

Africa Biogas Partnership Programme (ABPP)

Phase 2

Effect Evaluation

Final Report



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Final report

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The opinions expressed in this document represent the authors' points of view which are not necessarily shared by the Ministry of Foreign Affairs of the Netherlands or by the authorities of the concerned countries.

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Acronyms

AB/AOC	West and Central African Alliance for Biodigesters
ABPP	Africa Biogas Partnership Programme
ADE	Analysