprehensively analysed in the feasibility study (KBFS) which noted that “when analysing the investment cost, and calculating the expected fuel savings, it can be found that with the 16M³ reactors, the internal rate of return is marginal: only in year 7 will the net cash flows become positive.” This can be compared to the analysis below for smaller biogas plants which show that returns become positive in year 3 for a 6M³ biogas plant and in year 5 for a 12M³ biogas plant, as displayed below.

¹² <http://www.nmcp.or.ke>; Ministry of Health, Division of Malaria Control.

¹³ KBFS, 2007

Figure 1: IRR Graphs for different biodigesters



- 3.4.2 In addition, the payback analysis below demonstrates that: (i) smaller biodigester sizes give a better return on investment (ii) the payback period is greatly improved by lower plant costs (see table below) (iii) Economic benefits, including use of bio-slurry have a big impact on the payback period.

Table 2: Payback computations for different biodigesters (costs and revenues in EUROS)

Payback period for biodigesters in years				
	6	8	10	12
Total Cost	740	890	1030	1200
Maintenance Costs	260	260	260	260
Financial Revenues and Cost Savings	254	254	254	254
Economic Revenues and Cost Savings	178	178	178	178
Total Cost Savings	432	432	432	432
Financial Payback	2.91	3.50	4.05	4.72
Economic Payback	4.16	5.00	5.78	6.74
Total Payback in Years	1.71	2.06	2.38	2.78

3.5 Programme principles

- 3.5.1 Value for money: a system of household economic and technical analysis; energy audit.
- 3.5.2 Appropriate sizing: a system for sizing of biogas systems will be established.
- 3.5.3 Quality installations and after sales support: Criteria for admission of technologies; mandatory after sales service, warranties and guarantees; code of ethics and standards.
- 3.5.4 Investment and financial facilitation: Facilitating three forms of financing — subsidy, credit and carbon finance.
- 3.5.5 Added value: extension and utilisation of bio-slurry.

4 Programme Features and Outcomes

4.1 Goal and objectives

- 4.1.1 Goal: To establish a sustainable and commercial domestic biogas sector in Kenya.
- 4.1.2 Overall objective: To contribute to the achievement of the MDGs through the development of a commercially viable, market-oriented biogas sector and dissemination of 8,000 domestic biogas plants in rural areas in Kenya over a period of 4½ years.
- 4.1.3 Specific objectives
- i. To increase the number of good quality and operational household biogas plants by approximately 8,000 new units in a period of 4½ years.

- ii. To strengthen institutions enabling sustainable development of the biogas sector.
- iii. To ensure the continued operation of all biogas plants installed under the programme.
- iv. To optimize benefits that are currently under-developed in the Kenya biogas sector, specifically related to:
 - Gender aspects, women economic and children's educational status
 - Improved health from nutrition and reduced indoor air pollution
 - Environmental protection through reduced deforestation and environmental degradation
 - Employment creation, especially in the rural areas
 - Improved food security due to agricultural application of bio-slurry
 - Tapping of carbon finance.

4.2 Duration, technology and target market

- 4.2.1 Duration of programme: 4½ years; July 2009 to December 2013
- 4.2.2 Plant design: "KENBIM", a fixed dome design.
- 4.2.3 Programme phases: (i) Preparatory phase — 6 months; July 2009 to December 2009 (ii) Roll-out phase — 4 years; January 2010 to December 2013.
- 4.2.4 Programme areas: National; phased progression adopted, managed through KENDBIP Focal Points (KENFAP Regional Offices); KENDBIP Office (Biogas Office) located at KENFAP HQ in Nairobi. Programme kick off focal points: KENFAP Offices in Nakuru and Kiambu.
- 4.2.5 Target market: Rural households; livestock farmers; at least two cows under zero grazing.
- 4.2.6 Target number of plants and size: 8,000 domestic size biogas plants; size focus: 6m³ to 12m³; larger sizes of up to 16m³ may be undertaken but no emphasis on these larger sizes.

4.3 Programme impact and benefits

4.3.1 Expected programme impact

Significant improvement in the quality of life of the families concerned; about 50,000 persons as direct beneficiaries as users, in addition to other direct and indirect beneficiaries in extension, promotion, credit, microfinance, etc., and in biogas-related enterprise in appliances and parts.

4.3.2 Quantifiable programme benefits¹⁴ and contribution are linked to achievement of MDGs.

4.3.2.1 Environment and energy access (See PM Part IV – Document I: Quantifiable benefits of KENDBIP); MDG 1 and 7

- Reduce deforestation and desertification
- Control GHG emission from livestock and organic waste disposal
- Recycle nutrients and restore soil fertility
- Promote environmental awareness and link it with economic advantages

Outcomes:

- CO₂ equivalent emissions avoided 73,623 tonnes¹⁵
- Savings on fuelwood — 37,388 tones, valued at KES 194.4m¹⁶ (approx. EUR 1.9m).
- Savings on charcoal — 13,460 tonnes, valued at KES 250.3m¹⁷ (approx. EUR 2.4m).

¹⁴ Assuming a 3% drop-off or non-use rate in installed biogas plants

¹⁵ Under optimal construction and utilization, domestic biogas plants reduce GHG emissions by approximately 4 tonnes of CO₂ equivalent per annum

¹⁶ Price of fuelwood in Kenya as at 31 July 2009 = KES 800-1200 per ton depending on availability.

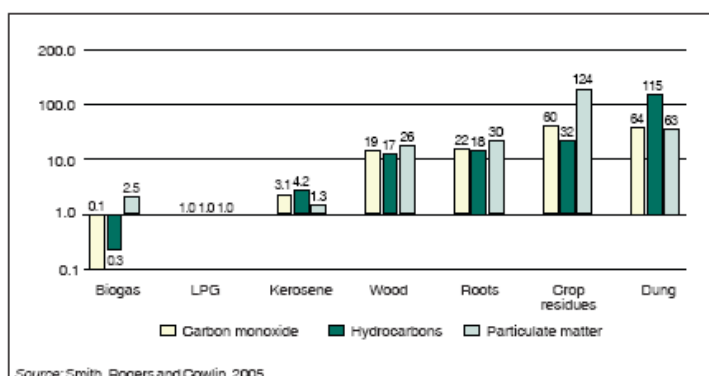
¹⁷ Price of charcoal in Kenya as at 31 July 2009 = KES 18, 600 per ton.

4.3.2.2 Health; MDG 4, 5 and 6

- Biogas stoves substitute conventional cook stoves and energy sources, virtually eliminating IAP and, hence, the related health risks (e.g. respiratory diseases, eye ailments, burning accidents in particular of women).

Figure 2: Emissions per meal by cooking relative to LPG

The energy ladder: pollutant emissions per meal by cooking fuel, relative to LPG (1.0 on the scale; measured in India)¹⁸



- Improve access to sanitation, hygiene education and reduce related illnesses
- Reduce accidents from open fire
- Reduce parasitic infections, diarrhoea and other water and vector borne diseases

Outcomes:

- Significant improvement of the health of over 15,000 men and women and 38,300 children

4.3.2.3 Agriculture; MDG 1

- Enhance integration of agriculture and animal husbandry for improvement of agricultural resources
- Enhance food security by improving agricultural yields through application of biogas slurry

Outcomes:

- Savings on plant nutrients (NPK) by about 60 per cent
- Increased organic matter in the soil – better fertility and food output by about 10 – 30 per cent.

4.3.2.4 Socio-economic; MDG 1, 2 and 3

- Reduces the burden collecting firewood on women and facilitates the alternative allocation of precious time of, in particular, the female members of the household.
- Empower women by offering opportunities in the development of the KENDBIP as operators of biogas burners, lamps and refrigerators
- Create employment in the biogas construction sector

Outcomes:

- Time — approximately 15 to 18 million¹⁹ hours per annum (equivalent up to 2,000 person-years) saved for women and children fetching firewood and other biomass sources for cooking and heating
- Effort saved in cooking, warming food and water and cleaning cooking pots for about

¹⁸ <http://www.fao.org>

¹⁹ Kenyan women and children spend approximately 4-5 hours per day searching for traditional fuels.

7,700 households (assuming a biogas plant non-use rate of 3% out of 8,000), representing over 15,000 men and women and about 38,800 children²⁰

- Study time for children — approx. 23,280²¹ children served with better reading light
- Employment of 366 youthful Kenyans as biogas Masons and 49 as field supervisors, in addition to other direct and indirect employment in extension, promotion, credit, microfinance, etc., and employment through biogas-related enterprise in appliances and parts.
- Creation of, or support to, over 100 biogas-related enterprises, mainly in the rural areas

4.3.2.5 Intrinsic non-monetary and non-tangible benefits; MDG 8

- Market development in a competitive atmosphere
- Establishment and promotion of a level biogas sector playing field
- Social benefits — e.g. improved quality of life, self esteem, status

4.4 Partner organizations

4.4.1 Category 1: Kenya Government

- i. Core ministries: Ministry of Energy, Ministry of Livestock Development, Ministry of Finance, Ministry of Industry; Ministry of Cooperatives Development and Marketing; Ministry of Agriculture.
- ii. Enforcement and regulatory agencies — e.g. Kenya Bureau of Standards.

4.4.2 Category 2: Private Sector

- i. Biogas Contractors
- ii. Financial institutions — Saccos, micro-finance companies and commercial banks
- iii. Consultants in Energy, Livestock, Agriculture
- iv. Farmer Associations and Relevant Groups

4.4.3 Category 3: Research and Educational Institutes

- i. Universities and Colleges
- ii. Livestock Research Bodies
- iii. Agricultural Research Bodies
- iv. Industrial Research Institutes, e.g. Kenya Industrial Research & Development Institute (KIRDI)

4.4.4 Category 4: Non-governmental Organisations

- i. Relevant NGOs, especially those with grassroots presence.

4.5 Budgets, funding and subsidy

4.5.1 Programme budget: EURO 10.443 million (see detailed computations in Work Package No. 9: Financial Facilitation and Subsidy Application)

- i. EURO 3.456 million for programme implementation costs
- ii. EURO 6.987 million for capital investment

4.5.2 Sources of funding: EURO 10.443 million (see detailed computations in Work Package No. 9: Financial Facilitation and Subsidy Application)

- i. EURO 3.498 million: via cash support by Hivos for:
 - a. EURO 2.014 million: programme activities
 - b. EURO 1.484 million: subsidy component
- ii. EURO 1.441 million: via technical assistance by SNV

²⁰ Average family size in Kenya is 5- National Health Study.

²¹ An average rural family in Kenya has 60% of children of school-going age.

- iii. EURO 0.455 million: subsidy component via cash support by Kenya Government
 - iv. EURO 5.049 million: capital contribution from end users
- 4.5.3 Nature and value of investment subsidy (see subsidy rationale in the PM Part I - Programme guidelines: Guide I – KENDBIP Subsidy Criteria and Management Guidelines)
- o Subsidy calculated using cost, benefit and returns rationale and fixed at KES 25,000 (equivalent to EUR 240 @ KES 105 programme exchange rate for EUR/KES)
 - o Subsidy used to buy down the cost of each fully installed and commissioned biogas plant – based on turn-key (order, supply, install, commission) installations
 - o Subsidy designed to have higher impact on smaller systems; pro-poor principle
 - o Where relevant, use of financial institutions as subsidy channelling agents.

The subsidy is critical in order to achieve the right balance between cost of biogas plants and forecasted demand. The success of the subsidy strategy will rely largely on how the subsidy message is communicated to potential users. The objective of the flat rate subsidy is to ensure that users of smaller biogas plants get a proportionately higher subsidy-cost ratio that users of larger digesters.

PART II — ORGANISATIONAL AND PARTNERSHIP PLAN

5 KENDBIP Partners

- 5.1 ABPP Public-Private-Partnership²² - DGIS, HIVOS, SNV
- 5.1.1 **The Dutch Ministry of Foreign Affairs** promotes the external relations and interests of the Kingdom of Netherlands (“The Netherlands”). It has eight goals, including: to increase wealth worldwide and fight poverty; to promote human and social development; and to protect and improve the environment. To achieve its objectives, the Ministry is structured into five directorates general, among them The Directorate-General for International Cooperation (DGIS). Since 1992 DGIS has been engaged in funding the SNV biogas programme in Nepal, Southeast Asian and Rwanda, thus facilitating the start of the ‘multi-stakeholders sector development approach’. Recognising that large and multi-sectoral initiatives, such as the ABPP, are difficult to be implemented by just one actor, DGIS Environment and Water Department (DGIS/DMW) in 2008 partnered with Hivos and SNV to implement the Africa domestic biogas initiative.
- 5.1.2 **Hivos** is a Dutch non-governmental not-for-profit development organization inspired by humanist values. Hivos started an access to energy programme in developing countries in 2005. In Kenya, Hivos will make available funds necessary for implementation of the approved Annual Operational Plans and Budgets. It will also avail its partner network and resource mobilization capacity to secure additional funding for the programme, as well as facilitate the design and development of systems and processes for accessing carbon financing.
- 5.1.3 **SNV** has gained global recognition in the set-up and implementation of national domestic biogas programmes in a number of countries in Asia and more recently in Africa. SNV has been selected as the provider of Technical Assistance to the ABPP. SNV will contribute to capacity development processes within the national domestic biogas programmes, supporting a programme approach based on national ownership. SNV will provide technical assistance/capacity building and advisory services as agreed in separate Activity Agreements (AAs) between SNV and KENFAP according to the format developed by SNV for this purpose.

²² Includes direct excerpts from PPP Proposal for ABPP (DGIS, Hivos and SNV), August 2008, Final Version.

SNV costs will be covered by its core budget for Kenya. Potential SNV support activities are:

- i. Advisory services primarily to KENFAP, The Biogas Office, the provincial and district based operating partners, and other relevant sector stakeholders.
- ii. Support the development of The Biogas Office.
- iii. Special training and experience sharing.
- iv. Special training of KENFAP senior management and the executive council.
- v. Special training and assistance in making annual plans and budgeting.
- vi. Specific advice on relevant market research and surveys.
- vii. Specific advice on development of programme tools.

Table 3: Planned SNV Technical Assistance – person days, full time equivalent

Full-time person day equivalent resources to be availed							
Category of TA	2009	2010	2011	2012	2013	Total	Rate
EU STA	55	163	163	163	163	707	900
EU MTA	10	60	80	80	80	310	840
						-	
HCN STA	163	163	163	163	163	815	235
HCN MTA		123	163	163	163	612	170
Total in Euros	228	509	569	569	569	2,444	2,145

Table 4: Planned SNV Technical Assistance – value in EUROS

Value of SNV ITA to be availed						
Category of TA	2009	2010	2011	2012	2013	EUR
EU STA	49,500	146,700	146,700	146,700	146,700	636,300
EU MTA	8,400	50,400	67,200	67,200	67,200	260,400
	-	-	-	-	-	-
HCN STA	38,305	38,305	38,305	38,305	38,305	191,525
HCN MTA	-	20,910	27,710	27,710	27,710	104,040
Total in Euros	96,205	256,315	279,915	279,915	279,915	1,192,265

5.2 Local Partners – MoE, KENBIC, KENFAP

5.2.1 **The Ministry of Energy (MoE)** was formed in 1979 upon Kenya Government’s realization that energy was a major component in the country’s development process. The Vision of the Ministry is: “To have affordable quality energy for all Kenyans” and its mission is: “To facilitate provision of clean, sustainable, affordable, reliable and secure energy services at least cost while protecting the environment.” Its main goal is “To facilitate availability of sufficient, secure, efficient and affordable clean energy by 2030”, with its core values being professional integrity and excellence; commitment to work; commitment to customer service; efficiency, transparency and accountability; zero tolerance to corruption; and a non-partisan stand. In addition to energy sector development, MoE also has an oversight role over energy sector parastatals and statutory bodies. The Ministry has a core team of about 280 staff; about 81 of them based in 12 Energy Centres in Busia, Kisii, Kakamega, Kericho, Uasin Gishu, Jamhuri, Wambugu, Kitui, Mtwapa and Migori.²³

The MoE is the host and Chair of KENBIC, hence taking a key role in facilitating and steering the process of establishing KENDBIP.

5.2.2 **The Kenya National Biogas Committee (KENBIC)** was formed on 23rd May 2007, originally as “The Kenya National Biogas Task Force” comprising a multi-stakeholder group that has been keen to see the fruition of a biogas programme in Kenya. Its evolution is detailed in the PM Part IV - Supporting information: Document III – Evolution of KENBIC.

23 Ministry of Energy Strategic Plan 2009

5.2.3 **KENFAP** was in May 2009 competitively selected by KENBIC as the National Implementing Agency. An expression of interest (EOI) was circulated through electronic mail to firms which were considered to meet the criteria, and further advertised in the local press. The interviews were attended also by Hivos and SNV.

KENFAP's history dates back to 1946 when the organization was known as the Kenya National Farmers Union (KNFU). Its vision is "Empowered Kenyan farmers with a strong voice" and its mission is "To empower its members to make informed choices for improved sustainable livelihoods". KENFAP objectives include: To promote unity, co-operation and dialogue among its members and between its members and other actors in the agricultural sector; To ensure timely intervention in the resolution of issues affecting the agricultural sector; To ensure effective representation of the farming community and expression of its views to government and the public at large; To encourage effective networking and collaboration with national and international associations that share the Federations objectives and aspirations; To Conduct and facilitate appropriate research into problems affecting agricultural production and marketing; To encourage collaboration between members of the farming community and any other legitimate entity whose actions are in the interest of the farming community.

KENFAP operates within a 5 year strategic planning cycle (current one being 2008-2012) with specific objectives, a monitoring system and result indicators. Among its strategic aims are: "To improve benefits from agricultural value chains by promoting objective engagement of women, youth and redressing environmental, HIV/AIDS, Gender and other cross cutting concerns; to improve benefits from agricultural value chains by promoting objective engagement of women, youth and redressing environmental, HIV/AIDS, Gender and other cross cutting concerns."

KENFAP's core values are: professionalism, accountability, integrity and efficiency. It has established a strong working relation with both national and international organizations and a self sustainability strategy elaborated via KENFAP Services Ltd, an economic activity coordination unit which engages in businesses aimed at generating income. For KENFAP's full profile see the PM Part IV – Supporting Information: Document V – KENFAP Profile.

KENFAP practices affirmative women representation with a policy requiring two thirds representation of women at all levels. In line with this policy, the organisation has established a Women Centre for Enterprise Development.

KENFAP will coordinate and facilitate the programme's implementation. Specific responsibilities of KENFAP during the term of KENDBIP implementation (2009 – 2013), KENFAP will be as follows:

- i. Global Contracting: Enter into a tripartite contract with Hivos and SNV.
- ii. Host and manage KENDBIP: Manage allocation of targets to Biogas Contractors, information and communication on the programme. Provide quality control, database maintenance, monitoring and evaluation. Budgetary and financial management. Prepare programme reports/documentation.
- iii. Enter into agreements with local partners: both collaboration and contractual relationships, including financial services, training services and slurry extension services. Provide general oversight on partners and Biogas Contractors. Defend the interests of KENDBIP in the participating institutions.
- iv. Subsidy administration: where practicable, outsource subsidy management to FIs dealing with biogas loan schemes for users and enterprises.
- v. Undertake specific supporting activities at the national level and local levels: develop all strategies and tools, in partnership with other parties where necessary.
- vi. Work hand-in-hand with the National Steering Committee: to establish an enabling

environment for KENDBIP through countrywide linkages and networks and to secure national funding for the implementation of the programme.

6 Organisational Framework and Core Partnerships

6.1 Overall institutional set-up

According to the feasibility study, 'Promoting Biogas Systems in Kenya', the present organization of the market involves promotion of technology done by government, NGOs and selected private companies selling directly to the end-users. There are several operating models simultaneously present. The market is still largely a market driven by projects and a few companies with their networks of technicians. Prices are high, volumes and market growth are low. The SWOT concludes that:

- The market can be characterized as immature, sales are not yet taking off.
- The market is served by a few pioneers, both NGOs and project supported private enterprises, with limited installation capacity.
- The market leader for household systems is installing about 30 systems a year. With the exception of the tubular systems, total installations per year are around hundred systems.
- There is an increasing awareness of the biogas product with farmers.
- The financial return is not that convincing on the short term (<3-5 years) that farmers invest for financial reasons in biogas digesters. Comfort, social standing, and cleaner practices for cooking are triggers at household level.

In order to create a vibrant commercial market, KENDBIP's institutional set-up will be divided into the following major player categories operating at three levels – national, regional and local.

- i. The National Government and its agencies: GoK / MoE, MoF, MoLFD, MoA, KEBS, KIRDI, etc.
- ii. The oversight, strategy and policy body: National Steering Committee.
- iii. The Implementing Agency: KENFAP, contracted by Hivos and SNV to implement the project.
- iv. Implementing Partners: Leverage Partners (complementary NGOs, Financial Institutions, etc.); Contract Partners (Suppliers of Goods and Services)
- v. Users: Households.

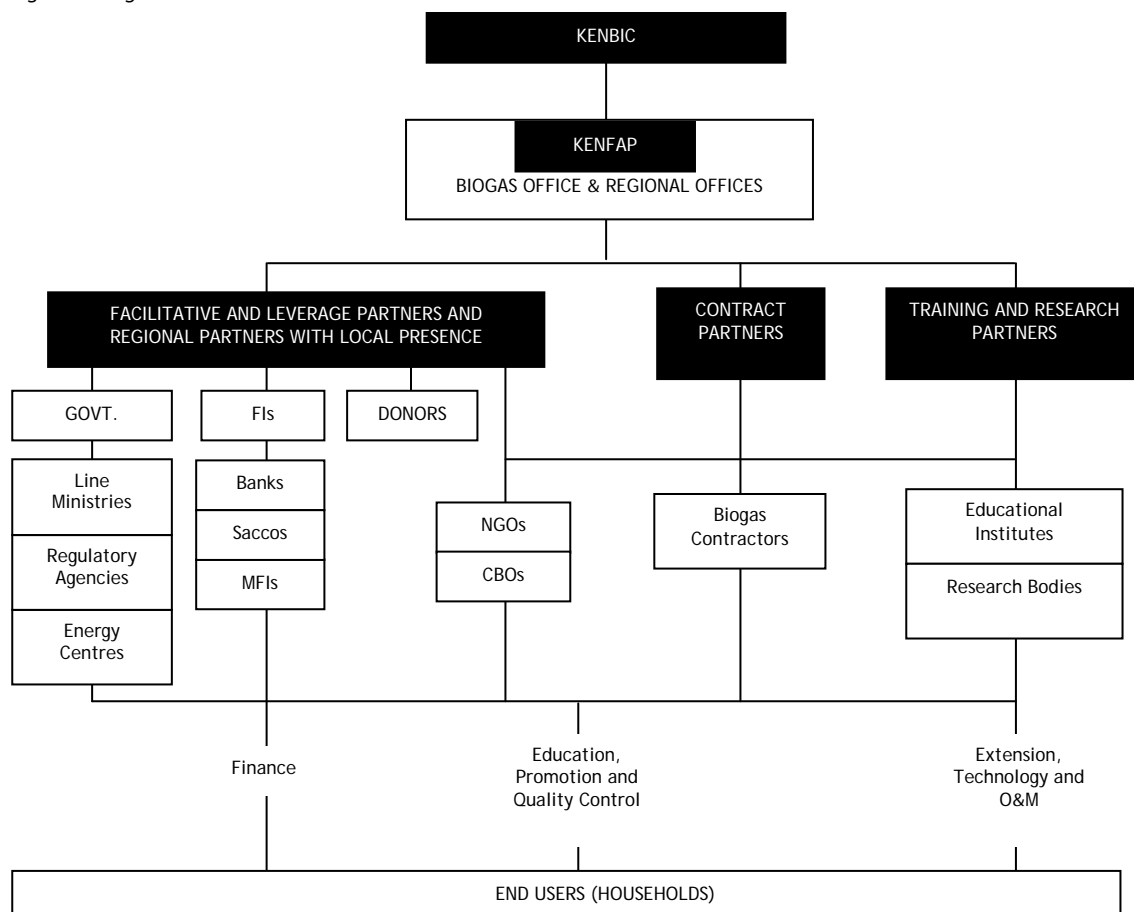
The eventual market structure is expected to be well integrated, private sector driven, with a critical mass of quality installations, a large number of technical and financial service providers, a high level of awareness among potential end users and strong cross linkages between the actors at various levels and in various disciplines.

6.2 Partnership as the delivery backbone

- 6.2.1 As shown in the figure below, KENFAP will upon commencement of its mandate as NIA, seek to engage strategic partners both at national and regional levels. Sector development implies the close collaboration of all relevant stakeholders – Government, Non-Government and private sector, at all levels: micro, meso and macro. In this process, KENFAP is not just a player amongst others, but acts as the "sector leader" tasked with the stimulation of commercial interaction between the biogas households (potential customers), Biogas Construction Enterprises (BCEs) and Biogas service providers. This will be achieved through capacity building, coordinating, facilitating and monitoring sector functions and supporting the technical, financial and institutional architecture necessary for development of the domestic biogas sector in Kenya. There are several other ongoing biogas initiatives in Kenya, and KENDBIP, based on its scale – by far the largest effort in domestic biogas so far – will act as the sector leader and work to collaborate with other initiatives.

KENFAP will partner specifically with those organisations that have been involved in the dairy and livestock sectors, and have a value-adding network or infrastructure in the field. Priority will be given to those organisations that can prove direct and influencing access to rural farmers with the potential to install biogas systems. Terms and conditions, and a selection criteria will apply – as detailed in the PM Part I – Programme Guidelines: Guide IV – Selection process for NGO’s, CBO’s, women groups etc.

Figure 3: Organisational Framework



6.2.2 Strategic Partners – NGOs, CBOs, and Private Companies

Examples of potential partners

Table 5: Examples of potential partners

Non-profit		Private Companies	
NGOs, CBOs	Projects	Diary Companies	Consultants
Heifer Int.	GTZ/PSDA	Brookside	Camco
TechnoServe	SDCP	Spin-it	IT Power
ABC-K		KCC	

KENFAP in its capacity as the NIA will competitively recruit project partners as defined more specifically in the Technical Strategy (Section 9; under Work Package no. 1, Task no. 1.2.3). It is envisaged, also, that the Association of Biogas Contractors of Kenya (ABC-K) will be a key strategic partner in KENDBIP and Biogas Contractors will be encouraged to join the association. ABC-K was registered on 21st September, 2007 by a group of 12 founding biogas

contracting firms. The Association currently has 24 registered members with over 50 trained masons and technicians in biogas technology. ABC-K has received significant support from GTZ through the Private Sector Development in Agriculture (PSDA) Project. PSDA has assisted ABC-K to hold various trainings as well as to launch their Strategic Plan for 2008-2012 on 25th March 2009. It's slogan is "ABC-K: Pace Setting the Biogas Industry."

ABC-K is governed by an elected executive committee, with the Secretary-General as its representative in KENBIC. ABC-K's role in the framework of KENDBIP includes:

- i. Representation of the interests of BCEs regarding policy development, regulatory and legal issues at national and regional levels.
- ii. Encouraging quality installations: achieving high standards of service delivery by assisting its members to mainstream the KENDBIP Code of Ethics.
- iii. Establishment of industry standards, in conjunction with MoE, Kenya Bureau of Standards, KENBIC and KENFAP.
- iv. Enhancing fair play and a level playing field: promote appropriate pricing in the biogas sector and promote competition.
- v. Preparation of suitable market development and promotion tools. These include functional guides (e.g. User Guides), promotion and marketing materials, as will be directed by KENFAP.

6.2.3 Strategic Partners – Public Bodies

Close collaboration with Government agencies will be crucial if the programme is to be a success. These bodies could potentially include: Line Ministries – Energy, Livestock, Agriculture, Finance, Cooperative Development; KEBS; Kenya Industrial Research and Development Institute (KIRDI); Educational and Research Institutes (e.g. potential partners: JKUAT, Egerton University, Kenyatta University).

6.2.4 Strategic Partners – Financial Institutions

They will potentially provide loan capital, stimulate demand, enhance quality control and contribute to the data base and data analysis.

6.3 Potential roles of partners and collaborators

- i. DGIS / Other Donors — Fund the programme
- ii. ABPP Partners, Hivos and SNV — Finance the programme activities; advisory services; donor networking; over-arching programme promotion and support; mobilise leveraging/financial support for the programme by others.
- iii. MoE — Coordination at Government level ; appoint National Steering Committee; official launch of the programme; provide enabling policy environment; ensure the programme is in line with National objectives and priorities; popularize the RE concept at national and international level; create awareness and build capacity through the Energy Centres; chair the National Steering Committee; provide leverage (financial and in-kind) to the programme; mobilise leveraging/financial support for the programme by others; provide national data and information; facilitate biogas plant demonstrations and use its Energy Centres to collect and collate basic and technical information on biogas.
- iv. The National Steering Committee will facilitate a favourable programme environment and ensure proper accountability of the programme towards its target group.

The National Steering Committee will comprise 5 to 7 institutions with national coverage, including representatives of contractors and (demand side) end users. Members may include government bodies, financial sector associations, private sector

players, educational and research institutions. Representation of contractors will have non voting rights, to avoid conflict of interest.

In addition to the above membership, SNV, Hivos and KENFAP will also be members of the National Steering Committee, also with non voting rights.

The National Steering Committee will be Chaired by MoE, with KENFAP as the Secretariat. Its role in KENDBIP will be similar to those in other countries running NDB Programmes, which are as follows²⁴:

- a) Overall: Programme policy guidance;
 - b) Standards: Provide advise and facilitate actions that ensure generally accepted standards for project management and administration;
 - c) Linkages: Assist the programme in establishing linkages of benefit to the programme, mobilise funds and facilitate a favourable programme environment;
 - d) Oversight and monitoring: Endorse the programme's strategy, review activities and outputs and approve the Annual Plans and Budgets.
- v. Other Government Ministries (MoA, MoLD, Ministry of Cooperatives and Marketing, MoF) and other agencies — Fiscal incentives; collaboration; Government subsidy provision; extension: Bio-slurry extension and sensitization; biogas-related extension services, especially on zero grazing; promotion of biogas (e.g. by the home economics unit, sensitisation of potential biogas customers through inclusion of KENDBIP in normal exhibitions, fairs, field days and barazas/village-level / local meetings, etc.); topical coverage in the Ministries' specific publications; setting up demo biogas plants in Agricultural and livestock Training Centres across the country; linkage of the biogas programme with ongoing programmes with the same target customer (e.g. the Smallholder Dairy Commercialization Programme).
 - vi. Private sector providers of goods and services — Construction of biogas plants; supply of construction materials, biogas appliances and accessories supply; bio-slurry extension / utilisation activities; aftersales service and maintenance; quality control services; promotion and marketing; programme development and new concepts; research, education and training; technical, management and financial advise.
 - vii. Research and Educational Institutions — Conduct R&D on biogas appliances and related accessories and results dissemination (RDD); advice on type and quality of materials required for biogas appliances and related accessories; fine-tune KENBIM designs and optimise performance; develop and disseminate necessary appliances; training: recommend and compile training curriculum, train Biogas Masons and trainers, support researchers to access the necessary biogas materials and literature, avail class rooms, fields for practicals and construction of models; promotion and marketing: set up demo biogas plants for farmers who frequent the institutes for dairy farming advice; bio-slurry extension / utilisation: undertake bio-slurry experiments, provide bio-slurry education tools.
 - viii. Financial services providers — Mainstream biogas loan products: provide loans to enterprises, provide loans to individuals; promote and market biogas as a loan product: maintain borrower database, use own customer database to create awareness; where necessary/beneficial to KENDBIP, assist in subsidy administration.
 - ix. NGOs, CBOs and other support organisations and service providers — Awareness creation: one to one discussions with end-users, offer structured and semi-structured interviews; mobilization and marketing: conduct awareness creation meetings and workshops; bio-slurry extension / utilisation services; conduct rapid regional appraisals

²⁴ Further details, on procedures and responsibilities of the Committee are provided in the *Terms of Reference for the National Biogas Steering Committee*, provided in the PM Part III.

- to build a profile of the target groups and spur interest to the communities; conduct training to the technicians and end-users; guide commercial bio-slurry utilisation.
- x. Potential biogas consumers (households) — Investment in biogas plant installations; operation and maintenance of biogas plants.

PART III — IMPLEMENTATION METHODOLOGY AND PLAN

7 Components of the Delivery Model

7.1 Programme phases

KENDBIP will be implemented through a spirit of partnerships, in two phases, with activities categorised into 9 technical and financial work packages.

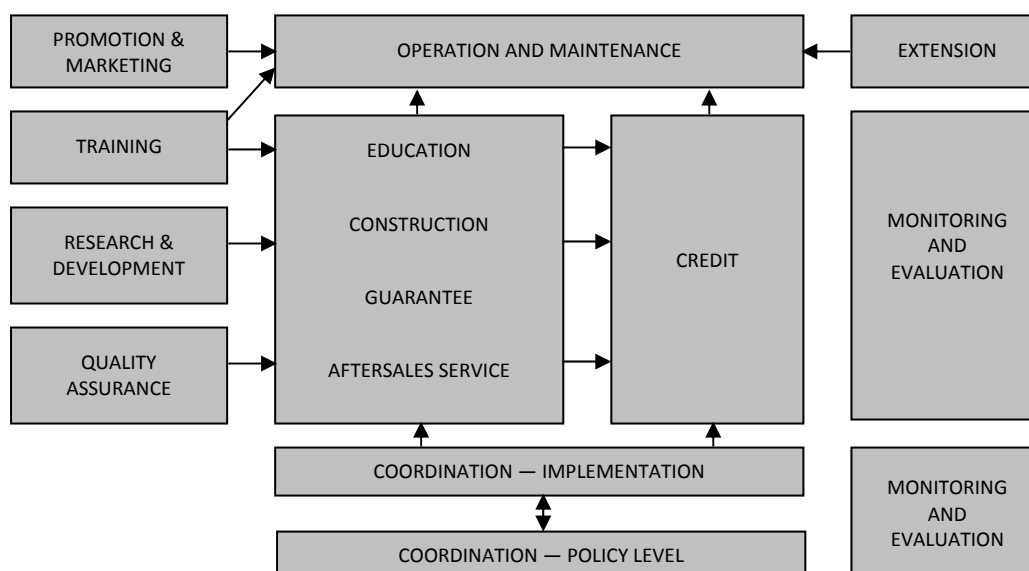
- a. Phase I – Inception, during which programme launch and preparatory activities will be undertaken. Partnership with households and institutions that will act as demo sites is emphasised.
- b. Phase II – Roll-out, when fully fledged biodigester installation activities and all related support components on both the supply and demand sides will be undertaken. Partnership with regional organisations with local presence is emphasised.

These Phases are elaborated by the Work Packages in section 9: KENDBIP Technical and Financial Work Packages. From a thematic perspective, KENDBIP will prioritise environmental protection, gender considerations and improvement of livelihoods.

7.2 Domestic Biogas Model

In general, based on SNV successful experience elsewhere, the most critical functions of a national domestic biogas programme, which KENDBIP will adopt, are as detailed below. The various delivery components will be contracted on a competitive basis with the exception to functions for which KENFAP has inherent infrastructure and comparative advantage.

Figure 4: Functional Components of Domestic Biogas Delivery Model



8 Technical Strategy

8.1 Logistical Setup

8.1.1 KENDBIP will adopt a multi-faceted and multi-stakeholder approach to ensure that only high quality biogas systems are installed and that sustainability of the market is achieved through a strong spirit of partnership with rural-based organizations, and application of a commercial market process. The strategy is informed by past barriers and challenges associated with dissemination of biogas plants, both in Kenya and elsewhere. The technical features to cushion the programme include biogas plant structural durability, reliability, robustness, affordability, size, ease of use, safety, after sales maintenance and service, performance and technical guarantee arrangements.

8.1.2 The programme has considered various risks, constraints and barriers to biogas dissemination and uptake. The key barriers revolve around financial, technical, institutional and O&M issues.

Table 6: Summary of barriers and challenges and KENDBIP measures

Market Barrier	Structural Instrument to Overcome Barrier
1. Limited Technical Skills	The programme will enable: (i) deployment of technical skills on biogas production; (ii) introduction of appropriate technology.
2. Inadequate transaction experience in end-user lending for household biogas plants; Lack of credit facilities for domestic energy products	The programme will: (i) A study will be undertaken to develop a country scenario. On this basis the programme will: (ii) Solicit early involvement of rural NGOs, MFIs and Saccos in the programme. (iii) Build the capacity of local micro finance institutions in lending for biogas. The programme will partner with effective MFIs that do not necessarily need standard capacity building services, but specific training (technical appraisal of demands from HH and from BCEs) for lending for biogas. (iv) Mobilise seed capital to catalyse biogas lending programmes in these institutions.
3. Limited regional visibility of biogas technology and low uptake in the rural areas	The programme will enhance awareness of biogas as an alternative household source of energy. Regional partnerships will be used to enhance delivery of the programme components at regional level.
4. Limited technical information at the consumer/end-user level	The programme will disseminate technical information to end users through the participating MFIs.
5. Data – lack of reliable and up-to-date data on many aspects of the population and livestock makes projections difficult	Use of best estimate simulations; creating own baseline; good record-keeping.
6. Low numbers of Biogas Masons and Contractors	Training biogas Masons on biogas construction as a business.
7. Unproductive time – especially related to in-kind leverage by end-users	Promotion of turn-key installations; educating end-users on inflation and its impacts on costs
8. Matching training capacities to market	Training of a large pool of technicians; promoting adoption

Market Barrier	Structural Instrument to Overcome Barrier
demand	of biogas training in vocational and technical institutions.
9. Retaining trained personnel– especially in the wake of more competitive sources of Masonry income	Promotion of customer clusters and numbers, to create economies of scale and hence better returns for the Biogas Contractors and their technicians; linking technical training to technical institutions.
10. High installed biogas plant cost – caused by multiple variables, including infrastructure costs, labour costs, materials – especially cement	Increased research and development, especially on designs and materials; bulk purchasing enabled by clustering and high per order units; negotiating and controlling the Biogas Contractor price range; allowing in-kind end-user contribution; provision of a capital cost reduction subsidy.

8.2 The Kenya Biogas Model — KENBIM

8.2.1 The KBFS provides a history of biogas in Kenya and reviews of the three biogas technologies mostly in use: the floating drum, fixed dome, and the more recently introduced plastic tubular biogas plants.

8.2.2 In March 2009, a team of experts comprising representatives of KENBIC and ABC-K, assisted by SNV advisors, proposed to create a hybrid of the modified CARMATEC and AKUT biogas models, leading to the birth of the Kenya Biogas Model (KENBIM). The design incorporates the positive aspects of the modified CARMATEC and AKUT biogas models. Diagrams, scope of the selection ToR and key design considerations are contained in the PM Part IV – Document II: Selection of KENBIM.

8.2.3 In addition to the selection of the appropriate technology, biogas sector stakeholders formulated a basic framework for quality management and in particular a quality control process. They also recommended some general accreditation / certification modalities for the participation of private sector Contractors / manufacturers.

8.3 Sizing of the biogas plant

8.3.1 As highlighted in the KBFS, most of the biogas plants installed in Kenya in the past have been large sizes, the most common being the 16m³. Such a biogas plant produces over 3,000 litres of biogas each day, compared to the needs of an average family in Kenya (5 persons) at just over 2,000 litres per day. Therefore in general the normal biogas plant in Kenya is oversized.

8.3.2 In addition, such a plant, if fed optimally, requires about 8 to 9 cows, which is way beyond the number, on average, owned by one small scale rural farmer – therefore most of the plants are also underfed. The implications are overinvestment by the end user and in the case of subsidised plants, wastage of subsidy funds held in unutilised excess capacity and cost of the plants. Furthermore, most of the plants end up being inefficient and have low pressure. Where the plant is well fed, it only leads to increased workload for the user in terms of feeding dung and water – which only produces additional idle gas. It can therefore not be over-emphasised why proper sizing is of paramount consideration under KENDBIP.

8.3.3 The size of biogas plants installed under KENDBIP will depend on the household's energy demand, availability of the feedstock and the consumer's ability to pay. Biogas Contractors will do sizing before making a quotation for an installation. Sizing guidelines are provided in the PM Part I – Programme Guidelines: Guide XIV – Sizing Guidelines.

8.4 KENBIM cost structure

The actual cost of KENBIM will emerge as the related R&D process get completed and the demo biogas plants have been constructed. However, SNV has provided initial back-of-the-envelope computations based on experience and current market pricing of the modified Carmatec and AKUT models. The following are the estimated costs for different sizes: 6m³ — EUR 740, 8m³ — EUR 890, 10m³ — EUR 1,030, 12m³ — EUR 1,200. Detailed analysis of the costs are provided in Part VIII - Annexe 4: KENBIM Cost Structure.

9 KENDBIP Technical and Financial Work Packages

9.1 Work Package No. 1 — Inception and Launch

9.1.1 Task 1.1 – Establishment and operationalisation of the Biogas Office

Task 1.1.1 Contract with Hivos and SNV.

Task 1.1.2 Contract SNV – Phase I Activity Agreements.

Task 1.1.3 Budget, plan and allocate agreed administrative staff and facilities to KENDBIP.

Task 1.1.4 Annual Budgets and Plans for 2009 and 2010.

Task 1.1.5 Develop and apply detailed job descriptions (JDs) for each of the positions.

Task 1.1.6 Recruit programme staff through a competitive and transparent process.

Task 1.1.7 Develop/procure and implement a financial system and software.

Task 1.1.8 Undertake programme audits (starting in February 2010).

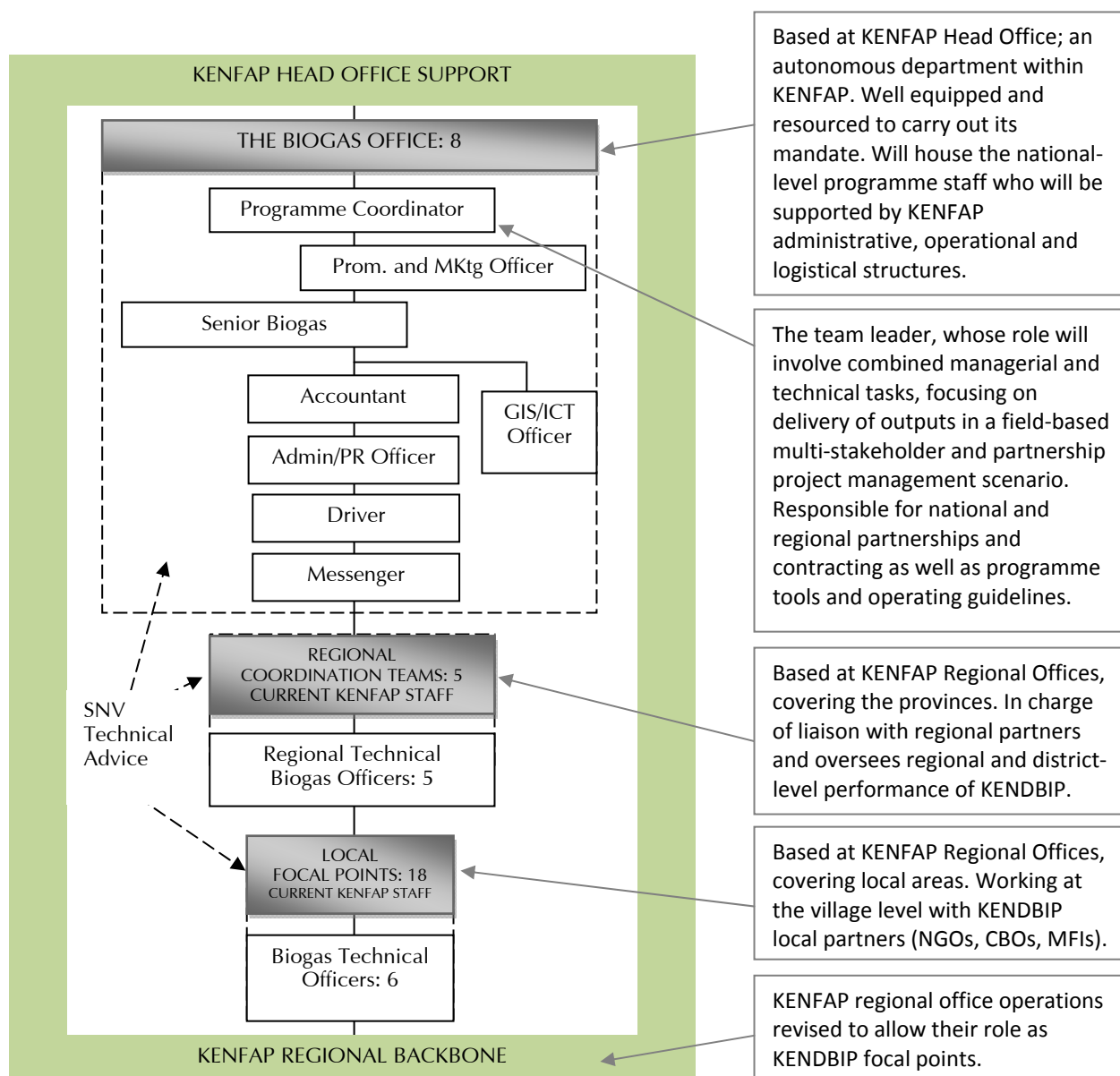
As shown in the programme organisational structure below, the Biogas Office will employ dedicated staff who will be backed by KENFAP management and regional staff. Local (district level) Biogas Officers will report to the Regional (provincial level) Biogas Officers, who will in turn report to the Senior Biogas Engineer based at Head Office. The Biogas Office financial management will be based on KENFAP's existing accounting functions and be subject to a annual audits.

KENFAP's gender policy will apply in filling the positions at the Biogas Office; at least 50% of the staff shall be women. In addition, at least one of the three senior officers – Programme Coordinator, Promotion and Marketing Officer and Senior Biogas Engineer – shall be a woman trained (expert) on gender. At the regional level, KENFAP shall endeavour to have at least 30% representation of women among all the direct programme staff. The programme will use sex-disaggregated data in all activities (in planning as well as measuring).

SNV will render technical support to KENDBIP personnel in execution of programme activities, focusing specifically on knowledge transfer, building local expertise and institutional capacity building. SNV will also assist KENFAP executive management in strategic planning and problem resolution. The level of effort by SNV will be agreed between KENFAP and SNV, guided by the TA budgets and Activity Agreements.

The National Steering Committee will form a technical sub-Committee, which will meet regularly with KENFAP to comprehensively make decisions on the programme.

Figure 5: Biogas Office Organogram



The positions shaded in grey represent KENFAP infrastructure and human resources, while the rest represent new dedicated programme staff. The Senior Biogas Engineer (SBE) will be responsible for all technical specifications and logistical delivery of all biogas plants. The SBE will also oversee all training, extension and bio-slurry application activities, and will supervise the technical activities at the regional and local levels. All Biogas Technical Officers in the focal points will report directly to the Regional Technical Biogas Officers, who will in turn report to the SBE. At the field level, all Biogas Technical Officers will be responsible for the same set of roles as the SBE, in addition to being tasked with achievement of programme targets.

9.1.2 Task 1.2 – Setting the base for market activities

Task 1.2.1 Coalesce and consolidate staff support

- Mainstreaming workshop for KENFAP head office and national staff. Highly interactive; explain the programme in detail; achieve staff buy-in.

- b) Field tour for core programme staff to experience first hand the opportunities, benefits and challenges of biogas plants.
- c) Obtain, review and action the views of KENFAP staff in all regions; propose appropriate changes in the strategy document to the National Steering Committee.
- d) Cascade the budgets and targets in the PID into regional components based on broad consultations with field staff responsible for meeting the set targets.

Task 1.2.2 Establish liason with Government; Seek both cooperation and leverage from relevant government line ministries and agencies; discuss leverage, promotion, education and extension components; agree on partnership areas and action plans.

Task 1.2.3 Establish partnerships KENFAP in its capacity as the NIA will competitively recruit project partners so that KENDBIP can achieve the minimum target of 8 000 plants by Dec 2013. The capacity of the sector will be built through the creation of an effective infrastructure of implementing partners. Partnership strategies by KENFAP will include, but not be limited to:

- Enter into contract with BCEs/NGOs at regional level;
- Proactively engage interested NGOs/institutions to include biogas service in their regular activities
- Tender lots of the programme areas.
- Where more effective, apply a mix of the three modalities named above.

Note: with some partners KENFAP may not have formalised relationship, but a mutual understanding on cooperation. KENFAP will Scope the market for facilitative and leverage partners (NGOs, CBOs, private entities, donors, development agencies, SNV and Hivos networks, etc.) for the different programme components; discuss various relevant components; agree on partnership areas and action plans, then sign MOUs, Agreements and Contracts. KENFAP will actively seek partnerships with local women's organizations in all programme activities, but especially in promotion.

Task 1.2.4 Establish liason with ABC-K; Based on its current biogas market role and the need to integrate existing biogas contractors who are members of ABC-K into KENDBIP, KENFAP will discuss areas of partnership with ABC-K. This will include commencing orientation and recruitment of ABC-K members to KENDBIP, establish KENDBIP Code of Conduct, commence building of national domestic biogas standards.

Task 1.2.5 Establish collaboration with training and R&D institutions; discuss training and R&D (design improvements, appliances, etc.) components; agree on partnership areas and action plans. Where identified partners exchange funds, goods or services with KENFAP, a priced service or product delivery contract will be drawn. Templates are provided in the PM Part II – Template IV: Memorandum of understanding.

Task 1.2.6 Undertake national biogas baseline surveys, including a gender and socio-economic baseline study and a credit mechanisms study; to set the framework for: (i) credit facilitation with financial services providers; (ii) monitoring and evaluation; (iii) highlight indicative benchmarks on which the programme's achievements will be judged. Prepare ToR in consultation with Hivos and SNV; competitively source consultants for the studies.

Task 1.2.7 Undertake premier rapid regional studies; A quick scan to verify the actual situation on the ground and give baseline information in the first Focal Points to be operationalised: Nakuru, Kiambu and surrounding regions. More details on the Rapid Regional Studies are contained in section 9.3 WP No. 3 – Promote and Market Biogas Technology and in the PM Part I: Guide XIII – Quick Scan Guidelines.

Coverage will grow gradually over the programme period, from these two Focal Points to a total of 23 Service Points, including 11 Focal Points and 5 Regional Coordination Points. The selection of the launch Focal Points was guided by the need to position the programme for wide geographical distribution, potential of biogas uptake in the immediate regions, proximity to the Biogas Office for back up and initial experience-building, existing Biogas Masonry capacity in the regions, awareness of biogas and the reputation of these regions as traditional dairy farming areas. Other considerations include the need to optimise activities within the limited timeframe for project start up (6 months) and proximity of the regions to relevant technical training institutes for early capacity building.

9.1.3 Task 1.3 – Preliminary Activities – Technical

During implementation, KENDBIP will require several work tools. These comprise (a) management tools and (b) field implementation tools. Templates are provided in the PM Part II – Programme Templates.

Task 1.3.1 Prepare/refine programme management tools: examine systems, controls, guidelines and templates in detail and customise them for adoption; (some of these tools may already exist with SNV, based on SNV biogas programmes elsewhere, and can be customised for local use). In conjunction with SNV, examine the entire programme implementation stream and identify all required tools, and have them prepared either internally or by contracted experts; collaborate with partners to refine these.

Task 1.3.2 Identify and prepare field implementation tools

- a) **For awareness creation and marketing;** tools that will be employed by various stakeholders in the programme including *inter alia*, in workshops, seminars and demonstrations (exhibitions and shows); information leaflets (brochures, posters etc), infomercials, and media articles. Marketing tools, distinct from promotion/awareness tools will have a “business case” or “investment case” argument to convince households that biogas is indeed the solution to their domestic energy needs. KENFAP will liaise with Biogas Contractors and ABC-K in preparation of promotion and marketing tools, which will consider issues related to youth and gender.
- b) **For training and education** at different levels and for different groups; including “curriculum” for training such sub categories as Biogas Contractors, Supervisors, Trainers, Extension Workers, Financial Institutions, End-Users, Entrepreneurs, etc.; contract selected partners to prepare these. The curriculum will include sections on the environmental protection and gender inclusivity as important considerations.
- c) **For operations and maintenance (O&M);** such as Biogas Contractor’s Guide, Biogas Inspection Guide, Biogas End-User’s Guide, Biogas System Trouble Shooting Guide, etc.; collaborate with ABC-K.

Task 1.3.3 Procure and install GIS equipment; develop and install a database software to support monitoring of biogas plants; SNV and Hivos will help to develop a database to begin the process.

9.1.4 Task 1.4 – Preliminary Activities – Training, Education and Demonstration

Task 1.4.1 Preliminary training of Biogas Masons and Supervisors; to meet immediate demand, train and certify 30 new Biogas Masons and 4 Supervisors; prioritise orientation (induction course to align trainees to KENDBIP work ethics, methods and Code of Conduct, aspirations) and use of existing Biogas Masons and Contractors as part of this initial target – hence incorporate both members and non-members of ABC-K. Biogas Masons will to a large extent be sourced locally in their specific normal operational regions; special consideration

for the youth and women (in line with KENFAP's gender policy).

Task 1.4.2 Identify and select Biogas Masons with advanced skills to act as future Trainers and Supervisors. Women will specifically be encouraged to take up training as masons and supervisors. Detailed training plans for Biogas Masons and Supervisors are detailed under the Roll-out Phase in section 9.2 - Work Package No. 2 – Training & Capacity Building.

Task 1.4.3 Preliminary training and education of Biogas Users and other stakeholders; Undertake user training and education three to six weeks after completion of demonstration and training plants; in parallel, train KENFAP staff, MFI promoters and other NGO staff on bio-slurry extension and awareness creation. More details under Roll-out Phase in section 9.2 - Work Package No. 2 – Training and capacity building.

Task 1.4.4 Construct demonstration plants; demonstrate the technical and economic viability of biogas plants in order to elicit demand. Install an initial 30 demo and 15 market biogas (total 45 demo biogas plants out of a total planned 140 for the entire programme) located in the target programme regions. More details on selection of locations, construction modalities and subsidies under Roll-out Phase in section 9.4 – Work Package No. 4 – Rollout: Product Ordering and Delivery.

9.1.5 **Task 1.5 – Preliminary Activities – Programme launch**

Task 1.5.1 Programme launch forum; Convene a high level programme launch event; procure press publicity, public and private sector buy-in.

9.1.6 **Work Package No. 1 Deliverables**

- 1) Fully established and operational Biogas Office.
- 2) Signed tripartite contract between KENFAP, Hivos and SNV.
- 3) Annual Programme Budgets and Plans for 2009 and 2010.
- 4) Specific KENDBIP staff time and facilities allocated to KENDBIP.
- 5) Detailed Job Descriptions for KENDBIP staff.
- 6) Appointed Biogas Office staff.
- 7) Installed and operational financial system and software.
- 8) Phase I programme audit report.
- 9) Operationlised Phase I AAs between SNV and KENFAP and associated report.
- 10) Technical sub-Committee.
- 11) KENFAP staff mainstreaming workshop and associated report.
- 12) Field tour for core KENFAP programme staff.
- 13) KENFAP field staff programme review report, expanded regional budgets and targets.
- 14) Partnership agreements, contracts, MOUs and LOUs – Government, Private Sector and Non-profit partner categories.
- 15) ABC-K / KENFAP cooperation framework and workplan.
- 16) KENDBIP Code of Conduct.
- 17) Framework for national domestic biogas standards.
- 18) National biogas baseline socio-economic, credit and gender surveys.
- 19) Premier rapid regional studies for Nakuru and Kiambu (and surrounding regions).
- 20) Programme management tools: systems, controls, guidelines and templates.
- 21) Field implementation tools - for awareness creation and marketing – print and electronic media materials, workshop and meeting plans, schedules.
- 22) Field implementation tools - for training and education – curriculum, lesson plans.
- 23) Field implementation tools - for operations and maintenance (O&M) – Biogas Contractor's Guide, Inspection Guide, End-User's Guide, Biogas System Trouble Shooting Guide.

- 24) Fully operational GIS equipment and related database software.
- 25) Trained Biogas Masons and Supervisors.
- 26) Initial batch of Biogas Users trained on bio-slurry use.
- 27) Group of initial partners (NGOs, CBOs) and KENFAP regional staff trained in bio-slurry extension and awareness creation.
- 28) 30 fully installed demonstration biogas plants and 15 fully installed market biogas plants.
- 29) Programme launch forum and associated event report.
- 30) PHASE I / INCEPTION REPORT

9.2 Work Package No. 2 — Training and Capacity Building

The growing biogas market will require low-cost high quality products. Technical skills, once established in an enterprise, will lead to job creation and sustainable development of the local economy. Although the exact number of masons, contractors and enterprises involved in the biogas sector in Kenya today is not known (it is estimated at over 100), there exists a growing network of trained practitioners, especially as a result of additional training by GTZ under the PSDA Project. Some of the active Biogas Masons are members of ABC-K. According to the association, membership as at October 2009 comprised 24 Biogas Contractors with 50 trained Biogas Masons and Technicians. The full list is provided in the PM Part IV: Document IV – ABC-K Membership and Coverage, August 2009.

KENDBIP will involve continuous capacity building, with various players within the biogas supply and value chains getting involved. The selection criteria will be as inclusive as possible, but will also apply a gender-sensitive approach, especially incorporation of youth and women. The full analysis of trainee numbers and categories is contained in Part VIII – Annexe 3: Training, capacity building and promotion statistics. The overall framework is as follows:

Table 7: Training and capacity enhancement matrix

Who	What	By Who	When	Goal
KENFAP	Administrative assistance; Development of delivery structures; Training and knowledge transfer	SNV Advisory Service; Consultants	Full period of the programme	Sustainability of the programme after ABPP grant
Biogas Contractors	Training and knowledge transfer; Mentoring; Development of delivery structures; Administrative assistance	The Biogas Officers; Consultants; Business Mentors/Advisors (including volunteers); Peers	Full period of the programme, but mostly in the first two years	Quality installations; profitable biogas business
Energy Centres	Development of delivery structures	The Biogas Officers; Consultants	Full period of the programme, but mostly in the first two years	Long term demonstration and training on biogas
Research and Educational Institutions	Development of delivery structures; Administrative assistance	The Biogas Officers; Consultants; Business Mentors/Advisors (including volunteers); Peers	Full period of the programme, but mostly in the first three years	Innovation; Technology transfer
Financial Services	Training and knowledge	The Biogas Officers;	Full period of the	Mainstreaming of

Who	What	By Who	When	Goal
Providers	transfer	Consultants	programme, but mostly in the first two years	biogas lending in the MFI sector
NGOs	Training and knowledge transfer	The Biogas Officers; Consultants	Full period of the programme	Long term support for biogas
Biogas Users	Training and knowledge transfer; Mentoring	The Biogas Officers; Consultants	Full period of the programme	Critical mass of biogas users to propel the market into the future
Representatives of Farmer Groups	Training and Knowledge transfer; Mentoring	The Biogas Officers; Consultants	Full period of the programme	Long term support for biogas
CBOs	Training and knowledge transfer	The Biogas Officers; Consultants	Full period of the programme	Long term support for biogas

9.2.1 Task 2.1 – Selection of trainees, trainers and training venues

Detailed selection criteria for these categories are contained in the PM Part I – Programme Guidelines.

Task 2.1.1 Select Training Venue; Training venue can influence the effectiveness of the training. The location must have adequate land area for demonstration and practical lessons (dummy models will be built and demolished after training sessions) and at least three sites will be required for a trainee class of an average of 20 persons. Where practical, collaboration with an existing training institute in the region will be preferred. KENDBIP will work with those organizations/institutions for technical training is a core competence or the key business. Training institutions will be encouraged to mainstream biogas Masonry training in their curriculum for sustainability during and beyond KENDBIP. SNV Advisory Services will play a crucial role in assisting these organizations to structure the appropriate training packages.

Task 2.1.2 Select Trainees; who have a masonry background, adequate experience or relevant certificates (such as Government Grade Test); at least one year of experience as a building Mason; have permanent residence or proof of long term residence in the target region; trainees will only be admitted to work in their locality. As indicated in WP 1, experienced biogas contractors and masons will be prioritised, subject to meeting the criteria and being successfully orientated into KENDBIP.

Task 2.1.3 Select Supervisors and Inspectors; from among experienced Biogas Masons who will have recently (past 12 months) constructed at least 5 efficiently-working biogas systems.

Task 2.1.4 Select trainers; generally to be recruited from among experienced Biogas Contractors and other relevant qualified consultants; personnel involved must have ability to build cumulative knowledge and experience (increased efficiency of subsequent trainings). Trainers will include specialists on gender inclusiveness who will execute the gender component in the curricula. Training institutions will be given priority and encouraged to provide or recruit qualified trainers.

Task 2.1.5 Select biogas enterprises; Biogas Contractors wanting to qualify for capacity building will be required to demonstrate that they possess/have: (i) the level of education required as a launch pad on which expertise will be built (at least O-level); (ii) a legal business unit that is tax compliant; (iii) a physical location as base or office and provide own postal address; (iv) a functional management system in place (not necessarily sophisticated, but) adequate to provide field data for monitoring and experience building; (v) a plan and clear vision for biogas marketing and construction; (vi) qualified staff, or willing to train staff,

for the purpose of undertaking installations; (vii) a good reputation and track record; (viii) membership to an industry association (e.g. ABC-K) or a professional body (note: not mandatory but desirable); (ix) commitment to comply with set codes of conduct for biogas; (x) completed the set minimum number of biogas installations before accreditation. Women led biogas related enterprises will be encouraged and prioritized for support and linkages.

Task 2.1.6 Create a Pool of Trained Biogas Masons; through rigorous theory and practical technical training. In addition, promotion, marketing, household energy needs assessment, extension services, and documentation. Training conducted on a vocational training trajectory. Three point training platform: (i) Training; (ii) Certification (iii) Re-training.

(i) **Task 2.1.6-1** Biogas Mason, Supervisor and Inspector Training

- **Group 1:** Biogas Masons: 1-day theory and 10 days' practical course (construct and demolish model).
- **Group 2:** Experienced Biogas Masons and Contractors: 3-day orientation to re-align practices to KENDBIP - already trained and currently involved in construction of biogas plants on an open market basis, hence full training not required.

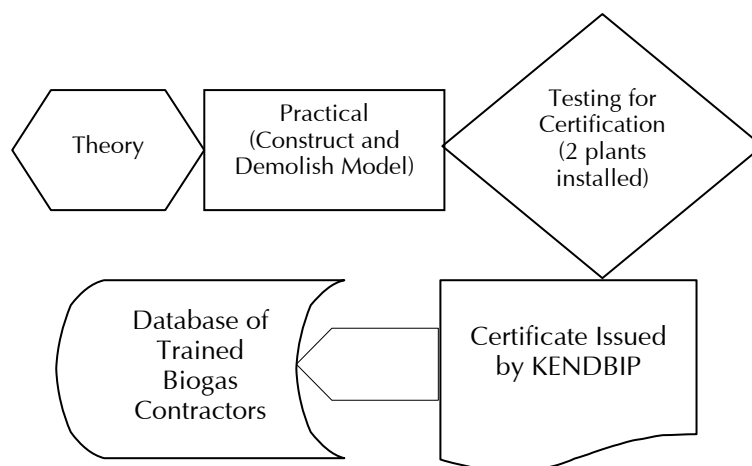
A total of 366 masons will be trained from Group 1 and Group 2.

- **Group 3:** Supervisors and Inspectors: 5-day course – training in supervision, inspection and training of trainer (ToT) skills. A total of 49 Supervisors and 14 Inspectors will be trained.

(ii) **Task 2.1.6-2** Certification / accreditation of trainees

- Done after training and construction of Certification Biogas Plants.
- If the Rapid Regional Biogas Study and selection criteria recommends so, the first Certification Biogas Plant may be at the Biogas Mason's household and become also a demonstration plant; however, one biogas trainee may not build more than one plant which acts as both a Certification and a demo biogas plant.
- Award of a KENDBIP Certificate based on two successful Certification plants.
- The full certification cycle is elaborated in the diagram below.

Figure 6: Training and Certification Process



(iii) **Task 2.1.6-3 Re-training**

- As practical as possible, trained personnel will be absorbed in the programme through contracting to ensure sustained work opportunities to keep them in the sector. Modalities will be put in place to guide this process.
- Trained Biogas Masons who display inefficiencies or lack of the required level of knowledge, will be re-trained; subject to one re-training, after which those who do not meet the minimum standards will be dropped from the programme.
- A total of 89 persons will be re-trained.

9.2.2 Task 2.2 – Capacity building activities – supply side

Target groups: KENFAP, Programme Partners (e.g. NGOs, CBOs, Financial Service Providers) and Biogas Contractors / entrepreneurs. Women CBOs will specifically be targeted.

Scope: Training, re-training, knowledge transfer; market awareness and promotion; programme management; technical training (production, integration, operation, maintenance, etc.), enterprise (product sourcing, pricing, delivery, working capital management, etc.); gender considerations and inclusiveness; exposing practitioners to new technology, best practice - an important and new field of private sector development lies in the local production and assembly of biogas equipment such as lamps, burners and gas pressure measurement facilities.

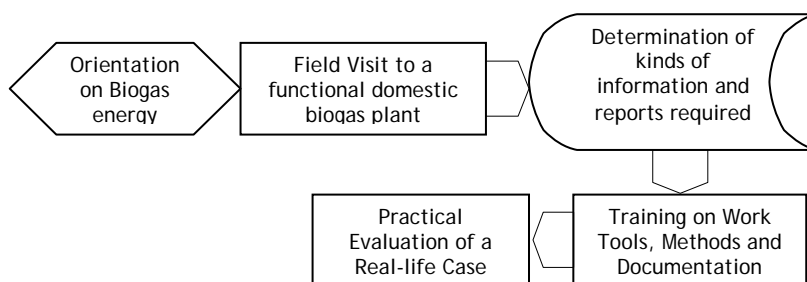
Task 2.2.1 Build the capacity of KENFAP

Administrative assistance – guidance by SNV to KENFAP on administrative issues related to the management of the programme; improvement of management skills.

Task 2.2.2 Build the capacity of Programme Partners – FIs, NGOs, CBOs, etc.

- Targets trainees include task managers, field, credit and marketing officers.
- Training will include demonstration of the business case; proving that engagement in biogas plants can be profitable and sustainable both for end users and service providers.
- Programme Partners will be orientated on the various international and local best practice in each area of practice, including financing mechanisms.

Figure 7: Building the capacities of Programme Partners



Task 2.2.3 Build sector capacity on biogas enterprise

KENDBIP will support the establishment of multiple biogas enterprises to join the existing Biogas Contractors. KENFAP will be responsible for qualification and award of installation contracts to these Biogas Contractors; all installations will be undertaken only by qualified and accredited Biogas Contractors. The biogas office will, with back up of SNV Advisory Services, lay the foundation for enterprise. A total of 109 biogas-related enterprises will be supported through:

- **Task 2.2.3-1** Mentor the sector players – transfer biogas enterprise knowledge and develop delivery abilities; provide organizations with tools of work (e.g. regional demand profiles to enable establishment of presence in a region, etc.); regular / scheduled forums and on-to-one consultations.
- **Task 2.2.3-2** Business start-up – assist private enterprises and/or interested craftsmen to start up their own biogas supply chain businesses; business modeling and planning expertise.
- **Task 2.2.3-3** Finance facilitation – link biogas enterprises to financial services providers in order to establish and grow biogas-related businesses.
- **Task 2.2.3-4** Provide linkages to other programmes – link biogas enterprises to other projects or programmes that support enterprise development.

9.2.3 Task 2.3 – Capacity building – demand side

Target groups: Biogas Users, Representatives of Farmer Groups, CBOs.

Scope: The aim is to enhance knowledge on the demand side so as to maximise benefits; training, re-training and knowledge transfer that exposes biogas users to biogas technology and related appliances (and use), based on new technology.

Task 2.3.1 Train users on biogas technology; on maintenance, trouble shooting, opportunities and limitations presented by biogas technology.

Task 2.3.2 Train users and partners on bio-slurry use; work together with biogas users, research institutions, NGOs, CBOs, line ministries, in order to transfer knowledge on an on-the-job basis. Focus on effective use of bio-slurry. User training will ideally be done in two stages:

- i. Before construction of biogas plants; during construction, the biogas plant owners will be encouraged to keep track of the construction process
- ii. About 3–6 weeks after completion of a plant's construction – O&M aspects of the completed biogas plant.

9.2.4 Work Package No. 2 Deliverables

- 1) List of qualifying trainees
- 2) List of approved training venues and trainers
- 3) Trained and certified Biogas Masons - 366
- 4) Trained Biogas Supervisors - 49
- 5) Trained Biogas Inspectors - 14
- 6) Biogas-related enterprises supported by KENDBIP – 109
- 7) Re-trained biogas technical persons – 89
- 8) Trained KENFAP staff – Dedicated staff at H/O (8), R/O (10) and L/O (36) = 54
- 9) Trained partner staff - NGOs, CBOs, Financial Service Providers, Farmer Groups – (including 150 bio-slurry extension personnel and 100 financial services staff).

9.3 Work Package No. 3 — Promote and Market Biogas Technology

KENDBIP seeks to introduce a unique strategy to ensure mass adoption of biogas plants countrywide. This will require a well developed promotion strategy to activate the sector and incentivise stakeholders. KENDBIP's awareness creation and consumer education programme will take into consideration and address concerns related to the challenges, barriers, risks, constraints and the lessons learned in the biogas sector in Kenya and elsewhere.

9.3.1 Task 3.1 – Prepare KENDBIP and KENFAP staff

Task 3.1.1 Prepare KENFAP Offices to play focal role and equip them; In the selected districts, KENFAP offices will be the regional focal points to support uptake of biogas activities and will support all promotion activities (including distribution of all promotion materials) and respond to any enquiries made on the programme.

Task 3.1.2 Develop an incentive package for successful promotion and apply it; An incentive scheme will be put in place to reward marketers. This will be based on confirmed (built up) biogas plant orders.

9.3.2 Task 3.2 – Build local area baselines and approaches

Task 3.2.1 Undertake Rapid Regional Biogas Studies; Before commencement of any promotional activities in a specified region, the Rapid Regional Biogas Study will be a pre-requisite (see more details in the PM Part I: Guide XIII – Quick Scan Guidelines). The results of the study will provide, among others:

- i. A quick scan on appropriate promotion and awareness creation actions suited for the region.
- ii. List of stakeholders who will be potential partners of KENFAP in a particular locality, and their local infrastructure.
- iii. A gender and youth inclusiveness strategy for the region.
- iv. Existing and established programmes and tools for promotion and awareness creation used by others, which can leverage or provide lessons for KENDBIP.
- v. Local human and geographical features: cultural and traditional practices and attitudes; local agricultural practices; local soil and climate conditions.

Task 3.2.2 Develop mechanisms for inclusion of women and apply them; Based on existing information and data, women and children are the most affected by challenges and impacts of traditional domestic energy sources. Nevertheless there exists a risk of low participation of women in training, promotion and marketing, private sector development, credit, programme management, extension. Therefore KENDBIP, in its awareness creation and consumer education practices, will take into consideration and prioritise the special needs of women, children and the youth. An analysis of barriers / constraints for (specific groups of) women to participate in and benefit from the programme will be made and following this analysis, a gender mainstreaming plan will be developed, with the help of specialists.

9.3.3 Task 3.3 – Establish partnerships and channels for promotion

Task 3.3.1 Identify and enter into collaboration with appropriate media channels and equip them; KENFAP has a wide network and collaboration with the mainstream media channels including TV and Radio stations in the private sector. KENDBIP will therefore also use this media to support in the promotion of biogas at a national level.

Task 3.3.2 Establish specific promotion actions to be undertaken by ABC-K; prepare plans, schedules and persons involved. Inclusion of Biogas Masons in marketing initiatives will be key in order to address technical concerns of potential customers. Proper training and preparation of the Biogas Masons will be critical.

Task 3.3.3 Establish specific promotion actions within the KENFAP network of farmer groups and equip the network; prepare plans, schedules; stipulate organisations and persons involved. Farmer groups include private sector companies with large farmer networks, e.g. dairy processing firms.

Task 3.3.4 Establish specific promotion actions to be undertaken by grassroots partner organizations and equip the partners; prepare plans, schedules; stipulate organisations – Government agencies and extension workers, grassroots NGOs working closely with communities to improve their livelihoods, Savings and Credit Cooperatives, especially farm produce-based and livestock and dairy marketing and credit societies, financial services providers having an elaborate rural infrastructure and a good reputation, CBOs, private companies with large farmer networks – e.g. milk processors, etc. Marketing for biogas will, wherever practical, be integrated into other programmes which seek to improve incomes – e.g. acquisition of additional dairy cattle, zero grazing advocacy, water projects, farm output improvement programmes, and new crop (e.g. horticulture) projects.

KENDBIP recognises (i) preferences/behaviour change and (ii) investment decision making at the household level as the two most difficult yet crucial milestones as far as biogas plants are concerned. To influence preferences and behaviour requires trust and conviction, while to influence a household investment decision requires spousal/family consultations and definite sources of capital. It is clear therefore that an affective campaign will have to involve parties who have longstanding, cordial and trustful relationships with potential biogas users. Partners will apply knowledge and experience in handling communities, propagate word of mouth to create a good impression of biogas, and execute specific localised campaigns among target populations. Among the key operational guidelines for the partners will be:

- i. Clear and common messages about biogas, pre-agreed with KENFAP.
- ii. Common value proposition as will be pre-determined by KENFAP.
- iii. Pre-agreed message delivery tools.
- iv. Pre-agreed target populations; promotion of customer clusters..
- v. Gender sensitivity; affirmative action during field activities.
- vi. Exclusive promotion of biogas models approved by KENFAP; initially this will be limited to KENBIM.
- vii. Involvement of trained biogas Masons/technicians.

Task 3.3.5 Hold annual partner forums; KENFAP will annually hold a forum between its programme staff and key stakeholders with whom it has MOUs or agreements to articulate key strategies and set targets and performance thresholds each year of operation.

9.3.4 **Task 3.4 – Produce tools for promotion and marketing**

Task 3.4.1 Identify, select and produce appropriate tools and media for communication; use of conventional promotion materials; determine quantities to be produced and who to design and produce them; ensure the designs and messages depict the thrust and uniqueness of the programme, and are effective. Promotion and awareness creation tools will target the primary factors considered by consumers when choosing solutions for domestic cooking, heating and lighting – e.g. affordability, fuel accessibility, functionality and aesthetics. The tools include:

- Printed media – for use by individuals: Flyers, calendars, greeting cards, brochures.
- Printed media – for public/global use: Banners, posters, newspaper articles.
- Body wear: Caps, polo shirts.
- Electronic – visual media: TV programmes, TV clips, Videos, Documentaries.
- Electronic – audio media: Radio and roadshows with partners.

9.3.5 **Task 3.5 – Undertake promotion, marketing and commercial market development**

KENDBIP is based entirely on the premise that facilitation of private sector players, coupled with promotions, awareness creation, capacity enhancement, quality products and their installation, training, infrastructure development and credit facilitation will all lead to a sustainable commercial market. The programme's marketing strategy will create a vibrant market in which biogas-related transactions become commonplace.

The objective of marketing will be to acquire as many new biogas customers as possible. The process will therefore involve organized teams and clear performance incentives. The teams will be provided with appropriate marketing tools, prepared by or under the direction of KENFAP.

Task 3.5.1 Establish a promotion and marketing master schedule and database; A marketing database will be maintained, and a basic reporting framework put in place to avoid overwhelming potential clients with information and duplicating marketing efforts (e.g. multiple visits to one client by multiple marketers).

Accordingly, product marketing is a key component of the programme:

Task 3.5.2 Brand and market KENDBIP and KENBIM;

- i. Branding of KENDBIP and propagating its image as a high quality cost-effective programme with the interests of the consumers and Biogas Contractors at heart.
- ii. Branding of KENBIM as the biogas model of choice.
- iii. Marketing of KENBIM as a value-adding household energy solution; with a clear and methodical value proposition to the farmer.

Task 3.5.3 Mobilise communities and community groups to uptake biogas; KENFAP will use its elaborate network of farmer groups and professional staff, combined with trained Biogas Contractors and Masons and the selected KENDBIP grassroots partners' networks, to apply the selected media to amplify reach out to communities and increase awareness among prospective biogas users. Women groups will form at least 50% of the communities mobilised. The promotion and marketing campaigns will be centred on the following core elements:

- o Economic benefits of biogas technology – cost savings, time savings, income generation (bio-slurry and sludge use, etc.), carbon credit income, financial facilitation; clear demonstration on why biogas makes sense as an investment.
- o Social benefits and personal development benefits – health (respiratory, fertility), sanitation, education, cleanliness, status.
- o Gender; inclusiveness of women at all levels of leadership and management..
- o Environmental benefits –air quality, forests (especially linkages to rivers, water, agriculture and electricity).
- o Creation of definitive market linkages between complementary stakeholders – e.g. Biogas Contractors and financial services providers.
- o Creating networks that avail the necessary products (components and appliances) to the market.
- o Availing technical services for the installation and after-sales services at close range – within a viable geographical radius; preferably not more than 30km radius.

The actions will include:

Task 3.5.2-1 Undertake a programme launch – 1 event

Task 3.5.3-2 Execute annual regional workshops – 1 every year

Task 3.5.4-3 Execute grassroots awareness and promotion forums – 226 (2/qtr per region)

9.3.6 Task 3.6 – Implement Demonstration Plants

Task 3.6.1 Select locations for demonstration

A set of criteria for selection of a demo biogas plant location will apply (see the PM Part I: Guide X and Guide XI), most importantly the availability of feedstock and proximity to target market. The actual location will be determined by the Biogas Office. A demo plant strategy will be discussed with local actors in every region. Suitable sites will include those where many people frequent, whether public or private. Examples of households that may qualify to host a

demo plant include agricultural role models and early adapters in rural villages. A sample agreement for hosting a demo plant is provided in the PM - Part I: Guide X and Guide XI.

Task 3.6.2 Construct demonstration biogas plants

Table 8: Number of planned demonstration biodigesters

Category	First 6 Months	Year 1	Year 2	Year 3	Year 4	Total
Demonstration Biogas Plants	30	40	35	35	0	140
Commercial Biogas Plants	15					
Total Biogas Plants Installed in the Preparatory Phase	45					

KENDBIP will facilitate construction of a total of 140 demonstration plants, comprising 5 demo plants for each of the 23 regions targeted (total 115), and an additional 25 demo plants distributed in these target regions based on market potential and emerging demand profile, as shown in the table above. The plants will be built, as much as possible, by Biogas Contractors domiciled in the specific regions. SNV will provide the technical back-up and training guidance to ensure capacity to construct these plants is developed in each region.

Selection of Biogas Contractors involved in building these demo biogas plants will be competitive, based on the selection criteria provided in the PM Part I: Guide VI – Selection Criteria for Biogas Contractors and the competitive selection process detailed the PM Part I: Guide II – Selection Process of Biogas Contractors.

Each demonstration biogas plant will qualify for a double subsidy as stipulated in more detail under financial facilitation (Section 9.9 - WP No. 9: Financial Facilitation and Subsidy Application).

9.3.7 Work Package 3 deliverables

1) Specific identities of KENFAP regional staff active in KENDBIP at local focal points.
2) List of specific facilities available to KENDBIP at every KENFAP regional office.
3) Incentive package for promoters and marketers under KENDBIP.
4) Rapid Regional Biogas Studies – one for every new region.
5) Specific guidelines for inclusion of women and children; gender mainstreaming plan.
6) Specific media channels for collaboration.
7) Specific promotion and marketing work plan for ABC-K.
8) Specific promotion and marketing work plan for KENFAP network of farmer groups.
9) Specific promotion and marketing work plan for grassroots partner organizations.
10) List of selected promotion and marketing tools – global and local level (for each region).
11) Promotion and marketing master schedule and database.
12) Promotion, marketing and commercial market development reports, including community mobilisation reports, KENDBIP and KENBIM brand promotion and brand recognition report.
13) Programme launch report – 1 report .
14) Annual regional workshop reports – 4 reports.
15) Grassroots awareness and promotion forum reports – 226 reports.
16) Identities of locations for biogas plant demonstration – 140 locations.
17) Constructed demonstration biogas plants totalling 140.

9.4 Work Package No. 4 — Roll-out: Product Ordering and Delivery

9.4.1 Task 4.1 – Schedule and implement roll-out plan

Task 4.1.1 Undertake geographical scheduling

KENFAP plans to roll-out the programme progressively, in different regions of the country, based on area economic activity and potential demand. The programme will increase coverage of new region using KENFAP Offices as regional focal points in a cascading manner to ensure efficient and effective delivery of the biogas plants nationally. In order to achieve success and build momentum, the Biogas Office will start to roll out through Focal Points located in regions that have obvious technical potential, targeting clients with obvious ability to purchase the systems. Incidentally, as shown in the maps below, KENFAP is already present in virtually all the regions where demand is expected to be highest.

Figure 8: Areas with high biogas potential

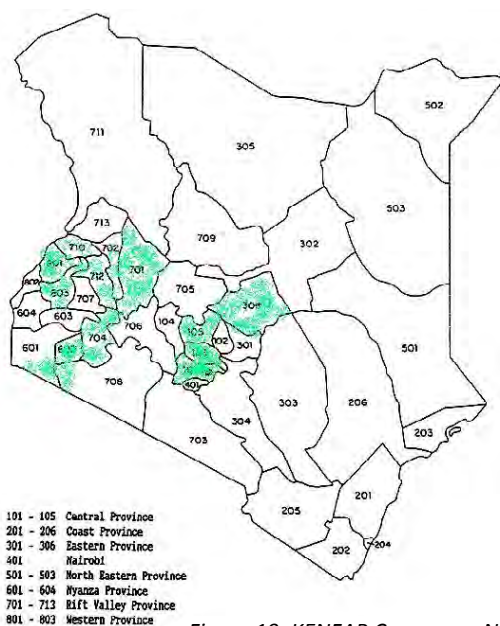


Figure 9: HH practising zero-grazing (2 or more cattle) or semi-zero grazing (3 or more cattle)

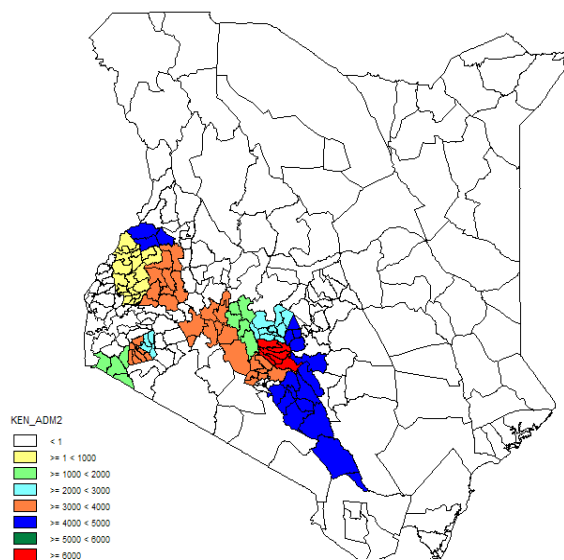


Figure 10: KENFAP Coverage - November 2009



Geographical scheduling has been influenced by availability of manpower experienced in biogas, level of perceived awareness in the region – due to past activity in the biogas sector; livestock count in the area; animal husbandry practices of the area’s communities (e.g. zero grazing); potential for learning, uptake and scaling up in the area; acceptability of the technology to the residents of the area; proximity to potentially suitable training facilities; farming habits (especially use of prevalent fertiliser); and settlement patterns (possibility of clustering, hence economies of scale).

Task 4.1.2 Activate focal points

There are seven (7) start-up Focal Points selected for roll out in year 1, out of which two (2) will be preparatory phase entry points. Detailed focal point distribution countrywide, by province, is contained in Part VIII – Annexe 5: Countrywide distribution of KENDBIP focal points.

Table 9: Planned activation of KENDBIP Regional, Focal and Service Points

No.	Year 1	Year 2	Year 3	Year 4
1	Nakuru*	Nandi***	Uasin Gishu**	Koibatek***
2	Kericho**	Bomet***	Meru Central**	Trans Nzoia***
3	Embu*	Kangundo***	Nyamira***	
4	Kakamega**	Vihiga***	Thika***	
5	Kisii*	Bungoma*	Maragua***	
6	Nyandarua**	Migori***	Kirinyaga***	
7	Kiambu**	Nyeri*	Murang'a***	
Total	7	7	7	2
Cummulative	7	14	21	23
Regional Coordination Offices			*	
Focal Points			**	
Service Points			***	

9.4.2 Task 4.2 – Establish the biogas plant ordering process

Task 4.2.1 Establish a framework to size all biogas plants

As highlighted in section 8.3 (Sizing of the biogas plant), sizing will be crucial for households. In general, however, the following size and demand profile is expected:

Table 10: Demand Profile (percentage)

KENDBIP Biogas Sizes and Estimated Demand						
4m ³	6m ³	8m ³	10m ³	12m ³	16m ³	Average Size
2.5%	15%	65%	10%	5%	2.5%	8.2

Sizing will entail a household energy audit and economic (household income) analysis, simplified by a standard form (see the PM Part II – Template II: Biogas plant size determination) to be filed by every Biogas Contractor while recommending the optimal solution.

Task 4.2.2 Establish the procurement window for cash customers

They have ready or near-ready cash - 100% of the investment required; have already made an investment decision. After size and investment value has been determined:

Task 4.2.2-1 Official order is made; Customer will enter into the standard agreement (see template in the PM Part II – Template III – Supply Contract) with a KENDBIP Certified Biogas Contractor of choice; place a 50% deposit with that Biogas Contractor and obtain an official receipt; send a copy of the agreement accompanied by a copies of the Biogas Contractor's Sizing Report and the receipt to KENDBIP focal point.

Task 4.2.2-2 Register the order; KENDBIP Officers at the focal point will register the biogas order in the monitoring system.

Task 4.2.2-3 Job Order is issued by KENDBIP; To approve the transaction, KENDBIP will review the 3 documents (sizing report, agreement and receipt), and issue a Job Order (JO) and a Job Card (JC) to the Biogas Contractor (see PM Part II – Template V and Template VI for samples templates).

Task 4.2.3 Establish the procurement window for credit customers

They have some or none of the required investment capital, but qualify for a loan from a financial services provider; have already made an investment decision. After size and investment value has been determined:

Task 4.2.3-1 Official order is made; Customer will enter into the standard agreement (see template in the PM Part II – Template III – Supply Contract) with the Biogas Contractor of choice; place a 10% deposit with the Biogas Contractor (or with the FI if that is the FI's requirement) and obtain an official receipt; send a loan application and a copy of the agreement, accompanied by a copies of the Biogas Contractor's Sizing Report and the receipt to the financial services provider of choice; send also a copy of each document to KENDBIP focal point.

Task 4.2.2-2 Register the order; KENDBIP Officers at the focal point will register the biogas order in the monitoring system.

Task 4.2.2-3 Job Order is issued by KENDBIP; To approve the transaction, KENDBIP will review the 4 documents (sizing report, agreement, receipt and loan application), and await a confirmation of loan approval – the customer will be responsible for delivering this to KENDBIP. Once the facility has been approved by the FI, KENDBIP will issue a Job Order (JO) and a Job Card (JC) to the Biogas Contractor (see the PM Part II – Template V and Template VI).

Task 4.2.2-4 Loan funds disbursed to Biogas Contractor; KENDBIP will issue a Technical Approval (see the PM for template) for the transaction to the FI, enabling a disbursement of 50 per cent of the cost to be made directly to the Biogas Contractor by the FI.

9.4.3 Task 4.3 – Establish the biogas plant delivery process

Task 4.3.1 Provide KENDBIP biogas technical manuals; Biogas Contractor's Guide, Biogas Inspection Guide and Biogas System Trouble Shooting Guide.

Task 4.3.2 Facilitate contributions of materials by the customer; Where the agreement stipulates that the customer will provide some materials or labour in kind on site:

- Construction work will commence only when the customer confirms by filling the JC and signing off to the effect that these materials or labour is on site or available on demand.
- KENDBIP will only issue the Technical Approval after the above confirmation is received via a copy of the section of the JC perforated for this purpose.

Task 4.3.3 Install the biogas plants; After receipt of the JO, JC and requisite deposit, the Biogas Contractor will proceed to site and commence installation of the biogas plant.

The programme targets to install a total of 8,000 biogas systems in a period of 4½ years. In the first year, a total of 500 biogas plants are earmarked for installation, including 140 demo biogas plants. Installations will rise to 1,500 in year 2, 2,500 in year 3 and 3,500 in year 4. By the end of the planned intervention period, 8,000 biogas plants will have been installed.

Table 11: Number of Planned Annual Domestic Biogas Installations

	First 6 Months	Year 1	Year 2	Year 3	Year 4	Total
Commercial Biogas Plants	15	415	1,465	2,465	3,500	7,860
Demonstration units	30	40	35	35	0	140
Total Number of Biogas Plants	45	455	1,500	2,500	3,500	8,000

Task 4.3.3 Supervise biogas plant feeding and operationalisation

The Biogas Contractor's Certified Biogas Supervisor will undertake after-sales routines, including feeding and operationalisation checks (see more details in WP below) and present the JC to the customer for confirmation and signature. A copy of the JC will be delivered to KENDBIP.

Task 4.3.4 Inspection by KENDBIP

KENDBIP's Inspector will visit the site, verify the installation and recommend it for subsidy allocation (see more details in WP below).

Task 4.3.5 Make final payments to Biogas Contractor

KENDBIP will send a Final Payment Approval to the customer, requesting full payment to the Biogas Contractor, less the full subsidy allocation. In the case of cash transactions, the customer will make the payment, whilst in the case of credit transactions, the FI will make this payment to the Biogas Contractor directly.

The subsidy portion of the contract amount will then be disbursed by KENFAP to the Biogas Contractor, less a retention of 5% of the total sum, for warranty and guarantees.

Task 4.3.6 Release the retention; together with any interest earned, the retention will be released to the Biogas Contractor after the expiry of the system warranty (36 months), and subject to verification of the mandatory 2 monitoring visits and demonstration of resolution of any warranty and guarantee matters that may have arisen during the 36 months. In this respect, KENDBIP will maintain a Retention Bank Account.

9.4.4 Work Package 4 deliverables

1) Geographic roll-out plan
2) 11 active focal points at district level supporting service points in the region
3) 23 active service points (including the focal point) at district level
4) 5 active regional coordination offices linked to the 11 focal points
5) Standardised biogas plant sizing protocol
6) Standardised biogas plant procurement procedure and work tools (JO, JC, Order Register, etc.) for cash customers
7) Standardised biogas plant procurement procedure and work tools (JO, JC, Order Register, etc.) for credit customers
8) Standardised credit access procedures
9) Technical manuals delivered and used in the market place
10) 8,000 installed and operational biogas digestors
11) Inspection protocol and inspected biogas digestors
12) Guarantees and warranties offered and active in the marketplace

9.5 Work Package No. 5 — After-sales Maintenance and Service

It is recognised that optimal functionality of plants constructed under KENDBIP will contribute significantly to the achievement of scale. Satisfied biogas users are the best advocates for

further sales as word of mouth among farmers forms the basis for many farmer procurement decisions at the household level. The good reputation of a working technology is considered by most farmers to be the best guarantee. The aim of the after sales function will be to ensure all (100%) biogas plants constructed under KENDBIP remain operational in their lifetime in order to safeguard the investment and maximise the user's benefits and return on investment. Therefore after sales services will form an integral part of the agreement between customers and Biogas Contractors.

KENDBIP principles for after sales maintenance and service are:

- a practical and well functioning after sales system
- timeliness in response and action
- availability of spare parts.

9.5.1 Task 5.1 – Set up the base for wholesome after-sales services

Task 5.1.1 Establish a network of appliance and spare parts suppliers; Biogas Contractors, appliance makers/assemblers and retailers will work together to deliver the requisite after sales support. This will involve supply and replacement of parts and appliances, such as pipes, burners, lamps, mixers and gas taps. Standardisation of appliances and parts by The Biogas Office will play a key role in linking Biogas Contractors and Customers to known suppliers of quality appliances and spare parts.

Task 5.1.2 – Train users; Ensure the user is properly instructed on the O&M aspects of biogas plants before and during construction of the plant.

Task 5.1.3 – Provide user manual; KENDBIP Biogas End-User's Guide.

Task 5.1.4 – Provide warranty and guarantee certificates to users; System structure/performance warranty (3 years) and appliance functionality guarantees (1 year).

9.5.2 Task 5.2 – Set up the framework for after-sales visits

Task 5.2.1 Establish a Customer Help Desk; The Biogas Office will maintain a 'Help Desk' comprising both landline and mobile telephone numbers, as well as a P.O. Box and email through which KENDBIP beneficiaries can lodge complaints or call to seek clarifications about their biogas plant installations.

Task 5.2.2 Ensure a biogas plant Completion Visit is performed; This is the first visit post-installation, four weeks after the completion, conducted by a KENDBIP Certified Biogas Supervisor; will occur after feeding of the plant and emission of first volume of biogas. The KENDBIP Certified Biogas Supervisor will confirm that: (i) Stipulated construction standards have been met; (ii) The biogas plant is fully functional; (iii) Biogas production is optimal; (iv) The user is well trained and all necessary O&M information and the reference guide have been provided; (v) The user understands the system warranty, appliance/parts guarantees and possesses the necessary Certificates; (vi) where relevant, user training has covered adequately not only O&M, but also financial considerations (and credit where relevant) and owners' rights.

Task 5.2.3 Ensure accurate registration of the global positioning of the biogas digester; The Certified Biogas Supervisor will register the biogas plant's Global Positioning System (GPS) coordinates. This will be used both for programme and carbon finance monitoring.

Task 5.2.4 Hand over to the end user; Both the Certified Biogas Supervisor and the biogas user will sign off the Biogas Plant Completion section of the JC as confirmation that the plant exists and is optimally operational.

Task 5.2.5 Inspect the Biogas Plant; An Inspector of KENDBIP will visit the site to verify that (i) the system exists; (ii) it is installed according to agreed standards; and (iii) it is performing to required standards. The Inspector will sign off the Biogas Plant Completion section of the JC as confirmation thereof, giving the plant an approval to qualify for subsidy. If the installation or performance do not meet standards, a referral will be raised through comments on the JC, which will be sent back to the Biogas Contractor for action.

9.5.3 Task 5.3 – Perform after-sales maintenance and service

Task 5.3.1 Execute routine/scheduled visits; Mandatory 1 routine visit to monitor system performance and undertake trouble shooting; visit at the end of the system warranty period (36 months from installation date).

Task 5.3.2 Execute on-call visits; At the discretion of the end user, and based on demand for service due to a problem the user cannot resolve without a physical visit. An initial attempt can be made to advise the user on telephone, but if solutions offered thereon do not work, a physical site visit becomes mandatory.

However, if at the expiry of 12 consecutive months from the installation date (and thereafter) there has been no on-call visit, the Biogas Contractor will make a routine annual visit in place of the expected on-call visit. During such visits, the Biogas Contractor will inspect: (i) Physical status of the biogas plant – any breakages, leakage, parts depreciation, etc.; (ii) Effectiveness of the biogas plant in terms of conversion of feedstock into gas; (iii) Efficiency of the system in terms of operation and emission of the stored gas through the burner.

The Biogas Contractor will (i) Repair any noted defects; (ii) Provide advise to the user in case any O&M deficiencies are noted.

Task 5.3.1 Document all visits; To document the visit, the Biogas Contractor will (i) Fill a form detailing the findings; (ii) Indicate the parts needed to be replaced and other repairs not undertaken; (iii) Indicate the appointment date for completion of any outstanding matters arising by the Biogas Contractor. All unresolved matters to be attended to within a period of two weeks; (iv) Obtain the signature of the user as confirmation of the matters documented, as well as sign the form to confirm his/her visit.

One copy of the completed and signed visit form shall be left with the biogas user, while a second copy will be taken away by the Biogas Contractor. The original will be sent to KENDBIP focal point for the region at KENFAP Offices. More detailed guidelines aftersales visits, including repair calls, no-shows, replacement of errant Biogas Contractors, etc., are contained in the PM Part I – Guide XV: After-sales maintenance and service guidelines.

9.5.4 Work Package 5 deliverables

1) a practical and well functioning after sales system
2) Network of appliance and spare parts suppliers
3) List of recommended appliances and parts
4) Trained domestic biogas users
5) Customer Help Desk at the Biogas Office
6) 8,000 biogas plant Completion Visits and Biogas Plant Completion Job Cards
7) 8,000 Global Positioning System (GPS) coordinates
8) Biogas plant inspection reports
9) Routine/scheduled Biogas Plant Visits reports
10) Repairs/complaints and resolution register

9.6 Work Package No. 6 — Extension Services

It is noteworthy that savings realized on fertilizer by the usage of bio-slurry is an important element of the financial internal rate of return (FIRR), hence a key influence on investment profile of a biogas plant. KENDBIP will take full advantage of bio-slurry utilization and targets to have, by the close of the programme in 2014, 60% of biogas users applying bio-slurry in their farms.

9.6.1 Task 6.1 – Establish area bio-slurry extension strategy

Task 6.1.1 Undertake and use area bio-slurry studies;

Task 6.1.1-1 – Bio-slurry sanitation study

Task 6.1.1-2 – Bio-slurry organic farming, fertiliser use, cost and impacts study

Task 6.1.1-3 – Study on gender aspects of bio-slurry utilisation

9.6.2 Task 6.2 – Establish extension service network

Task 6.2.1 Educate all relevant partners on importance of bio-slurry; The effluent from a biogas plant, known as “bio-slurry”, is a high value fertilizer. It follows that bio-slurry, when applied to farmlands, can substantially increase farm produce yields. This economic value addition to a livestock farmer’s earnings improves the business case for a biogas plant. KENFAP will disseminate this message to all partners.

Task 6.2.2 Identify and organize bio-slurry extension partners/workers; Agricultural extension services are best suited to inform farmers about the important and methods of use of bio-slurry. KENFAP will forge partnerships with existing extension service providers such as relevant line ministries (MoA, MoLD, etc.), NGOs and CBOs; obtain staff commitment; orientate the staff with SNV Advisory assistance.

Task 6.2.3 Educate famers on bio-slurry uses and methods of application; With SNV’s technical assistance, educate farmers on bio-slurry introduction on farm, and fertiliser substitution; also bio-slurry sanitation, organic farming. Undertake training on composting best practice and preparation of composting pits.

9.6.3 Task 6.3 – Undertake farm demonstrations; Real-life agricultural demonstration on bio-slurry management and use, on active biogas installations.

9.6.4 Work Package 6 deliverables

1) Area-specific/regional bio-slurry studies on:
a. sanitation
b. organic farming
c. fertiliser use, cost and impacts
2) Partners educated on bio-slurry
3) Operational bio-slurry extension framework with extension partners/workers
4) Farmers educated on bio-slurry uses and methods of application
5) Bio-slurry farm demonstrations

9.7 Work Package No. 7 — Biogas Plant and Appliances R&D

Currently, Kenya does not have manufacturers of most of the domestic biogas appliances and relies on imports. This is mainly because there is an insufficient market for biogas appliances

in general due to the low uptake of the technology. This means, the programme will continue to rely on imported appliances at least for the first one to two years while plans to introduce local assembly and production are finalized and implemented. The key determinant of how fast this subsidiary industry can be built is market uptake of biogas plants. Cost effective production relies on economies of scale, while quality production relies on innovation, research and technology transfer.

The list of appliances and components which KENDBIP will seek to have researched / investigated for local assembly and production will comprise domestic biogas appliances and accessories.

9.7.1 Task 7.1 – Operationalise the R&D framework

Task 7.1.1 Identify and partner with R&D institutions; Evaluation of the added value of local manufacture/assembly will be made through long term oriented R&D (see PM Part I – Guide IX: Selection Criteria for Research and Development Partners) as well as through lessons from other programmes – in and outside Africa. KENFAP will identify and enter in collaborative agreements with partner R&D and educational institutions. The guiding principle: “added value to the domestic biogas user”.

Task 7.1.2 Conduct a market study on domestic biogas appliances and components (availability, sources, uses, pricing, repairs, challenges, etc.)

Task 7.1.3 Enhance education and experience-sharing related to biogas; KENDBIP will support critical expert and practitioner scholarships for studies on biogas production and use, including experience-sharing missions. During the early phase of the programme, KENFAP staff directly associated with the programme will be considered for possible visits to countries such as Nepal, Vietnam, Tanzania and Rwanda, China, India, to experience first hand the experiences of the programmes and markets in those regions.

9.7.2 Task 7.2 – Undertake R&D

Task 7.2.1 Conduct engineering analysis of the appliances and components; in collaboration with a scientific / engineering research institution; the objective will be to increase system efficiency; the newly designed KENBIM requires further testing and optimization to improve efficiencies even more. A process to investigate and resolve emerging technical problems of the KENBIM design will be put in place.

Task 7.2.2 Conduct appliances and components cost analysis; partnership between economic R&D and scientific/engineering R&D; the objective will be to reduce overall biogas cost – high capital outlay is one of the market development barriers identified in Kenya, and largely the reason for subsidy allocations in KENDBIP. Therefore R&D will have cost reduction (KES/cubic meter of constructed biogas plant) as one of its top priorities. This will focus mainly on fabrication elements – e.g. type of bricks, binder (cement, sand), etc.

Task 7.2.3 Conduct enterprise investigations and modeling; to determine which type of SMEs would assemble or manufacture selected components and appliances, and the SME's specific needs.

Task 7.2.4 Develop bio-slurry practices; KENDBIP will investigate the characteristics of bio-slurry in each target region and provide farming and crop type solutions based on each region's climatic and soil conditions and water availability (e.g. for irrigation). The possibilities and options for packaging biogas sludge as fertilizer will also be investigated.

9.7.3 Task 7.3 – Develop technology and methods

Task 7.3.1 Undertake components and appliances development; One of the key challenges facing biogas users in Kenya is availability of good quality and reliable user appliances – e.g. gas cookers/stoves, burners, domestic lighting lamps, regulators, pipes and associated

components. KENDBIP will investigate different options and solutions, with a special focus on possibility of local production and assembly, as opposed to innovation of new products.

Task 7.3.2 Undertake business technical and financial modeling; and pilot test these models; recommend final business models and technical specifications for adoption by the market.

Task 7.3.3 Investigate new technology; On a continuous basis, examine emerging technologies that may lead to more effective and more efficient alternative designs – including those using different base materials (e.g. plastic).

Task 7.3.4 Investigate social and gender dynamics of biogas; The introduction of biogas on a large scale in rural households – with its related positive impacts on health, agriculture, environment, incomes, etc, is expected to lead to social and gender related adjustments. KENDBIP will collaborate with research institutions to monitor and investigate these changes, and to make appropriate recommendations for further programme actions to enhance positive aspects and mitigate/correct any negative impacts.

Task 7.3.5 Standardise the education and R&D results; By the third year of operation, KENDBIP will have provided enough outputs and lessons, as well as research findings to enable standardization of the programme results into recommended best practice.

9.7.4 Work Package 7 deliverables

1) An operational R&D framework
2) Specific partner education and R&D institutions
3) Market study on domestic biogas appliances and components
4) Practitioner scholarships for studies on biogas production and use
5) R&D experience-sharing tours/visits
6) Engineering analysis of specific appliances and components
7) Economic and cost analysis of specific appliances and components
8) Engineering analysis of alternative biogas technologies
9) Economic analysis of alternative biogas technologies
10) An engineering analysis of KENBIM
11) An economic analysis of KENBIM
12) Biogas enterprise investigation and modeling reports
13) Bio-slurry best practice
14) Social and gender best practice
15) R&D best practice

9.8 Work Package No. 8 — Quality Control

KENDBIP recognises the fact that non-functioning and poorly functioning biogas plants cause not only investment losses but also injure the reputation of biogas technology and ultimately negate efforts to establish a sustainable biogas sector. Quality control will be of prime concern, especially because KENBIM a newly designed biogas model.

QC will be embedded in (i) Programme tools; (ii) Programme systems and controls.

9.8.1 **Task 8.1 – Implement embedded tools, systems and controls**

Task 8.1.1 Implement programme tools; KENDBIP staff will identify and ensure implementation of all programme QC tool, including: formal contracting at all levels, Activity Agreements, Annual Budgets and Plans, Job descriptions (JDs) for all programme positions, KENDBIP work ethics, methods and Code of Conduct, National domestic biogas standards, Training Curriculum, Biogas Contractor’s Guide, Biogas Inspection Guide, Biogas End-User’s Guide, Biogas System Trouble Shooting Guide, National biogas baseline surveys, Rapid regional studies, Annual end-user surveys, GIS equipment and database software, Structured training and training plans, Demonstration and training plants, Selection criteria for Trainees, Training venues, and biogas enterprises, guarantees and warranties.

Task 8.1.2 Implement programme systems and controls; KENDBIP staff will identify and ensure implementation of all programme systems and controls, including: competitive and transparent staff recruitment, SNV technical backstopping, Programme orientation forums, Cooperation with Government, industry association – ABC-K and other partners, Transparent partner recruitment based on formalised criteria, Programme audits, Financial management system and software, Dedicated programme staff, local presence of programme staff, with formalised reporting lines, SNV management backstopping, Technical sub-Committee, Collaboration with training and R&D institutions, to set the framework for monitoring and evaluation, Phased implementation/geographic coverage, Locally resident biogas masons, Standard for training needs assessment, Proper selection of training participants and selection of facilitators, Relevant training content and training program scheduling, Appropriate training methods, Effective practical session and evaluation of the training, Prompt action taken on evaluation findings, Competition through a pool of Trained Biogas Masons (wholesome training – theory, practical, non-technical matters – enterprise, promotion, extension), Supervision of construction, Inspection of completed biogas plants, Biogas Mason Certification, Re-training of trained biogas personnel, Capacity building of KENFAP, Capacity building of programme partners – FIs, NGOs, CBOs, etc., Capacity building of biogas enterprises, Finance facilitation, Linkages to other programmes, QC related to training, labeling and branding of all KENDBIP programme biogas plants, Corrective and punitive measures combined to enforce quality, R&D.

9.8.2 **Task 8.2 – Establish the Kenya Biogas Centre of Excellence (KBCE)**

In collaboration with a research and educational institution, establish the KBCE to focus on applied research and development and champion the R&D elements of KENDBIP as stipulated in this document. It will also act as a demonstration, information dissemination and forum/conference centre.

9.8.3 **Task 8.3 – Establish and implement a Biogas Construction QC protocol**

Task 8.3.1 Implement the biogas construction supervision framework; Each Biogas Contractor will put in place a clear supervision protocol, which will ensure close supervision of masonry work during the construction period. It will conform to the Supervisor training and selection criteria (see WP 2: Training and capacity building and the PM Part I – Guide VI: Selection criteria for biogas contractors). Supervisors will typically be employees or contract staff paid directly by the Biogas Contractor. The role of a Supervisor will be to ensure that Biogas Masons follow strictly the stipulated quality procedures during construction.

It is envisaged that one Supervisor in a region can oversee construction of 2 - 3 biogas plants in a week. Hence the network of Supervisors required is as follows:

Table 12: Analysis of Supervision Protocol for the programme

Description	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Annual target of biogas systems	45	455	1,500	2,500	3,500	8,000
Plants supervised by 1 Foreman per annum (based on 2 – 3 per week for a total of 48 weeks/annum) assuming 75% engagement over the year	36	72	72	72	72	
Number of Supervisors Required During The Year	2	7	21	35	49	
Number of New Supervisors Required	2	5	14	14	14	

Task 8.3.2 Establish and activate the KENDBIP QC team; QC site visits will be undertaken by KENDBIP QC team (composed of KENDBIP Officers and KENFAP regional staff); It will be prudent therefore to employ 2 Inspectors from the very beginning because the construction of demo biogas plants at the start of the programme will require much more vigorous reviews and at least two to three visits per biogas plant on average. The number of Inspectors will grow according to the needs of the programme.

Task 8.3.3 Undertake inspection of biogas plants; To achieve efficiency, a cluster approach in installations and inspections will be encouraged through a “cluster incentive”²⁵ for biogas marketers and Biogas Contractors. In the first year and a half, all (100%) of biogas plants constructed will be reviewed by the QC team. Thereafter new plants will be inspected on a sample basis so as to achieve a total programme inspection sample of at least 30%.

In subsequent years, the QC Team will have gained cumulative experience and will take shorter time in inspection of each new plant, enabling them to additionally pay an annual visit to previously completed plants, on a sample basis. At least 10% of all previously installed plants (over one year old) will be visited each year.

Task 8.3.4 Establish reporting, incentive and remedy mechanisms for inspections; A “two-plus-one” week or “3-week” model will be adopted in QC; each QC Inspector will be out in the field for two weeks, then back in the office for compilation of reports for one week (including travel to and from). Based on the field report, further training may be necessary to enhance quality.

Masons will be paid an administrative fee of KES 250/- for each of the reports finalised on quality assurance. The QC Report will be used to determine corrective actions, training and re-training needs of the programme. It will also inform feedback to evaluation of Biogas Contractors; also act as a tool for grading and disqualification of a Biogas Contractor who does not show signs of improvement or action on areas of concern. It will also act as part of QA on programme staff.

During each 2-week field inspection visit, each QC team will review at least 3 – 4 plants per week; hence in one year – assuming a 48-week year (12 months x 4 weeks/month), there will be 16 inspection cycles (48 weeks / 3 weeks per cycle). This will result in 16 cycles x 2 weeks per cycle x 3 – 4 plants inspected = 32 x (3 to 4) = 96 to 128 plants inspections in one year.

Table 13: No. of biogas plants inspected per day

Timeframe:	Week 1	Week 2	Week 3
Target number of biogas plants per week:	3-4	3-4	0
Cumulative no. in 48 week year (2 weeks in field and 1 week reporting), net 32 field weeks:	48-64	96-128	At least 96 reports

²⁵ Detailed in the Incentives and HR Terms Policy Guidelines – Annexe 6

Task 8.3.5 Recruit and train adequate number of Inspectors; To inspect the planned number of plants, at least two Inspectors per KENDBIP Regional Focal Point (KENFAP Offices) will be required.

Table 14: Inspection analysis

Description	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Annual target of biogas systems	45	455	1,500	2,500	3,500	8,000
Plants reviewed by 1 QC Team p.a. (assuming a low of 3 per wk)	48	96	96	96	96	96
Number of QC Teams Required During The Year	1	5	7	7	7	7
Maximum Number of Inspectors Required	2	10	14	14	14	14
Number of New Inspectors Required	2	8	4	0	0	14
Number of New QC Teams Required	1	4	2	0	0	7
Total Number of New Biogas Plants Inspected	45	455	672	672	672	2516
Ratio of New Biogas Plants Inspected	100%	100%	45%	27%	19%	31%
Total No. of Annual Biogas Plant Visits (Previous Installations)	0	45	50	200	450	745
Ratio of Annual Biogas Plant Visits (Previous Installations)	0%	100%	10%	10%	10%	17%
Total No. of Biogas Plants Inspected (Old and New)	45	500	722	872	1122	3261
Average No. of Biogas Plants Per Inspector Per Annum	23	50	52	63	81	233
Average No. of Biogas Plants Per Inspector Per Wk (32 Wks/Yr)	1	2	2	2	3	

9.8.4 Work Package 8 deliverables

1) An operational Kenya Biogas Centre of Excellence (KBCE)
2) 49 active biogas construction Supervisors
3) 14 active biogas Inspectors
4) An established and activate KENDBIP QC team (Inspectors)
5) 2,500 or 30% of all installed biogas plants inspected
6) 745 or 10% of all installed biogas plants inspected a second time
7) QC reporting framework
8) QC incentives
9) QC reports
10) Well designed and active programme QC tools, including: Formal contracts, Activity Agreements, Annual Budgets and Plans, Job descriptions (JDs) for all programme positions, KENDBIP work ethics, methods and Code of Conduct, National domestic biogas standards, Training Curriculum, Biogas Contractor's Guide, Biogas Inspection Guide, Biogas End-User's Guide, Biogas System Trouble Shooting Guide, National biogas baseline surveys, Rapid regional studies, GIS equipment and database software, Structured training and training plans, Demonstration and training plants, Selection criteria for Trainees, Training venues, and biogas enterprises, Guarantees and warranties.
11) Well designed and active programme systems and controls, including: Competitive and transparent staff recruitment, SNV technical backstopping, Programme orientation forums, Cooperation with Government, industry association – ABC-K and other partners, Transparent partner recruitment based on formalised criteria, Programme audits, Financial management system and software, Dedicated programme staff, local presence of programme staff, with formalised reporting lines, SNV management backstopping, Technical sub-Committee, Collaboration with training and R&D institutions, to set the framework for monitoring and evaluation, Phased implementation/geographic coverage, Locally resident biogas masons, Standard for training needs assessment, Proper selection of training participants and selection of facilitators, Relevant training content and training program scheduling, Appropriate training methods, Effective practical session and evaluation of the training, Prompt action taken on evaluation findings, Competition through a pool of Trained Biogas Masons (wholesome training – theory, practical, non-technical matters – enterprise, promotion, extension), Supervision of construction, Inspection of completed biogas plants, Biogas Mason Certification, Re-training of trained biogas personnel, Capacity building of KENFAP, Capacity building of programme partners – FIs, NGOs, CBOs, etc., Capacity building of biogas enterprises, Finance facilitation, Linkages to other programmes, QC related to training, labeling and branding of all KENDBIP programme biogas plants, Corrective and punitive measures combined to enforce quality, R&D.

9.9 Work Package No. 9 — Financial Facilitation and Subsidy Application

9.9.1 Task 9.1 – Establish the overall programme budget

The total programme cost is KES 1.096 billion equivalent to EUR 10.443 million spread over the 4½ years of the programme. The summary below shows the different components (see detailed budgets provided in Part VIII – Annexe 1). This budget has been prepared in detailed consultation with KENFAP, SNV and Hivos.

Table 15: All-in KENDBIP Budget

KENDBIP Overall Budget	KES	EURO	Ratio
Investment	733,671,822	6,987,350	67%
Programme support activities	211,495,914	2,014,251	19%
Technical assistance	151,326,000	1,441,200	14%
Total application	1,096,493,736	10,442,801	100%

Investment in digesters in the form of contributions from householders in cash, credit and subsidies, amounts to KES 733.672 million (about EUR 6.987 million) or 67% of the total programme cost. Programme support activities overseen or executed by KENFAP total KES 211.496 million (about EUR 2.014 million), plus technical assistance as budgeted for by SNV amounting to EUR 1.441 million (about KES 151.326 million). The breakdown is as follows:

Table 16: KENDBIP Categorised Budget

Budget Breakdown		KES	EURO		
a	Investment				
	Investment by households	530,171,822	5,049,255	72%	48%
	Investment subsidy	203,500,000	1,938,095	28%	19%
	Sub total investment	733,671,822	6,987,350	100%	67%
b	Activities				
1	Promotion & marketing	33,755,303	321,480	16%	3%
2	Finance	7,192,900	68,504	3%	1%
3	Private sector development	3,815,350	36,337	2%	0%
4	Quality management	11,630,640	110,768	5%	1%
5	Training	21,376,276	203,584	10%	2%
6	Extension	14,365,073	136,811	7%	1%
7	Institutional support	23,327,600	222,168	11%	2%
8	Monitoring & evaluation	6,242,250	59,450	3%	1%
9	Research & development	1,331,646	12,683	1%	0%
10	HR & management	83,300,439	793,338	39%	8%
11	Contingencies	5,158,437	49,128	2%	0%
	Sub total activities	211,495,914	2,014,251	100%	19%
	Total Programme Costs	945,167,736	9,001,601		
c	Technical assistance				
	International TA	151,326,000	1,441,200		
	Sub total technical assistance	151,326,000	1,441,200		14%
	Total budget	1,096,493,736	10,442,801		100%

9.9.2 Task 9.2 – Establish sources and application of funds

- (i) The total programme budget is KES 1.096 billion (about Euro 10.443 million). There are three core funder categories: Hivos – KES 367.241 million (approximately EUR 3.498 million); SNV (technical assistance/advisory services) – EUR 1.441 million (about KES 151.326 million); Government of Kenya – KES 47.755 million (or EUR 454,806) – crucial, as it relates directly to subsidies; Householders – KES 530.172 million (about EUR 5.049 million). In turn, the householders are supported by further funding from financial services providers, employers, farm-produce based companies (e.g. dairy processors), and personal/family savings or donations.

Table 17: KENDBIP Funding Partners

Source of funds		KES		EURO		%
Households		530,171,822		5,049,255		48%
SNV regular funding		151,326,000		1,441,200		14%
ABPP/Hivos		367,241,284		3,497,540	4,938,740 (SNV+Hivos)	33%
Gvt of KENYA	5%	47,754,630		454,806		4%
Total funds		1,096,493,736		10,442,801		100%

KENFAP will work hand in hand with the National Steering Committee to obtain commitment for this contribution, or more, as well as approach other potential donors. The subsidy/total investment ratio is 28%, as shown below:

Table 18: KENDBIP Capital Investment

Investment		KES		EURO		%
Investment by households		530,171,822		5,049,255		72%
Investment subsidy		203,500,000		1,938,095		28%
Total investment		733,671,822		6,987,350		100%

- (ii) Besides investing in capital costs, owners of biogas plants will provide O&M (operation, maintenance and repair). Following experiences in Asian countries, annual repair and maintenance cost is estimated at 1.5% of the total construction cost for a fixed dome type of biogas plant. Annual financial cost for operating the plant – dung and water collection and mixing – are basically calculated at zero, although in locations where households have to pay for water or water transport these expenditures have to be taken into account. The following table elaborates the KENDBIP O&M component.

Table 19: KENDBIP O&M Profile and Costs

KENBIM O&M	All costs in EURO					
	4 m3	6 m3	8 m3	10 m3	12 m3	16 m3
Total plant installation outlay	590	740	890	1,030	1,200	1,500
Annual repair and maintenance	11.80	14.80	17.80	20.60	24.00	30.00
Repair & Maintenance - in years	236	296	356	412	480	600
Estimated proportion of users	2.5%	15.0%	65.0%	10.0%	5.0%	2.5%
Estimated number of users	200	1,200	5,200	800	400	200
Estimated Q&M Investment	47,200	355,200	1,851,200	329,600	192,000	120,000
Total O&M	2,895,200					

9.9.3 Task 9.3 – Establish Annual Budgets and Plans

Each year, KENFAP will extract an Annual Budget and Plan from this main budget, which will be reviewed and approved by the National Steering Committee before submission to HIVOS for final approval and disbursement. Similarly, the Preparatory Phase funding is extracted from this budget. KENFAP will strive to operate within budgets, but may re-allocate up to a maximum of 20% of specific budgets within their activity categories shown below. Movement of budgets across activity categories will require the approval of the National Steering Committee and, ultimately, HIVOS.

Table 20: KENDBIP Summary Implementation Budget by Activity Category

Programme Implementation Costs		KES	EURO	as a % of impl. Costs	as a % of prog costs
1	Promotion & marketing	33,755,303	321,480	16%	3%
2	Finance	7,192,900	68,504	3%	1%
3	Private sector development	3,815,350	36,337	2%	0%
4	Quality management	11,630,640	110,768	5%	1%
5	Training	21,376,276	203,584	10%	2%
6	Extension	14,365,073	136,811	7%	1%
7	Institutional support	23,327,600	222,168	11%	2%
8	Monitoring & evaluation	6,242,250	59,450	3%	1%
9	Research & development	1,331,646	12,683	1%	0%
10	HR & management	83,300,439	793,338	39%	8%
	Direct cost	70,545,455	671,862	33%	6%
	NIA support costs	12,754,984	121,477	2%	1%
11	Contingencies	5,158,437	49,128	2%	0.5%
Total programme implementation costs		211,495,914	2,014,251	100%	19%

9.9.4 Task 9.5 – Establish credit financing mechanisms

As analysed in the KBFS and emphasised in this PID, biogas systems are in general a steep investment for the average Kenyan householder. According to the budgets presented above (Section 9.9.2), households will contribute a total of KES 530.172 million (about EUR 5.049 million) in capital for the biogas plants. Of this, 25% or KES 132.543 million (about EUR 1.262 million) is estimated to be in cash and 75% or KES 397.629 million (about EUR 3.787 million) in credit. Currently there exists no credit mechanism for KENDBIP to specifically finance biogas end users or contractors. In addition, the ABPP funding does not cater for a credit fund. Hence KENFAP will:

Task 9.5.1 Identify financial services partners and negotiate credit financing; KENFAP will of necessity be charged with the responsibility of identifying appropriate financial services partners to establish credit financing mechanisms for KENDBIP. Various forms of financing of domestic energy products in Kenya have been ongoing (including most recently efforts by GTZ/PSDA) – including some experiments with biogas financing – such experiences will act as leverage or learning points for KENFAP’s initiative.

Task 9.5.2 Collaborate with National Steering Committee, MoE, HIVOS and SNV in raising credit funds; In establishing credit financing mechanisms and raising credit funds, KENFAP will seek the assistance of the National Steering Committee, as well as individually by MoE, HIVOS and SNV.

Task 9.5.3 Convene a financial services workshop; KENFAP will invite financiers (donors, MFIs, Saccos, Banks, NGOs) to a finance stakeholders workshop to elaborate the credit financing opportunities presented by KENDBIP. Thereafter, KENFAP will make individual presentations to financiers to further demonstrate/examine the individual business case and explore ways of collaborating with willing financial institutions.

Some of the credit products that may be proposed to them are listed in the following table:

Table 21: Financial products potentially applicable to KENDBIP

Facility	Beneficiary	Terms	Security
Biogas plant Loan	Individual Households	Commercial interest rates; up to three year's repayment	Personal guarantee; stocks and shares, farm proceeds
Biogas Business Loan	Enterprises /Biogas Contractors/products manufacturers and assemblers	Commercial interest rates; up to three year's repayment	Debenture over company assets; Directors' guarantee

9.9.5 Task 9.6 – Establish subsidy financing mechanisms

Task 9.6.1 Design and implement a subsidy methodology; One that ensures: (i) the amount and nature of any subsidies are considered in detail and critically, to avoid distortion/spoilage of the same market it is meant to develop; and (ii) that subsidies are deliberately pro-poor; (iii) subsidy management takes advantage of FIs as credit leverage partners and subsidy disbursement channels.

The rationale for subsidies in KENDBIP is analysed in detail in the PM under Guide I – KENDBIP Subsidy Criteria and Management Guidelines. In general, the following are the guiding principles: (i) A pro-poor approach (increasing the breadth of the target market); (ii) Significant reduction in the cost outlay (overcoming investment hurdle); (iii) Increased householder investment returns (easing the investment decision); (iv) Subsidy as a promotion tool (achieving economies of scale and a sustainable market); (iv) Subsidy as a quality assurance tool (QC compliance in order to access subsidy).

Based on the analysis detailed in the PM, a flat rate subsidy of KES 25,000 (about EUR 240) will be offered by KENDBIP for every domestic biogas plant installed – irrespective of its size, but subject to the 16m³ upper limit – and subject to the programme budget of 8,000 domestic biogas plants. The table below shows the total tentative subsidy allocation.

The impact of subsidies will be higher on smaller plants. The demand profile and associated budgets is expected to be as follows:

Table 22: KENDBIP Demand and Subsidy Profile

Subsidy Distribution	All costs in EURO					
	4 m ³	6 m ³	8 m ³	10 m ³	12 m ³	16 m ³
Total plant installation outlay	590	740	890	1,030	1,200	1,500
Subsidy amount	240	240	240	240	240	240
Ratio of subsidy to cost	41%	32%	27%	23%	20%	16%
Estimated proportion of users per size	2.5%	15.0%	65.0%	10.0%	5.0%	2.5%
Estimated number of users	200	1,200	5,200	800	400	200
Total estimated value of subsidy	48,000	288,000	1,248,000	192,000	96,000	48,000
Total Subsidy	1,920,000					

The minimum amount of subsidy requirement for the programme amounts to 19% per cent of the total programme cost and on average 28% per cent of total cost of all systems to be installed. This subsidy level is considered sufficient to attract potential customers while not being excessive as to result in undue market distortion and unreasonably high financial internal rates of return (FIRRs) for the farmer.

9.9.6 Task 9.7 – Establish carbon financing mechanisms

The majority of households in Kenya using biomass, specifically fuelwood and charcoal, for cooking. This not only leads to environmental degradation from destruction of forests, but

also emissions of Green House Gases (GHG) to the atmosphere. In households, installation of biodigesters enables fermentation of animal dung in anaerobic conditions and replacement of raw biomass as a fuel source; this contributes to global reduction in GHG emissions.

Task 9.7.1 Design and implement a carbon finance methodology; It is not yet clear whether carbon credits from KENDBIP will be sold on the voluntary market or under a Clean Development Mechanism (CDM) programmatic scheme. Proposals in this PID are therefore only tentative and will be considered alongside other options.

Options will be pursued and the most practical/profitable route will be adopted and implemented. The resultant carbon revenue is expected to generate additional funds that may be utilised for further development of the market. The underlying principles to guide any carbon finance developments under KENDBIP are:

- i. Local ownership and management of the carbon finance programme;
- ii. Carbon revenue transactions embedded in the biogas plant sales agreement;
- iii. Reasonable returns to the biogas plant users;
- iv. Long term biogas sector development.

9.9.7 Work Package 9 deliverables

1) Overall programme budget
2) Annual Budgets and Plans, showing:
3) Identified sources and application of funds
4) Specific analysis of SNV Technical Assistance
5) Householder capital and O&M investment
6) Established and negotiated credit financing mechanisms with specific financial sector partners
7) A dedicated KENDBIP credit fund
8) <i>Financial services workshop</i>
9) Operational subsidy system, including financial sector participation
10) Operational carbon finance methodology

PART IV — PROGRAMME AND RISK MANAGEMENT

9.10 Programme and Funds Management

The custody of all programme funds is the responsibility of KENFAP, which shall ensure prudent management of all funds, and that all funds are applied to the intended purposes in their entirety.

9.10.1 Disbursement of funds by ABPP to KENFAP

Programme funds will originate from DGIS, through Hivos, to KENFAP. The fund disbursement relationship between ABPP and KENDBIP is established through a tripartite agreement between KENFAP, Hivos and SNV. Hivos will disburse funds in foreign currency (EURO) directly to KENFAP, into two separate and dedicated local KENDBIP EURO bank accounts – one for programme funds and the other for the subsidy funds. Funding requests will be submitted twice annually, together with the financial and narrative reports of the preceding semester. Funds will be disbursed in accordance to the detailed budgets (or their revised versions approved by Hivos) in Annexe 1 and the Disbursement Guidelines in the PM Part I – Guide XII: Disbursement guidelines. All disbursements are subject to Hivos approval, must be in line with the PID and annual budgets (or their revised versions approved by Hivos) and can only be approved if financial reporting is up to date.

9.10.2 Disbursement of funds by KENFAP to sub-recipients

Upon receiving funds from Hivos, KENFAP will utilise the allocated funds for management purposes and towards programme implementation costs through the Biogas Office. KENFAP will also disburse funds to funded partners and contracted parties – together “sub-recipients”, all in accordance with the detailed budgets (or their revised versions approved by Hivos) in Annexes 1.

KENFAP will be charged with the responsibility of assessing and approving the capacity of each sub-recipient to implement KENDBIP activities and to report thereon. KENFAP will adhere to principles of fairness, competitiveness and transparency in awarding contracts to sub-recipients and will document in full and submit each sub-recipient assessment to Hivos.

For purposes of formal partnerships and contracted parties, KENFAP will enter into a detailed Grant Agreement with each party which stipulates all the salient feature of the Grant Funding and sub-recipient responsibilities. A copy of each letter or memorandum of understanding and each legal agreement entered into between KENFAP and sub-recipients will be availed to Hivos upon signature.

9.10.3 Procurement of goods and services by KENDBIP

When purchasing goods and services, KENFAP will consistently aim to obtain the best price-quality ratio and, where practicable KENFAP will call for competitive tenders. KENFAP shall keep Hivos informed about the policies and practices that it shall use to contract for goods and services and will ask for its approval. KENFAP will ensure that sub-recipients comply with the policies and practices it adopts for tendering and awarding contracts and procurement in general.

Procurement of goods, works and services will be carried out in accordance with internationally accepted principles and good procurement practices. KENFAP’s written Procurement Rules, after acceptance by Hivos, shall apply to the procurement of goods, works and services carried out by KENFAP, or an agency/consultant appointed by KENFAP for that purpose.

9.10.4 Bank accounts and related revenues and costs

KENFAP shall open four separate bank accounts for the purpose of management of KENDBIP; one foreign currency account for receiving programme funds and one foreign currency account for receiving subsidy funds. Each account will have one corresponding local currency account opened, out of which all local currency-based transactions will be managed. Foreign currency-based transactions will be operated from the foreign currency accounts.

KENFAP will negotiate with its bank to ensure that all KENDBIP accounts attract reasonable interest on all credit balances, to the credit of the same accounts and KENDBIP. Any interest on Grant Funds disbursed by Hivos to KENFAP for KENDBIP or by KENFAP to sub-recipients shall be accounted for and used solely for Programme Purposes as defined in the PID, Annual Operational Plans and Budgets, as approved by the National Steering Committee.

It will be KENFAP’s sole responsibility to ensure that any bank used by KENFAP to transact any business of KENDBIP is fully compliant with all applicable local and international banking standards and regulations. KENFAP will keep reasonable watch over and review of the financial status and operational standing of such banks, and immediately recommend appropriate actions to Hivos – which could include moving KENDBIP funds to another bank if necessary.

9.11 Risk Management

9.11.1 Kenya Biogas sector SWOT Analysis

Table 23: SWOT analysis for Kenya biogas sector

STRENGTHS	OPPORTUNITIES
<ul style="list-style-type: none"> ▪ Track record of some Biogas Contractors/pioneers involved in dissemination and construction of biogas plants e.g. SCODE, GTZ ▪ Favourable finance sector- SACCOs, MFIs and FIs ▪ Some financial institutions working currently with the consumers in biogas dissemination e.g. KWFT ▪ Relevant experience of NIA in managing multi-level, multi institutional and multi-stakeholder programmes. ▪ Wide network of farmers providing all the biogas plants. ▪ Support from the Government ministries and other relevant institutions – the MoE, KENFAP ▪ Some biogas Masons have already been trained 	<ul style="list-style-type: none"> ▪ Many regions in Kenya with many sources of the feedstock and practice of zero grazing ▪ Sufficient water available for the biogas plant operation ▪ Revived interest in donor community in biogas ▪ Financing interest from the financial institutions taking interest in supporting biogas initiatives ▪ Increasing energy demand in the country due to population increase , changing lifestyles and fuels cost increases ▪ Forests, the source of the primary fuel (firewood) used by most households, are diminishing. ▪ Changing national policy in favour of renewable energy. Accrual benefits from carbon trading.
WEAKNESSES	THREATS
<ul style="list-style-type: none"> ▪ Low quality appliances e.g. the burners ▪ High cost of the construction materials ▪ Poor workmanship leading to malfunctioned biogas plants ▪ poor after-sales service ▪ few companies commercially active in the biogas sector ▪ financial returns not convincing on short term (< 3-5 years) ▪ lack of consistence training and technical support to the technicians from the stakeholders ▪ lack of regulatory and legal frame in the biogas industry ▪ lack of subsidies to support the construction of the biogas plants ▪ inappropriately sensitised financial sector 	<ul style="list-style-type: none"> ▪ Irregular water supplies occasioned by the frequent droughts ▪ Loss of confidence on the biogas plants due to poor designs and constructions ▪ Price fluctuations hence changing costs of constructions ▪ Overly risk averse to farming community.

9.11.2 Deductions from programme SWOT Analysis

- The market can be characterized as immature, sales are yet to take off
- The market is served by a few pioneers, both NGOs and programme supported private enterprises, with limited installation capacity.
- The market leader for household systems, SCODE, is installing about 30 systems a year.
- With the exception of the tubular systems, total installations per year are around hundred systems.
- There is an increasing awareness of the biogas product with farmers. SCODE has a waiting list of about 100 interested persons. This waiting list might be the result of the decreased retail prices, which come with an increased financial return for an investment in the product.

- The financial return is not convincing on the short term (<3-5 years) that farmers invest for financial reasons in biogas plants. Comfort, social standing, and cleaner practices for cooking are triggers at household level.
- More recently a product differentiation took place, which will offer an opportunity to serve both less wealthy clients as well as larger institutional clients. This differentiation will bring further segmentation to the market and new opportunities for different type of companies and technicians.
- The market will need strong support in terms of capacity building to increase sales number from hundreds to thousands of systems installed per year.
- The market is best served by challenging and facilitating the actual players to grow their companies further. The actual actors involved are playing different roles.
- NGOs like SCODE and companies like REECON, could specialize in designing and implementing on the job training courses for Masons/technicians.
- Masons and technicians could work directly or indirectly with NGOs or larger construction companies (e.g. active in the institutional segment of the market) as subBiogas Contractors for the household segment of the market.
- Training courses could gradually transfer from on the job to vocational education centres.
- Government agencies could continue to promote and support proven technologies at fairs, demonstration farms and demonstration centres and actively refer customers to regional private sector players.

9.11.3 KENDBIP SWOT Analysis

Table 24: SWOT Analysis for KENDBIP

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> ▪ Strong networking and partnerships with policy makers at national and international levels ▪ Financial ability to invest in arid and semi-arid districts and communities ▪ Technical expertise within the organization to exploit other sources of renewable energy ▪ Intensified application of science, technology and innovation to raise productivity and efficiency 	<ul style="list-style-type: none"> ▪ lack of regulatory and legal frame in the biogas industry ▪ lack of subsidies to support the construction of the biogas plants ▪ Inappropriately sensitised financial sector
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> ▪ Insufficient household energy supply hence opportunity to invest ▪ Life-long training and education; raise labour productivity to international levels ▪ Opportunity to invest in carbon financing through the constructed biogas plants (carbon revenue transactions embedded in the biogas plant sales agreement) 	<ul style="list-style-type: none"> ▪ Political uncertainty in the country ▪ Current economic crisis might deter farmers from investing in bio-biogas plants

9.11.4 Strategies to mitigate risks, constraints and barriers

Table 25: Risk Mitigation Analysis

Risk / constraint / barrier	Mitigation strategies / actions / measures
i. Market risks: Acceptability of the technology	Sensitisation of the market players and potential customers before installation of the systems; educating MFI officers, who are the interface with the customer on a day-to-day basis; selection of appropriate technology taking into account cultural practices and beliefs; ensuring the technology is working effectively and is well maintained.
ii. Cultural risks: Construction of biogas systems	Orientation of the market and explanation of the need to involve persons of all backgrounds; orientation of the technical team to ensure they understand local cultural practices to ensure they do not make offensive statements or act socially incorrectly.
iii. Economic risks: Inflation and rising costs of oil; construction costs of the biogas plants	Finding lower cost designs which do not compromise quality and output of biogas; construction of biogas plants on a turn key basis.
iv. Financing mechanism: programme funds and credit for users and entrepreneurs	Clear PID with detailed budgets and implementation schedule, to ensure smooth disbursement of funds. The programme has given the development of appropriate financing mechanisms priority.
v. Leverage risks: Inability of MFIs to leverage the seed capital	Assisting the MFIs to link with finance from other sources, for instance like-minded donors; incorporate end-user leverage; lend 100% to the segment of the market where risks are lower.
vi. Subsidies and subsidy mechanisms	Administration of subsidies through a separate bank account and clear subsidy guidelines.
vii. Political risks: Competition that may emerge due to the development of a national programme	Transparency and responsiveness to the market and other players will ensure there is no suspicion; ensuring the national biogas initiative is private sector-driven and therefore available for participation by all willing and ready parties.
viii. Technical risks: Failure of the biogas systems.	Proper technical training of local Biogas Contractors; availability of maintenance backup; educating the users on proper handling practices and maintenance.
ix. Programme inherent risks: Bureaucracy; management	Appointment of a strong NIA with both experience and capacity to handle multi-stakeholder programme; In addition, a detailed monitoring and evaluation system has been designed to guide the programme implementation.
x. Social and political stability	Appropriate community mobilisation, preceded by a Rapid Biogas Study in each region; training communities on participatory approaches to maximise programme local ownership.
xi. Force majeure, litigation and contingent liabilities	Proper monitoring and evaluation; Proper agreements; Proper operational guidelines; Legal setting – Hivos/KENFAP Agreement.

PART V — PROGRAMME MONITORING & EVALUATION PLAN

9.12 M&E Framework and actions

9.12.1 Summary of M&E Plan

Monitoring and evaluation (M&E) will be an integral system of reflection and communication in KENDBIP. The M&E system will integrate formal and informal, data-oriented and

communication—based approaches. KENFAP will be responsible for all levels of M&E functions. It is also responsible for all programme documentation.

ABPP has developed a monitoring matrix which shows, number of plants, annual and cumulative production over the years, cost benefit analysis on subsidy, credit benefits in fuel substitution per HH, carbon value and fertiliser value, outreach (number of women reached, men, children), environmental and agricultural impacts, health and sanitation impacts, impacts on employment creation, persons training, impacts of training, sector development, growth in partnership among others. This will be used through out the programme period to demonstrated success levels of the different components of the programme.

9.12.2 Output-based approach to M&E

The basis for effective monitoring and evaluation is proper baseline setting. In its preparatory activities over the first six months, KENFAP will, by commissioning Baseline Surveys, perfect the output-based impact-oriented monitoring and evaluation baseline indicators, with specific focus on parameters drawn from the regions targeted for intervention. Such indicators will take into account documented barriers and risks associated with biogas sector development, such as poor administration and management, high initial capital and maintenance costs; and poor technical capacity. It will take into account the goal and objectives of not only KENDBIP, but also ABPP's and National Priorities – such as poverty reduction, livelihood improvement, wealth creation. (See draft ToR for baseline setting in the PM Part III – TOR II: TOR for Rapid Regional Biogas Studies).

A performance evaluation procedure will also be adopted, as outlined in PM Part II – Template VIII: Monitoring and evaluation plan.

9.12.3 Monitoring system

KENFAP will maintain and comply with a system to monitor the performance of sub-recipients and ensure regular reporting by the sub-recipients.

For this purpose, a monitoring matrix has been developed which shows, number of plants, annual and cumulative production over the years, cost benefit analysis on subsidy, credit benefits in fuel substitution per household, carbon value and fertiliser value, outreach (number of women reached, men, children), environmental and agricultural impacts, health and sanitation impacts, impacts on employment creation, persons training, impacts of training, sector development, growth in partnership among others.

KENFAP will be responsible for monitoring and evaluating the progress of the Annual Plans towards the objective of KENDBIP, including the activities implemented by sub-recipients, in accordance with the monitoring and evaluation plan approved by Hivos and SNV. KENFAP will put in place measures to ensure that it receives only quality data and accurate reports.

Plant Identification and Locations System (PILS) under KENDBIP will record the position of every (100%) biogas plant constructed under the programme. This will act as both a monitoring and promotion tool; and in the case of a carbon credit system will be indispensable and vital for plant verification (hence carbon revenue transactions embedded in the biogas plant sales agreement). KENFAP regional staff assigned to KENDBIP will be responsible for registration of all the Global Positioning System (GPS) coordinates during the Plant Completion Visits.

Each year, KENFAP will commission an end-user survey aimed at assessing the programme's effectiveness in addressing end-user needs, including technical support.

9.12.4 Evaluation system

Baseline data generated via KENFAP Baseline Surveys, the Impact Template (see PM Part II – Template IX: Impact and Action Plan) and the monitoring and evaluation template (see PM

Part II – Template VIII – Monitoring and Evaluation plan) will provide the departure points for future mid-term and final evaluation of impact.

Two levels of evaluation are proposed: (i) mid-term evaluation and; (ii) final programme evaluation. Both will be done by external consultants independently appointed by Hivos, with National Steering Committee recommendation. The evaluation will focus on two key components of the programme- Technical and financial issues.

In addition, Hivos, in its sole discretion, can conduct or commission evaluations of the Annual Plans, or of specified activities of the Annual Plans, implementing structures or other issues. Hivos will specify the terms of reference for any evaluation and an appropriate schedule for conducting it. KENFAP will require sub-recipients to facilitate such evaluations. Hivos may inspect or instruct to inspect at any time the activities carried out in connection with KENDBIP, including KENFAP and sub-recipients' reports and financial accounts. KENFAP will ensure that Hivos faces no objections or hindrances in carrying out such evaluations.

9.12.5 Monitoring and evaluation tools

The following tools are designed to ensure that the programme monitoring is conducted thoroughly and this will enable the programme to be on track and necessary adjustments made from an informed point of view.

9.12.6 Templates for monitoring

i. Template I: Activity Plan (see PM Part II – Template VIII: Monitoring and Evaluation Plan)

This will detail monthly planned action. Monitoring will be done by checking actual results against the planned outputs. This is important as it will enable the partners to have a standard framework hence making it easier for self monitoring and quarterly reporting by the implementing agency.

ii. Template II: Impact Template (see PM Part II – Template IX: Impact and Action Plan)

This template will support the programme management understand the likely impacts of the programme. Programme impacts determine success or failure. Impacts start coming out half-way the programme and will require to be tracked every six months, by an appropriate officer in the Monitoring and Evaluation function. If the templates indicate that there is likely to be little or no impact, KENDBIP management will take corrective action.

9.12.7 End-user surveys

The annual end-user surveys will be undertaken by independent parties contracted by KENFAP to determine the responsiveness of the programme to end-user needs, and to identify gaps and challenges that need addressing and which could inform future activities.

9.12.8 Programme progress reports

KENFAP shall provide to Hivos and SNV general progress reports, containing a narrative and a financial component, every six months (from February to June and from July to December), within 6 weeks of the termination of the period, or at any moment upon request of Hivos and SNV. KENFAP shall provide on request of Hivos specific reports, covering particular issues or regions at all times. Hivos and SNV will guide KENFAP on the required content of the progress reports and KENFAP shall act in accordance therewith.

The Biogas Contractors will make a monthly progress reports to KENFAP. Their reports will form the basis for KENFAP's semi-annual reporting to ABPP.

Acceptance by the Hivos and SNV will be by acknowledgement of (i) receipt and (ii) approval. Such approval will be provided by Hivos in writing, after any queries have been clarified by KENFAP. On the other hand, all Reports shall be deemed to be accepted by Hivos and SNV at

the expiry of two months after their submission, unless one of the ABPP partners has explicitly raised any objection within this time period.

9.12.9 Programme Audits

- i. Books and Records: KENFAP and its sub-recipients will maintain accounting books and records specifically for KENDBIP and in accordance with the generally accepted Kenyan and International Accounting Standards.
- ii. Audits: KENFAP will have annual financial audits of Programme inflows and expenditures conducted by an independent auditor. KENFAP will submit this Audit Report to Hivos no later than the 25th of February of every year in respect of the previous (European) calendar year. KENFAP will also furnish a copy of its audited annual accounts, as soon as received from its auditors.
- iii. Independent Auditor: Audit services for KENDBIP will be procured through a competitive tender. KENFAP will notify Hivos of the independent auditor that it has selected to perform the annual audits of KENDBIP. The final selection of the auditor and its terms of reference shall be subject to the approval of Hivos. The audit shall be carried out in accordance with International Accounting & Financial Reporting Standards (IASs & IFRs) as amended from time to time and issued by the International Accounting Standard Board (IASB). The cost of the audit will be met from the programme budget.
- iv. Sub-recipients Audits: KENFAP will ensure that sub-recipients have their accounting books and records audited and will present to Hivos a copy of all completed sub-recipient audits.

9.12.10 Programme insurances and contingent liabilities

- i. Insurances: KENFAP will maintain, where available at a reasonable cost, all risk property insurance on Programme assets and comprehensive general liability insurance with financially sound and reputable insurance companies. The insurance coverage will be consistent with that held by similar entities engaged in comparable activities.
- ii. Contingent liabilities: KENFAP will guard KENDBIP from any contingent liabilities by entering into appropriate and well structured legal agreements with all parties with whom KENFAP transacts KENDBIP business. KENFAP will use the services of reputed and legally competent counsel in contracting for KENDBIP.
- iii. Illegal or corrupt practices: KENFAP and its staff will not offer to third parties or seek or accept from or be promised by third parties, for themselves or for any other party, any gift, remuneration, compensation or benefit of any kind whatsoever, which could be interpreted as an illegal or corrupt practice. Such practices may provide grounds for dissolution of the contract between KENFAP and Hivos.
- iv. Ownership of materials: Any studies, reports, knowledge or other intellectual products (graphic, software or otherwise) prepared by any of the Parties under this agreement will be the property of KENDBIP and may be used for purposes of knowledge sharing and networking and (joint) publications. Any other uses will be as approved by Hivos.

9.12.11 Programme communication and documentation

All the programme partners will meet semi-annually to evaluate the programme progress, share experiences and lessons learnt. KENFAP will be responsible for coordinating the partners and convening such events.

All the programme documentation will be uploaded in the programme website and will be updated regularly to keep the interested stakeholders informed of the programme progress. Other relevant avenues such as electronic media will be used for programme communication. KENFAP will be the custodian of all the official programme documents.

PART VI — ANNEXES

Annexe 1: Detailed Budget Computations

1	Promotion and marketing						Budget	as a % of	as a % of
		2009	2010	2011	2012	2013	total	component	total budget
1.01	Dev. & Prodn of Promo Materials	9,305,607	6,927,607	2,838,607	2,838,607	-	21,910,428	65%	10.62%
1.02	Cluster promotion	63,625	1,781,500	1,781,500	1,781,500	1,781,500	7,189,625	21%	3.48%
1.03	Biogas Quick Scan	304,500	418,688	418,688	418,688	418,688	1,979,250	6%	0.96%
1.04	KENDBIP Website	116,000	-	-	-	-	116,000	0%	0.06%
1.05	Customer Help Desk	116,000	-	-	-	-	116,000	0%	0.06%
1.06	Launch of program	-	2,444,000	-	-	-	2,444,000	7%	1.18%
	Total promotion	9,905,732	11,571,795	5,038,795	5,038,795	2,200,188	33,755,303	100%	16.36%

2	Finance						Budget	as a % of	as a % of
		2009	2010	2011	2012	2013	total	component	total budget
2.01	Subsidy transfer & administration	46,875	309,375	959,375	1,584,375	2,187,500	5,087,500	71%	2.47%
2.02	Carbon Finance Development	-	730,800	-	-	-	730,800	10%	0.35%
2.03	Internal Audit costs	46,400	92,800	92,800	92,800	92,800	417,600	6%	0.20%
2.04	Annual financial and management audit	-	188,500	188,500	188,500	188,500	754,000	10%	0.37%
2.05	Financial software / updates	203,000	-	-	-	-	203,000	3%	0.10%
	Total finance	296,275	1,321,475	1,240,675	1,865,675	2,468,800	7,192,900	100%	3.49%

3	Private sector support						Budget	as a % of	as a % of
		2009	2010	2011	2012	2013	total	component	total budget
3.01	Biogas Sector Survey - Appliances	-	456,750	-	-	-	456,750	12%	0.22%
3.02	Enterprise Development Training	-	248,860	746,580	746,580	746,580	2,488,600	65%	1.21%
3.03	Sector Development Meetings	285,000	400,000	130,000	35,000	20,000	870,000	23%	0.42%
	Total private sector support	285,000	1,105,610	876,580	781,580	766,580	3,815,350	100%	1.85%

4	Quality management	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
	<i>Plant completion visits</i>							0.00%	
	<i>Plant annual maintenance visits</i>							0.00%	
4.01	BCE plant report processing	9,000	91,000	300,000	500,000	700,000	1,600,000	14%	0.78%
4.02	QC Completion Incentive	11,250	113,750	375,000	625,000	875,000	2,000,000	17%	0.97%
	<i>Field Logistics</i>							0.00%	
4.03	QC by the 28 active focal points	2,187	22,113	72,900	121,500	170,100	388,800	3%	0.19%
4.04	QC by the 5 active regional coordination offices	608	6,143	20,250	33,750	47,250	108,000	1%	0.05%
4.05	QC Biogas Plants Inspection Protocol for the 2,5	1,688	17,063	56,250	93,750	131,250	300,000	3%	0.15%
4.06	QC Biogas plants inspected a second time - 745	503	5,085	16,763	27,938	39,113	89,400	1%	0.04%
4.07	QC by the Biogas Office in Nairobi	1,688	17,063	56,250	93,750	131,250	300,000	3%	0.15%
	<i>Field Tools and Equipment</i>							0.00%	
4.08	QC Manuals and books	107,900	-	-	322,900	-	430,800	4%	0.21%
4.09	Honda XL 125	-	398,750	398,750	398,750	398,750	1,595,000	14%	0.77%
4.10	GIS software/hardware & maintenance	580,000	-	-	-	-	580,000	5%	0.28%
4.11	QM database software & maint	87,000	-	-	-	-	87,000	1%	0.04%
4.12	Operation and maintenance costs	393,240	939,600	939,600	939,600	939,600	4,151,640	36%	2.01%
	Total quality management	1,195,062	1,610,565	2,235,763	3,156,938	3,432,313	11,630,640	100%	5.64%

5	Training	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
5.01	Upgrading existing Biogas Masons	219,069	794,124	1,725,166	-	-	2,738,358	13%	1.33%
5.02	Visits to vet approved training venues	-	87,000	-	-	-	87,000	0%	0.04%
5.03	Biogas Masons trained - new	62,771	282,470	1,475,122	3,264,100	3,264,100	8,348,564	39%	4.05%
5.04	Biogas Masons re-trained	44,167	176,669	485,839	463,755	463,755	1,634,185	8%	0.79%
5.05	Biogas Supervisors trained	21,905	54,763	153,337	153,337	153,337	536,679	3%	0.26%
5.06	Biogas Supervisors re-trained	10,953	10,953	32,858	32,858	32,858	120,479	1%	0.06%
5.07	Biogas Inspectors trained	21,905	87,621	43,811	-	-	153,337	1%	0.07%
5.08	Biogas Inspector re-trained	21,905	87,621	43,811	-	-	153,337	1%	0.07%
5.09	Bio-slurry & O&M extension worker training	535,178	535,178	535,178	535,178	535,178	2,675,888	13%	1.30%
5.10	Biogas end-users: O&M and bio-slurry training	40,900	286,300	920,250	1,533,750	2,147,250	4,928,450	23%	2.39%
	Total training	978,753	2,402,698	5,415,370	5,982,978	6,596,478	21,376,276	100%	10.36%

6	Extension	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
6.01	Bioslurry - fertilizer study	-	304,500	-	-	-	304,500	2%	0.15%
6.02	Bioslurry - sanitation study	-	487,200	-	-	-	487,200	3%	0.24%
6.03	Biogas - organic farming study	-	304,500	-	-	-	304,500	2%	0.15%
6.04	Bioslurry - farm demonstration	271,618	366,992	315,132	315,132	-	1,268,873	9%	0.61%
6.05	Extension support services (post installation)	67,500	682,500	2,250,000	3,750,000	5,250,000	12,000,000	84%	5.82%
	Total extension	339,118	2,145,692	2,565,132	4,065,132	5,250,000	14,365,073	100%	6.96%

7	Inst. Dev. & Support Costs/Fees	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
7.01	ABC-K support	180,000	360,000	360,000	360,000	360,000	1,620,000	7%	0.79%
7.02	NGO network support	300,000	600,000	600,000	600,000	600,000	2,700,000	12%	1.31%
7.03	Village (CBO) network support	210,000	420,000	420,000	420,000	420,000	1,890,000	8%	0.92%
7.04	Private Sector (media and farmer groups)	210,000	420,000	420,000	420,000	420,000	1,890,000	8%	0.92%
7.05	Financial Services Providers	300,000	600,000	600,000	600,000	600,000	2,700,000	12%	1.31%
7.06	Government Agencies - for extension, etc.	300,000	600,000	600,000	600,000	600,000	2,700,000	12%	1.31%
7.07	Educational and Research institutes	210,000	420,000	420,000	420,000	420,000	1,890,000	8%	0.92%
7.08	Annual regional workshops	-	255,000	255,000	255,000	255,000	1,020,000	4%	0.49%
7.09	Programme partners' semi-annual workshop	-	418,000	418,000	418,000	418,000	1,672,000	7%	0.81%
7.10	Financial services workshops	368,000	368,000	368,000	368,000	368,000	1,840,000	8%	0.89%
7.11	KENFAP / Biogas Office Capacity Building	548,100	1,375,500	478,500	247,500	-	2,649,600	11%	1.28%
7.12	National Biogas Steering Committee	84,000	168,000	168,000	168,000	168,000	756,000	3%	0.37%
	Total institutional support	2,710,100	6,004,500	5,107,500	4,876,500	4,629,000	23,327,600	100%	11.31%

8	Monitoring & evaluation	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
8.01	Domestic Biogas Baseline Survey	-	2,923,200	-	-	-	2,923,200	47%	1.42%
8.02	Biogas User Survey	-	-	456,750	456,750	456,750	1,370,250	22%	0.66%
8.03	Environmental Impact Study	-	-	-	-	487,200	487,200	8%	0.24%
8.04	External project evaluation	-	-	487,200	-	-	487,200	8%	0.24%
8.05	External project final evaluation	-	-	-	-	974,400	974,400	16%	0.47%
	Total extension	-	2,923,200	943,950	456,750	1,918,350	6,242,250	100%	3.03%

9	R & D / Standardization	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
9.01	Design refinement of KENBIM	-	90,000	-	-	-	90,000	7%	0.04%
9.02	KENBIM field testing	-	135,000	-	-	-	135,000	10%	0.07%
9.03	Biogas appliances and parts research and deve	-	90,000	90,000	90,000	-	270,000	20%	0.13%
9.04	Biogas standards - development and formulati	-	135,000	135,000	-	-	270,000	20%	0.13%
9.05	Biogas standards - production and distribution	-	18,662	18,662	18,662	18,662	74,646	6%	0.04%
9.06	Research and development framework support	-	101,250	101,250	101,250	101,250	405,000	30%	0.20%
9.07	R&D experience-sharing tours/visits	-	87,000	-	-	-	87,000	7%	0.04%
9.08	MSc / BSc study support	-	-	-	-	-	-	0%	0.00%
	Total research & development	-	656,912	344,912	209,912	119,912	1,331,646	100%	0.65%

10	HR & management	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
10.01	Programme Coordinator	498,000	2,041,800	2,143,890	2,251,085	2,363,639	9,298,413	11%	4.51%
10.02	Snr. Biogas Engineer	264,000	1,082,400	1,136,520	1,193,346	1,253,013	4,929,279	6%	2.39%
10.03	Promotion and Marketing Officer	264,000	1,082,400	1,136,520	1,193,346	1,253,013	4,929,279	6%	2.39%
10.04	Accountant	150,000	615,000	645,750	678,038	711,939	2,800,727	3%	1.36%
10.05	GIS/ICT Officer	150,000	615,000	645,750	678,038	711,939	2,800,727	3%	1.36%
10.06	Admin/PR Officer	60,000	246,000	258,300	271,215	284,776	1,120,291	1%	0.54%
10.07	Driver	75,000	307,500	322,875	339,019	355,970	1,400,363	2%	0.68%
10.08	Messenger	51,000	209,100	219,555	230,533	242,059	952,247	1%	0.46%
10.09	Regional Biogas Technical Officers	360,000	1,323,000	1,984,500	2,083,725	2,187,911	7,939,136	10%	3.85%
10.10	Local Biogas Technical Officers	150,000	1,260,000	1,736,438	2,083,725	2,187,911	7,418,074	9%	3.60%
10.11	Staff development	32,243	142,601	173,296	194,008	206,101	748,249	1%	0.36%
10.12	Staff Benefits (Medical Ins., Pension)	185,738	453,668	511,266	546,928	407,409	2,105,007	3%	1.02%
10.13	Bus fares and other transport costs	36,000	90,000	126,000	126,000	126,000	504,000	1%	0.24%
10.14	Focal Points - DSA	96,000	240,000	336,000	336,000	336,000	1,344,000	2%	0.65%
10.15	Biogas Office Nairobi - DSA	300,000	600,000	600,000	600,000	600,000	2,700,000	3%	1.31%
10.16	Transportation car	300,000	600,000	600,000	600,000	600,000	2,700,000	3%	1.31%
10.17	Transportation motor cycle	64,800	216,000	280,800	280,800	280,800	1,123,200	1%	0.54%
10.18	Office rent	382,800	765,600	765,600	765,600	765,600	3,445,200	4%	1.67%
10.19	Utilities	111,360	222,720	222,720	222,720	222,720	1,002,240	1%	0.49%
10.20	Office expenses - Internet, telephone, etc.	435,600	937,200	1,015,200	1,090,200	1,111,200	4,589,400	6%	2.22%
10.21	Programme insurances	-	86,043	77,439	69,695	62,725	295,902	0%	0.14%
10.22	Office furniture	641,045	137,025	137,025	137,025	-	1,052,120	1%	0.51%
10.23	Office equipment	1,061,400	-	226,200	-	-	1,287,600	2%	0.62%
10.24	Vehicle Toyota pick-up double cabin	-	4,060,000	-	-	-	4,060,000	5%	1.97%
	Total operating expenses	5,668,985	17,333,056	15,301,643	15,971,043	16,270,727	70,545,454	85%	34.19%

10	HR & management	Budget					as a % of component	as a % of total budget	
		2009	2010	2011	2012	2013			total
10.25	KENFAP HR Inputs for Inception Phase	725,550					725,550	1%	0.35%
10.26	Contracted HR Inputs for WP1 (Consultants)	3,971,100					3,971,100	5%	1.92%
10.27	KENFAP o/head and staff support costs	141,725	433,326	382,541	399,276	406,768	1,763,636	2%	0.85%
10.28	KENFAP Regional Coordinators	90,000	330,750	496,125	520,931	546,978	1,984,784	2%	0.96%
10.29	KENFAP Local Supervisors	37,500	393,750	826,875	1,410,855	1,640,933	4,309,914	5%	2.09%
	Total support costs	4,965,875	1,157,826	1,705,541	2,331,063	2,594,679	12,754,984	15%	6.18%
	Total operational and support expenses	10,634,860	18,490,882	17,007,184	18,302,106	18,865,406	83,300,439	100%	40.37%

Annexe 2: Activity and Time Plan

				Y1			Y2			Y3			Y4						
		P1	P2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Output 1: Inception and launch																			
Activities																			
1.1 Establishment and operationalisation of the Biogas Office																			
	1.1.1 Contract with Hivos and SNV																		
	1.1.2 Contract SNV – Phase I Activity Agreements																		
	1.1.3 Budget, plan and allocate agreed administrative staff and facilities to KENDBIP.																		
	1.1.4 Annual Budgets and Plans for 2009 and 2010.																		
	1.1.5 Develop and apply detailed job descriptions (JDs) for each of the positions.																		
	1.1.6 Recruit programme staff through a competitive and transparent process.																		
	1.1.7 Develop/procure and implement a financial system and software.																		
	1.1.8 Undertake programme audits (starting in February 2010).																		
1.2 Setting the base for market activities																			
	1.2.1 Coalesce and consolidate staff support																		
	1.2.2 Establish liason with Government																		
	1.2.3 Establish partnerships																		
	1.2.4 Establish liason with ABC-K																		
	1.2.5 Establish collaboration with training and R&D institutions																		
	1.2.6 Undertake national biogas baseline surveys																		
	1.2.7 Undertake premier rapid regional studies																		
1.3 Preliminary Activities – Technical																			
	1.3.1 Prepare/refine programme management tools.																		
	1.3.2 Identify and prepare field implementation tools																		
	1.3.3 Procure and purchase GIS equipment																		
1.4 Preliminary Activities – Training, Education and Demonstration																			
	1.4.1 Preliminary training of Biogas Masons and Supervisors																		
	1.4.2 Identify and select Biogas Masons																		
	1.4.3 Preliminary training and education																		
	1.4.4 Construct demonstration plants;																		
1.5 Preliminary Activities – Programme launch																			
	1.5.1 Programme launch forum																		

			Y1		Y2					Y3			Y4							
			P1	P2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Outputs 2: Training and Capacity Building																				
Activities																				
2.1 Selection of trainees, trainers and training venues																				
	2.1.1	Select Training Venue																		
	2.1.2	Select Trainees																		
	2.1.3	Select Supervisors and Inspectors																		
	2.1.4	Select trainers																		
	2.1.5	Select biogas enterprises																		
	2.1.6	Create a Pool of Trained Biogas Masons																		
2.2 Capacity building activities – supply side																				
	2.2.1	Build the capacity of KENFAP																		
	2.2.2	Build the capacity of Programme Partners – FIs, NGOs, CBOs, etc.																		
	2.2.3	Build sector capacity on biogas enterprise																		
2.3 Capacity building – demand side																				
	2.3.1	Train users on biogas technology																		
	2.3.2	Train users and partners on bio-slurry use;																		

Outputs 3: Promote and Market Biogas Technology																				
Activities																				
3.1 Prepare KENDBIP and KENFAP staff																				
	3.1.1	Prepare KENFAP Offices to play focal role and equip them																		
	3.1.2	Develop an incentive package for successful promotion and apply it																		
3.2 Build local area baselines and approaches																				
	3.2.1	Undertake Rapid Regional Biogas Studies																		
	3.2.2	Develop mechanisms for inclusion of women and apply them																		
3.3 Establish partnerships and channels for promotion																				
	3.3.1	Identify and enter into collaboration with appropriate media channels and																		
	3.3.2	Establish specific promotion actions to be undertaken by ABC-K																		
	3.3.3	Establish specific promotion actions within the KENFAP network of farmer																		
	3.3.4	Establish specific promotion actions to be undertaken by grassroots partner																		
	3.3.5	Hold annual partner forums																		
3.4 Produce tools for promotion and marketing																				
	3.4.1	Identify, select and produce appropriate tools and media for																		
3.5 Undertake promotion, marketing and commercial market development																				
	3.5.1	Establish a promotion and marketing master schedule and database																		
	3.5.2	Brand and market KENDBIP and KENBIM																		

		P1	P2	Y1	Q1	Q2	Q3	Q4	Y2	Q5	Q6	Q	Q	Y3	Q	Q	Y4	Q13	Q14	Q15	Q16
	3.5.3 Mobilise communities and community groups to uptake biogas																				
3.6	Implement Demonstration Plants																				
	3.6.1 Select locations for demonstration																				
	3.6.2 Construct demonstration biogas plants																				

Outputs 4: Roll-out: Product Ordering and Delivery

Activities:

4.1	Schedule and implement roll-out plan																				
	4.1.1 Undertake geographical scheduling																				
	4.1.2 Activate focal points																				
4.2	Establish the biogas plant ordering process																				
	4.2.1 Establish a framework to size all biogas plants																				
	4.2.2 Establish the procurement window for cash customers																				
	4.2.3 Establish the procurement window for credit customers																				
4.3	Establish the biogas plant delivery process																				
	4.3.1 Provide KENDBIP biogas technical manuals																				
	4.3.2 Facilitate contributions of materials by the customer																				
	4.3.3 Install the biogas plants																				
	4.3.4 Supervise biogas plant feeding and operationalisation																				
	4.3.5 Inspection by KENDBIP																				
	4.3.6 Make final payments to Biogas Contractor																				
	4.3.7 Release the retention																				

Outputs 5: After-sales Maintenance and Service

Activities:

5.1	Set up the base for wholesome after-sales services																				
	5.1.1 Establish a network of appliance and spare parts suppliers;																				
	5.1.2 Train users																				
	5.1.3 Provide user manual;																				
	5.1.4 Provide warranty and guarantee certificates to users;																				
5.2	Set up the framework for after-sales visits																				
	5.2.1 Establish a Customer Help Desk																				
	5.2.2 Ensure a biogas plant Completion Visit is performed																				
	5.2.3 Ensure accurate registration of the global positioning of the biogas digester																				

				Y1				Y2				Y3				Y4			
		P1	P2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
5.2.4	Hand over to the end user																		
5.2.5	Inspect the Biogas Plant;																		
5.3	Perform after-sales maintenance and service																		
5.3.1	Execute routine/scheduled visits																		
5.3.2	Execute on-call visits;																		
5.3.3	Document all visits;																		

Outputs 6: Extension Services

Activities																			
6.1	Establish area bio-slurry extension strategy																		
6.1.1	Undertake and use area bio-slurry studies																		
6.2	Establish extension service network																		
6.2.1	Educate all relevant partners on importance of bio-slurry;																		
6.2.2	Identify and organize bio-slurry extension partners/workers;																		
6.2.3	Educate farmers on bio-slurry uses and methods of application;																		
6.3	Undertake farm demonstrations																		

Output 7 Biogas Plant and Appliances R&D

Activities																			
7.1	Operationalise the R&D framework																		
7.1.1	Identify and partner with R&D institutions																		
7.1.2	Conduct a market study																		
7.1.3	Enhance education and experience-sharing related to biogas;																		
7.2	Undertake R&D																		
7.2.1	Conduct engineering analysis of the appliances and components;																		
7.2.2	Conduct appliances and components cost analysis;																		
7.2.3	Conduct enterprise investigations and modeling																		
7.2.4	Develop bio-slurry practices																		
7.3	Develop technology and methods																		
7.3.1	Undertake components and appliances development																		
7.3.2	Undertake business technical and financial modeling;																		
7.3.3	Investigate new technology																		
7.3.4	Investigate social and gender dynamics of biogas																		
7.3.5	Standardise the education and R&D results																		

		P1	P2	Y1	Q1	Q2	Q3	Q4	Y2	Q5	Q6	Q7	Q8	Y3	Q9	Q10	Q11	Q12	Y4	Q13	Q14	Q15	Q16
Output 8: Quality Control																							
8.1	Implement embedded tools, systems and controls																						
	8.1.1 Implement programme tools																						
	8.1.2 Implement programme systems and controls																						
8.2	Establish the Kenya Biogas Centre of Excellence (KBCE)																						
8.3	Establish and implement a Biogas Construction QC protocol																						
	8.3.1 Implement the biogas construction supervision framework;																						
	8.3.2 Establish and activate the KENDBIP QC team																						
	8.3.3 Undertake inspection of biogas plants;																						
	8.3.4 Establish reporting, incentive and remedy mechanisms for inspections																						
	8.3.5 Recruit and train adequate number of Inspectors;																						

Output 9: Financial Facilitation and Subsidy Application																							
9.1	Establish the overall programme budget																						
9.2	Establish sources and application of funds																						
9.3	Establish Annual Budgets and Plans																						
9.4	Establish the Preparatory Phase budget																						
9.5	Establish credit financing mechanisms																						
	9.5.1 Identify financial services partners and negotiate credit financing																						
	9.5.2 Collaborate with National Steering Committee, MoE, HIVOS and SNV in																						
	9.5.3 Convene a financial services workshop																						
9.6	Establish subsidy financing mechanisms																						
	9.6.1 Design and implement a subsidy methodology																						
9.7	Establish carbon financing mechanisms																						
	9.7.1 Design and implement a carbon finance methodology																						

Annexe 3: Logical Framework Matrix

Intervention Logics		Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
	<ul style="list-style-type: none"> Goal: To develop and disseminate domestic biogas in rural areas through establishment of a sustainable commercial biogas sector in Kenya 	<ul style="list-style-type: none"> Biogas sector operating commercially Women and children no longer going out to look for firewood Reduced indoor air pollution 	<ul style="list-style-type: none"> Project final report Project mid-term and final evaluation 	<ul style="list-style-type: none"> Communities willingness to adopt biogas technology to substitute firewood for cooking
	<ul style="list-style-type: none"> Purpose: To enhance access to modern energy for cooking in rural Kenya 	<ul style="list-style-type: none"> At least 8000 households using biogas system by the end of Y4 	<ul style="list-style-type: none"> Project progress reports Project final report 	<ul style="list-style-type: none"> Consumers willingness and ability to pay for the biogas
Output 1: Inception and launch		<ul style="list-style-type: none"> Contracts signed with partners and contractors by end of P2 Tools and approaches completed by P2 	<ul style="list-style-type: none"> Inception and programme launch report 	<ul style="list-style-type: none"> Willingness of partners and contractors to work together in the project
Activities				
1.1	<ul style="list-style-type: none"> Establishment and operationalisation of the Biogas Office Contract with Hivos and SNV Contract SNV – Phase I Activity Agreements Budget, plan and allocate agreed administrative staff and facilities to KENDBIP. Annual Budgets and Plans for 2009 and 2010. Develop and apply detailed job descriptions (JDs) for each of the positions. Recruit programme staff through a competitive and transparent process. Develop/procure and implement a financial system and software. Undertake programme audits (starting in February 2010). 	<ul style="list-style-type: none"> Biogas office fully established and operationalised by end of Q1 Signed tripartite contract between KENFAP, Hivos and SNV Specific KENDBIP staff time and facilities allocated to KENDBIP Annual Programme Budgets and Plans for 2009 and 2010 developed Detailed Job Descriptions for KENDBIP staff Biogas Office staff appointed Financial system and software installed and operational Phase I programme audit conducted beginning February 2010 	<ul style="list-style-type: none"> Operationalisation report Copies of signed contract List and number of administrative staff allocated to KENDBIP Programme List of appointed biogas staff Financial report Phase I programme audit report 	<ul style="list-style-type: none"> Willingness of partners to participate in the programme Finances available on time
1.2	<ul style="list-style-type: none"> Setting the base for market activities Coalesce and consolidate staff support Establish liason with Government Establish partnerships Establish liason with ABC-K Establish collaboration with training and R&D institutions Undertake national biogas baseline surveys Undertake premier rapid regional studies 	<ul style="list-style-type: none"> Operationlised Phase I AAs between SNV and KENFAP Technical sub-Committee KENDBIP/Government cooperation framework and work plan Partnership agreements, contracts, MOUs and LOUs – Government, Private Sector and Non-profit partner categories signed ABC-K/KENFAP cooperation framework and w/plan 	<ul style="list-style-type: none"> Operationalisation phase report Copies of contracts, agreements , LoUs and MoU Baseline biogas surveys – reports Regional studies report for Nakuru, Kiambu and the surroundings regions 	<ul style="list-style-type: none"> Willingness of partners to participate in the programme Willingness of staff to support the prgramme Finances available on time willingness of ABC-K to collaborate with KENDBIP willingness of R&D institutions to collaborate with KENDBIP

Intervention Logics		Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
		<ul style="list-style-type: none"> R&D/KENDBIP collaboration framework and work plan established National biogas baseline surveys and gender mainstreaming plan Premier rapid regional studies for Nakuru and Kiambu (and surrounding regions). 		
1.3	<ul style="list-style-type: none"> Preliminary Activities – Technical Prepare/refine programme management tools. Identify and prepare field implementation tools Procure and purchase GIS equipment 	<ul style="list-style-type: none"> Programme management tools: systems, controls, guidelines and templates developed Field implementation tools developed GIS system purchased 	<ul style="list-style-type: none"> Programme management tools and field implementation tools reprot Procurement receipt for the GIS 	<ul style="list-style-type: none"> Finances available on time
1.4	<ul style="list-style-type: none"> Preliminary Activities – Training, Education and Demonstration Preliminary training of Biogas Masons and Supervisors Identify and select Biogas Masons Preliminary training and education Construct demonstration plants; 	<ul style="list-style-type: none"> Series of training conducted by end of 30 biogas masons and four supervisors identified and selected for training 30 Biogas Masons and 4 Supervisors trained 30 fully installed demonstration biogas plants and 15 fully installed market biogas plants 	<ul style="list-style-type: none"> Training modules List of trained person Number of biogas plants installed 	<ul style="list-style-type: none"> Technician willingness to be trained Finances available on time
1.5	<ul style="list-style-type: none"> Preliminary Activities – Programme launch Programme launch forum 	<ul style="list-style-type: none"> Programme launch forum held 	<ul style="list-style-type: none"> Programme launch report 	<ul style="list-style-type: none"> Finances available on time for the launch
Outputs 2: Training and Capacity Building		<ul style="list-style-type: none"> Pool of biogas masons, supervisors and inspectors created Biogas related enterprises developed 	<ul style="list-style-type: none"> Capacity building report 	<ul style="list-style-type: none"> Willingness of partners to participate in capacity building
Activities				
2.1	<ul style="list-style-type: none"> Selection of trainees, trainers and training venues Select Training Venue Select Trainees Select Supervisors and Inspectors Select trainers Select biogas enterprises Create a Pool of Trained Biogas Masons 	<ul style="list-style-type: none"> Training venues selected 366 biogas masons trained and certified 49 Biogas Supervisors trained 14 Biogas Inspectors trained 89 biogas technical persons re-trained 109 Biogas-related enterprises supported by KENDBIP 	<ul style="list-style-type: none"> List of approved training venues List of qualifying trainees List of approved supervisors and inspectors List of biogas enterprises supported by KENDBIP 	<ul style="list-style-type: none"> Finances available of time Willingness of biogas masons, supervisors and inspectors to undergo training Willingness of Entrepreneurs to participate in the programme
2.2	<ul style="list-style-type: none"> Capacity building activities – supply side Build the capacity of KENFAP Build the capacity of Programme Partners – FIs, NGOs, CBOs, etc. Build sector capacity on biogas enterprise 	<ul style="list-style-type: none"> KENFAP staff Trained Partner staff - NGOs, CBOs, Financial Service Providers, Farmer Groups – (including 150 bio-slurry extension personnel and 100 financial services staff) trained 	<ul style="list-style-type: none"> Training modules List of trained persons 	<ul style="list-style-type: none"> Willingness of Partner staff to undergo capacity building training Finances available on time
2.3	<ul style="list-style-type: none"> Capacity building – demand side Train users on biogas technology Train users and partners on bio-slurry use 	<ul style="list-style-type: none"> Biogas user trained on biogas technology Biogas users and partners trained bio slurry use 	<ul style="list-style-type: none"> Training modules List of trained users and partners 	<ul style="list-style-type: none"> Willingness of Biogas users and partners to undergo the training

Intervention Logics	Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
Outputs 3: Promote and Market Biogas Technology	<ul style="list-style-type: none"> Number of farmers investing in biogas technology 	<ul style="list-style-type: none"> Promotion and marketing report 	<ul style="list-style-type: none"> Willingness of farmers to invest in biogas technology
Activity:			
3.1	<ul style="list-style-type: none"> Prepare KENDBIP and KENFAP staff Prepare KENFAP Offices to play focal role and equip them Develop an incentive package for successful promotion and apply it 	<ul style="list-style-type: none"> List and specific identities of KENFAP Regional staff List of specific facilities available to KENDBIP at every KENFAP regional office 	<ul style="list-style-type: none"> Willingness of KENFAP to avail facilities to KENDBIP Finances available on time
3.2	<ul style="list-style-type: none"> Build local area baselines and approaches Undertake Rapid Regional Biogas Studies Develop mechanisms for inclusion of women and apply them 	<ul style="list-style-type: none"> Rapid Regional Biogas Studies carried out – one for every new region Specific guidelines for inclusion of women and children developed 	<ul style="list-style-type: none"> Report on the finding of the study List of specific guidelines for inclusion of women and children Willingness of women to be included in the programme Finances available on time
3.3	<ul style="list-style-type: none"> Est. partnerships and channels for promotion Identify and enter into collaboration with appropriate media channels and equip them Establish specific promotion actions to be undertaken by ABC-K Establish specific promotion actions within the KENFAP network of farmer groups and equip the network Establish specific promotion actions to be undertaken by grassroots partner organizations and equip the partners Hold annual partner forums 	<ul style="list-style-type: none"> Specific media channels for collaboration identified Specific promotion and marketing work plan for ABC-K developed Specific promotion and marketing work plan for KENFAP network of farmer groups developed Specific promotion and marketing work plan for grassroots partner organizations developed Annual partners forum held 	<ul style="list-style-type: none"> List of media channel identified Copy of the collaboration agreement Promotion action plan for KENFAP Promotion action plan for ABC-K Promotion action plan for grassroots partner organizations Willingness of media channels to collaborate and participate in the programme promotion Willingness of ABC-K, KENFAP, and grassroots partner organization to participate in the promotion of the programme Finances available on time
3.4	<ul style="list-style-type: none"> Produce tools for promotion and marketing Identify, select and produce appropriate tools and media for communication 	<ul style="list-style-type: none"> promotion and marketing tools – global and local level (for each region)selected 	<ul style="list-style-type: none"> list of marketing tools selected Finances available on time
3.5	<ul style="list-style-type: none"> Undertake promotion, marketing and commercial market development Establish a promotion and marketing master schedule and database Brand and market KENDBIP and KENBIM Mobilise communities and community groups to uptake biogas 	<ul style="list-style-type: none"> Promotion and marketing master schedule and database developed KENDBIP and KENBIM branded Communities and CBO mobilised to uptake biogas 	<ul style="list-style-type: none"> Promotion, marketing and commercial market development reports, including community mobilisation reports, KENDBIP and KENBIM brand promotion and brand recognition report Grassroots awareness and promotion forum reports Finance available on time Community willingness to uptake biogas technology
3.6	<ul style="list-style-type: none"> Implement Demonstration Plants Select locations for demonstration 	<ul style="list-style-type: none"> 140 locations. for biogas plant demonstration identified 	<ul style="list-style-type: none"> Number and GPS Coordinates of the identified locations Willingness of farmers/institutions to host

Intervention Logics		Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
	<ul style="list-style-type: none"> Construct demonstration biogas plants 	<ul style="list-style-type: none"> 140 demonstration biogas plants Constructed. 	<ul style="list-style-type: none"> Number of demonstration units 	<ul style="list-style-type: none"> demonstration units Finance available on time
Outputs 4: Roll-out: Product Ordering and Delivery		<ul style="list-style-type: none"> Biogas plant ordering process Biogas plant delivery systems 	<ul style="list-style-type: none"> Work tools such as JO, JC 	<ul style="list-style-type: none"> Willingness of stakeholders to follow the laid down procedure
Activities:				
4.1	<ul style="list-style-type: none"> Schedule and implement roll-out plan Undertake geographical scheduling Activate focal points 	<ul style="list-style-type: none"> Geographic roll-out plan developed 11 active focal and 23 service points activated 	<ul style="list-style-type: none"> Schedule and implementation roll-out plan report 	<ul style="list-style-type: none"> Finances available on time
4.2	<ul style="list-style-type: none"> Establish the biogas plant ordering process Establish a framework to size all biogas plants Establish the procurement window for cash customers Establish the procurement window for credit customers 	<ul style="list-style-type: none"> Standardised biogas plant sizing protocol established Standardised biogas plant procurement procedure and work tools (JO, JC, Order Register, etc.) for cash customers established Standardised biogas plant procurement procedure and work tools (JO, JC, Order Register, etc.) for credit customers established 	<ul style="list-style-type: none"> Plant sizing protocol document procurement procedure for cash customers document procurement procedure for credit customers document 	<ul style="list-style-type: none"> Willingness of customers to install biogas plant on credit or cash
4.3	<ul style="list-style-type: none"> Establish the biogas plant delivery process Provide KENDBIP biogas technical manuals Facilitate contributions of materials by the customer Install the biogas plants Supervise biogas plant feeding and operationalisation Inspection by KENDBIP Make final payments to Biogas Contractor Release the retention 	<ul style="list-style-type: none"> Technical manuals delivered and used in the market place 8,000 installed and operational biogas digesters Inspection protocol and inspected biogas digesters 	<ul style="list-style-type: none"> Number of technical manual delivered Number of installed and operational biogas plants Inspection protocol and list of inspected plants 	<ul style="list-style-type: none"> Strong will of farmers to install biogas plants Technical team (Masons, supervisors and inspectors) available on site as expected
Outputs 5: After-sales Maintenance and Service		<ul style="list-style-type: none"> After-sale and maintenance services established 	<ul style="list-style-type: none"> Customers receiving after sale services Progress report 	<ul style="list-style-type: none"> Willingness of biogas masons to offer after sale services
Activities:				
5.1	<ul style="list-style-type: none"> Set up the base for wholesome after-sales services Establish a network of appliance and spare parts suppliers; Train users Provide user manual; Provide warranty and guarantee certificates to users; 	<ul style="list-style-type: none"> practical and well functioning after sales system developed Network of appliance and spare parts suppliers available domestic biogas users trained user manual provided to the users 	<ul style="list-style-type: none"> list of trained biogas users number of biogas manuals delivered to biogas users 	<ul style="list-style-type: none"> Finances available on time. Willingness of biogas users to undergo training
5.2	<ul style="list-style-type: none"> Set up the framework for after-sales visits Establish a Customer Help Desk Ensure a biogas plant Completion Visit is performed 	<ul style="list-style-type: none"> Customer Help Desk at the Biogas Office established 8,000 biogas plant Completion Visits and Biogas Plant Completion Job Cards 	<ul style="list-style-type: none"> Customers getting relevant programme information from the help desk 	<ul style="list-style-type: none"> GIS system will be installed on time Programme customers will seek

Intervention Logics		Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
	<ul style="list-style-type: none"> ▪ Ensure accurate registration of the global positioning of the biogas digester ▪ Hand over to the end user ▪ Inspect the Biogas Plant; 	<ul style="list-style-type: none"> ▪ 8,000 Global Positioning System (GPS) coordinates entered to the database 	<ul style="list-style-type: none"> ▪ Biogas plant inspection reports 	<ul style="list-style-type: none"> ▪ help/clarification.
5.3	<ul style="list-style-type: none"> ▪ Perform after-sales maintenance and service ▪ Execute routine/scheduled visits ▪ Execute on-call visits; ▪ Document all visits 	<ul style="list-style-type: none"> ▪ Routine/scheduled visit ▪ routine/scheduled visits conducted ▪ on-call visits executed 	<ul style="list-style-type: none"> ▪ visit reports ▪ Repairs/complaints and resolution register 	<ul style="list-style-type: none"> ▪ Willingness of masons to offer after-sale and maintenance services
Outputs 6: Extension Services		<ul style="list-style-type: none"> ▪ Bio-slurry extension services provided 	<ul style="list-style-type: none"> ▪ Progress report 	<ul style="list-style-type: none"> ▪ Willingness of partners and stake holders to participate in the programme
Activities				
6.1	<ul style="list-style-type: none"> ▪ Establish area bio-slurry extension strategy ▪ Undertake and use area bio-slurry studies 	<ul style="list-style-type: none"> ▪ Area-specific/regional bio-slurry studies on: Sanitation; organic farming; fertiliser use, cost and impacts. 	<ul style="list-style-type: none"> ▪ Study report 	
6.2	<ul style="list-style-type: none"> ▪ Establish extension service network ▪ Educate all relevant partners on importance of bio-slurry; ▪ Identify and organize bio-slurry extension partners/workers; ▪ Educate farmers on bio-slurry uses and methods of application; 	<ul style="list-style-type: none"> ▪ Partners educated on bio-slurry ▪ Bio-slurry extension partners/workers educated ▪ Farmers educated on bio-slurry uses and methods of application 	<ul style="list-style-type: none"> ▪ Training modules ▪ List of trained persons 	<ul style="list-style-type: none"> ▪ Willingness of stakeholders to be educated.
6.3	<ul style="list-style-type: none"> ▪ Undertake farm demonstrations; 	<ul style="list-style-type: none"> ▪ Bio-slurry farm demonstrations undertaken 	<ul style="list-style-type: none"> ▪ Demonstration report 	<ul style="list-style-type: none"> ▪ Willingness of stakeholders to participate in the demonstration.
Output 7 Biogas Plant and Appliances R&D		<ul style="list-style-type: none"> ▪ R&D undertaken on biogas technology 	<ul style="list-style-type: none"> ▪ R&D report 	<ul style="list-style-type: none"> ▪ Willingness of R&D institutions to engage in research
7.1	<ul style="list-style-type: none"> ▪ Operationalise the R&D framework ▪ Identify and partner with R&D institutions ▪ Conduct a market study ▪ Enhance education and experience-sharing on biogas 	<ul style="list-style-type: none"> ▪ R&D framework operationalised ▪ R&D institutions identified and partnership contract signed ▪ Market study on domestic biogas appliances and components carried out ▪ scholarships for studies on biogas production and use issued ▪ R&D experience-sharing tours/visits conducted 	<ul style="list-style-type: none"> ▪ Copy of partnership contract between KENDBIP and R&D institutions ▪ Study report on market appliances ▪ Number of scholarship for studies 	<ul style="list-style-type: none"> ▪ Willingness of R&D institutions to enter into partnership with KENDBIP ▪ Willingness of persons to undertake studies on biogas production and use ▪ Finances available on time
7.2	<ul style="list-style-type: none"> ▪ Undertake R&D ▪ Conduct engineering analysis of the appliances and 	<ul style="list-style-type: none"> ▪ Engineering analysis of specific appliances and components carried out 	<ul style="list-style-type: none"> ▪ Engineering analysis of specific appliances and components report 	<ul style="list-style-type: none"> ▪ Finances available on time for the study

Intervention Logics		Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
	<ul style="list-style-type: none"> components; ▪ Conduct appliances and components cost analysis; ▪ Conduct enterprise investigations and modeling ▪ Develop bio-slurry practices 	<ul style="list-style-type: none"> ▪ Economic and cost analysis of specific appliances and components ▪ Biogas enterprise investigation and modeling carried out ▪ Bio-slurry best practice 	<ul style="list-style-type: none"> ▪ Economic and cost analysis of specific appliances and components report ▪ Biogas enterprise investigation and modeling report ▪ Bio-slurry best practice report 	
7.3	<ul style="list-style-type: none"> ▪ Develop technology and methods ▪ Undertake components and appliances development ▪ Undertake business technical and financial modeling; ▪ Investigate new technology ▪ Investigate social and gender dynamics of biogas ▪ Standardise the education and R&D results 	<ul style="list-style-type: none"> ▪ Engineering analysis of alternative biogas technologies carried out ▪ Economic analysis of alternative biogas technologies carried out ▪ An engineering analysis of KENBIM conducted. ▪ An economic analysis of KENBIM undertaken ▪ Social and gender best practice investigated ▪ R&D best practice 	<ul style="list-style-type: none"> ▪ components and appliances development report ▪ business technical and financial modeling report ▪ Social and gender dynamics of biogas report ▪ R&D best practice report 	<ul style="list-style-type: none"> ▪ Finance available on time
Output 8: Quality Control		<ul style="list-style-type: none"> ▪ Establishment implementation of quality standards 	<ul style="list-style-type: none"> ▪ QC report 	<ul style="list-style-type: none"> ▪ Willingness of masons to adhere to the quality standards
8.1	<ul style="list-style-type: none"> ▪ Implement embedded tools, systems and controls ▪ Implement programme tools ▪ Implement programme systems and controls 	<ul style="list-style-type: none"> ▪ Well designed and active programme QC tools implemented ▪ Well designed and active programme systems and controls implemented 	<ul style="list-style-type: none"> ▪ Embedded tools, systems and controls implementation reports 	<ul style="list-style-type: none"> ▪ Finances available on time
8.2	<ul style="list-style-type: none"> ▪ Establish the Kenya Biogas Centre of Excellence (KBCE) 	<ul style="list-style-type: none"> ▪ An operational Kenya Biogas Centre of Excellence (KBCE) established 	<ul style="list-style-type: none"> ▪ KBCE establishment report 	<ul style="list-style-type: none"> ▪ Finances available for the establishment
8.3	<ul style="list-style-type: none"> ▪ Establish and implement a Biogas Construction QC protocol ▪ Implement the biogas construction supervision framework; ▪ Establish and activate the KENDBIP QC team ▪ Undertake inspection of biogas plants; ▪ Establish reporting, incentive and remedy mechanisms for inspections ▪ Recruit and train adequate number of Inspectors 	<ul style="list-style-type: none"> ▪ 49 active biogas construction Supervisors and the supervision framework established ▪ KENDBIP QC team (Inspectors) established and activated ▪ 2,500 or 30% of all installed biogas plants inspected ▪ QC incentives provided ▪ QC reporting framework established 	<ul style="list-style-type: none"> ▪ construction supervision framework implementation report ▪ KENDBIP QC team (Inspectors) establishment and activation report ▪ Number and list of biogas inspectors recruited and trained ▪ List of QC incentives and remedy mechanisms provided 	<ul style="list-style-type: none"> ▪ Willingness of biogas inspectors to be trained ▪ Finances available on time
Output 9: Financial Facilitation and Subsidy Application		<ul style="list-style-type: none"> ▪ Financial facilitation and subsidy application established 	<ul style="list-style-type: none"> ▪ Financial Report 	<ul style="list-style-type: none"> ▪ Willingness of partners and stakeholders to offer financial facilitation.
9.1	<ul style="list-style-type: none"> ▪ Establish the overall programme budget 	<ul style="list-style-type: none"> ▪ Overall programme budget established 	<ul style="list-style-type: none"> ▪ Programme budget 	
9.2	<ul style="list-style-type: none"> ▪ Establish sources and application of funds 	<ul style="list-style-type: none"> ▪ sources and application of funds established 	<ul style="list-style-type: none"> ▪ source and application of funds report 	<ul style="list-style-type: none"> ▪ Willingness of partners to fund the project

Intervention Logics		Objectively Verifiable indicators (OVI)	Means of Verification (MoV)	Critical Assumptions
9.3	<ul style="list-style-type: none"> ▪ Establish Annual Budgets and Plans 	<ul style="list-style-type: none"> ▪ Annual budgets and plans established 	<ul style="list-style-type: none"> ▪ Annual budgets and plans report 	<ul style="list-style-type: none"> ▪ Finances available on time
9.4	<ul style="list-style-type: none"> ▪ Establish the Preparatory Phase budget 	<ul style="list-style-type: none"> ▪ Preparatory phase budget prepared 	<ul style="list-style-type: none"> ▪ Preparatory phase budget 	<ul style="list-style-type: none"> ▪ Finances available on time
9.5	<ul style="list-style-type: none"> ▪ Establish credit financing mechanisms ▪ Identify financial services partners and negotiate credit financing ▪ Collaborate with National Steering Committee, MoE, HIVOS and SNV in raising credit funds ▪ Convene a financial services workshop 	<ul style="list-style-type: none"> ▪ Established and negotiated credit financing mechanisms with specific financial sector partners ▪ Financial services workshop ▪ A dedicated KENDBIP credit fund 	<ul style="list-style-type: none"> ▪ Credit financing report ▪ Minute of the workshop 	<ul style="list-style-type: none"> ▪ Willingness of financial institutions to offer credit services ▪ Willingness of partners to raise credit funds
9.6	<ul style="list-style-type: none"> ▪ Establish subsidy financing mechanisms ▪ Design and implement a subsidy methodology 	<ul style="list-style-type: none"> ▪ subsidy system, including financial sector participation developed and operationalised 	<ul style="list-style-type: none"> ▪ subsidy financing mechanism report 	<ul style="list-style-type: none"> ▪ Finances available on time
9.7	<ul style="list-style-type: none"> ▪ Establish carbon financing mechanisms ▪ Design and implement a carbon finance methodology 	<ul style="list-style-type: none"> ▪ Carbon finance methodology established 	<ul style="list-style-type: none"> ▪ Carbon finance methodology document 	<ul style="list-style-type: none"> ▪ Finances available on time

Annexe 4: Training, capacity building and promotion statistics

Number of Service Providers, Biogas Contractors and Promoters

Taking the annual KENDBIP targets, the associated computed training and outreach/promotion scenario is as follows:

Table 26: Training / Outreach Targets

Number of Trainees - Summary							
Description	Avg No.	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Biogas Mason	20	10	38	110	104	104	366
Biogas Mason Refresher	10	2	8	22	21	21	74
Biogas Supervisor	5	2	5	14	14	14	49
Biogas Supervisor Refresher	2	1	1	3	3	3	11
Biogas Inspector	5	2	8	4	0	0	14
Biogas Inspector Refresher	2	1	2	1	0	0	4
Total Technical Training Outreach		18	62	154	142	142	518
Biogas Launch Workshop	200	0	200	0	0	0	200
Biogas Regional Workshops	50	0	50	50	50	50	200
Village Extension Service Providers	30	30	30	30	30	30	150
Credit Managers, Officers and Marketers	20	20	20	20	20	20	100
Biogas Enterprise Training	10	3	12	32	31	31	109
Total Programme Implementation Training Outreach		53	312	132	131	131	759
Biogas Awareness & Promotion	50	100	2800	2800	2800	2800	11300
Biogas Operation & Maintenance	15	20	140	450	750	1050	2410
Bio-slurry Application	15	20	140	450	750	1050	2410
Total User Training Outreach (net of repeat attendees)		100	2800	2800	2800	2800	11300
Total Number of People Trained		171	3174	3086	3073	3073	12577

Computations for training sessions

Table 27: Summary of all training sessions

Description	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Biogas Mason	1	2	6	6	6	21
Biogas Mason Refresher	0	0	3	2	2	7
Biogas Supervisor	1	1	3	3	3	11
Biogas Supervisor Refresher	0	0	2	1	2	5
Biogas Inspector	1	2	1	0	0	4
Biogas Inspector Refresher	0	1	0	0	0	1
Total Technical Training Sessions	3	6	15	12	13	49
Biogas Launch Workshop		1				1
KENFAP Capacity Building Workshop (mainstreaming)		1				1
Programme partners' semi-annual workshop		1	1	1	1	4
Biogas Regional Workshops		1	1	1	1	4
Village Extension Service Providers	1	1	1	1	1	5
Credit Managers, Officers and Marketers	1	1	1	1	1	5
Biogas Enterprise Training	0	2	6	6	6	20
Total Programme Implementation Sessions	2	8	10	10	10	40
Promotion - 2 per quarter per region		2	56	56	56	226
Operation & Maintenance - 1 session for every 50 users		1	10	30	50	161
Bio-slurry Application - 1 session for every 50 users		1	10	30	50	161
Total User Training Sessions	4	76	116	156	196	548
Total Number of Training Sessions	9	90	141	178	219	637

Computations for Biogas Mason training

Table 28: Biogas Mason training statistics

Description	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Annual target of biogas systems	45	455	1500	2500	3500	8000
Total Construction Time Required = 15 days per plant (based on a 10 - 12 day uninterrupted construction period for each unit and a 2 -3 day rest for each construction team, in-between installations)	675	6825	22500	37500	52500	
Total Time Available in the Year (based on 48 weeks and 6 days per week)	144	288	288	288	288	
Number of Biogas Construction Teams Required	5	24	79	131	183	
Number of Masons Required (assuming two masons per plant - a senior mason and a helper)	10	48	158	262	366	
Number of New Masons Required	10	38	110	104	104	
Number of Training Sessions (assuming 20 masons per session)	1	2	6	6	6	21

Computations for Biogas Construction Supervisors (Foremen) training

Table 29: Biogas Supervisor (Foreman) training statistics

Description	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Annual target of biogas systems	45	455	1,500	2,500	3,500	8,000
Plants supervised by 1 Foreman per annum (based on 2 – 3 per week for a total of 48 weeks/annum) assuming 75% engagement over the year	36	72	72	72	72	
Number of Supervisors Required During The Year	2	7	21	35	49	
Number of New Supervisors Required	2	5	14	14	14	

Computations for Biogas Inspectors (QC, completion, performance after sales) training

Table 30: Biogas Inspector training statistics

Description	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Annual target of biogas systems	45	455	1,500	2,500	3,500	8,000
Plants reviewed by 1 QC Team p.a. (assuming a low of 3 per wk)	48	96	96	96	96	96
Number of QC Teams Required During The Year	1	5	7	7	7	7
Maximum Number of Inspectors Required	2	10	14	14	14	14
Number of New Inspectors Required	2	8	4	0	0	14
Number of New QC Teams Required	1	4	2	0	0	7
Total Number of New Biogas Plants Inspected	45	455	672	672	672	2516
Ratio of New Biogas Plants Inspected	100%	100%	45%	27%	19%	31%
Total No. of Annual Biogas Plant Visits (Previous Installations)	0	45	50	200	450	745
Ratio of Annual Biogas Plant Visits (Previous Installations)	0%	100%	10%	10%	10%	17%
Total No. of Biogas Plants Inspected (Old and New)	45	500	722	872	1122	3261
Average No. of Biogas Plants Per Inspector Per Annum	23	50	52	63	81	233
Average No. of Biogas Plants Per Inspector Per Wk (32 Wks/Yr)	1	2	2	2	3	

Computations for Biogas Enterprises

Table 31: Biogas Enterprise training statistics

Enterprise Development	First 6 months	Yr 1	Yr 2	Yr 3	Yr 4	Total
Annual target of biogas systems	45	455	1500	2500	3500	8000
Number of Biogas Construction Teams	5	24	79	131	183	183
Number of Biogas Enterprises (1)	2	12	39	65	91	91
Number of Appliance and Spare-part Traders (2)	1	3	8	13	18	18
Total Number of Enterprises	3	15	47	78	109	109
Total Number of New Enterprises	3	12	32	31	31	109
Mentoring and Training Sessions Cumm. - 6 per annum	0	1	4	7	10	22
Mentoring and Training Sessions (3)	0	2	6	6	6	20
1. - assuming two Teams for every one Biogas Enterprise						
2. - assuming 200 biogas plants can be supported by one Biogas Appliance and Spare Parts Enterprise						
3. - assuming one regional Workshop for every 10 enterprises semi annually						

Annexe 5: KENBIM Cost Structure (estimated)

Table 32: Biogas plant costs for 6cM and 8cM

ITEM DESCRIPTION		6m3			8m3		
A	General bulk Materials	UNIT	QTY	TOTAL		QTY	TOTAL
1	Cement-50 kg	bags	17	13,600	18%	20	16,000
2	Water proof cement-1kg	bags	4	800	1%	5	1,000
3	Quarry stones dressed/Blocks-390x190x150mm	pcs	180	7,200	10%	220	8,800
4	Bricks-230x110x90mm	pcs	260	5,200	7%	300	6,000
5	Sand	tonnes	3	4,500	6%	4	6,000
6	Ballast-25mm-1"	tonnes	2	2,400	3%	3	3,600
7	Lime 25kg bags	bags	3	750	1%	3	750
8	Square twisted bar-Y8/R8	lengths	6	3,000	4%	7	3,500
9	Round Bars-R6	lengths	3	900	1%	4	1,200
10	Binding wire	kg	3	360	0%	4	480
	Sub Total 1			38,710	52%		47,330
B	Assorted items + Piping fittings			11,613	15%	30%	14,199
	Sub Total 2			50,323	67%		61,529
C	Labour Cost						
1	Skilled labour	person-day	8	8,000	11%	9	9,000
2	Unskilled labour	person-day	8	4,000	5%	9	4,500
3	Sub Total 3			12,000	16%		13,500
	Total			62,323	83%		75,029
	Overhead, guarantee & after sales service(20%)	Is		12,465	17%	20%	15,006
	Grand Total			75,000	100%		90,035
	EUR Equivalent at KES per EUR		105	720			860

Table 33: Biogas plant costs for 10cM and 12cM

ITEM DESCRIPTION			10m3			12m3		
A	General bulk Materials	UNIT	QTY	TOTAL		QTY	TOTAL	
1	Cement-50 kg	bags	22	17,600	17%	27	21,600	18%
2	Water proof cement-1kg	bags	6	1,200	1%	7	1,400	1%
3	Quarry stones dressed/Blocks-390x190x150mm	pcs	270	10,800	10%	290	11,600	10%
4	Bricks-230x110x90mm	pcs	340	6,800	6%	400	8,000	7%
5	Sand	tonnes	5	7,500	7%	6	9,000	7%
6	Ballast-25mm-1"	tonnes	4	4,800	5%	4	4,800	4%
7	Lime 25kg bags	bags	3	750	1%	4	1,000	1%
8	Square twisted bar-Y8/R8	lengths	8	4,000	4%	9	4,500	4%
9	Round Bars-R6	lengths	5	1,500	1%	5	1,500	1%
10	Binding wire	kg	5	600	1%	5	600	0%
Sub Total 1				55,550	53%		64,000	53%
B Assorted items + Piping fittings				16,665	16%		19,200	16%
Sub Total 2				72,215	69%		83,200	69%
C Labour Cost								
1	Skilled labour	person-day	10	10,000	10%	12	12,000	10%
2	Unskilled labour	person-day	10	5,000	5%	12	6,000	5%
3	Sub Total 3			15,000	14%		18,000	15%
Total				87,215	83%		101,200	83%
Overhead, guarantee & after sales service(20%)		ls		17,443	17%		20,240	17%
Grand Total				104,658	100%		121,440	100%
EUR Equivalent at KES per EUR			105	1,000			1,160	

Annexe 6: Countrywide distribution of KENDBIP Focal Points

Table 34: Series of tables showing exact location of KENDBIP Regional, Focal and ServicePoints

Region	KENFAP Branch	Reg. Coord. Office	Focal Points	Service Points	Year 1	Year 2	Year 3	Year 4
Rift Valley	Nakuru	x	x	x	x			
	Koibatek			x				x
	Uasin Gishu		x	x		x		
	Trans Nzoia			x				x
	Nandi			x			x	
	Kericho		x	x	x			
	Bomet			x		x		
Eastern	Kangundo			x		x		
	Embu	x	x	x	x			
	Meru Central		x	x			x	
Western	Kakamega		x	x	x			
	Vihiga			x		x		
	Bungoma	x	x	x		x		
	Kisii	x	x	x	x			
	Nyamira			x			x	
	Migori			x		x		
Central	Thika			x			x	
	Nyeri	x	x	x		x		
	Nyandarua		x	x	x			
	Maragua			x			x	
	Kirinyaga			x			x	
	Murang'a			x			x	
	Kiambu		x	x	x			
Totals		5	11	23	7	7	7	2

Annexe 7: References

1. Kenya Vision 2030, GOK, October 2007
2. First Medium Term Plan, GOK, MTP, 2008-2012
3. Kenya Biogas Feasibility Study “Promoting Biogas Systems in Kenya”, ETC UK, 18 October 2007
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7. PPP Proposal for ABPP (DGIS, Hivos and SNV), August 2008.
8. Strategic Plan 2008-2012, ABC-K, 25th March 2009.
9. Websites: www.energy.go.ke, www.nesc.go.ke, and www.planning.go.ke

References in the Programme Manual (PM)

10. Study on Kenya’s Energy Demand, Supply and Policy Strategy for Households, Small Scale Industries, Kamfor Report, 2002
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12. Central Bank Website: www.centralbank.go.ke

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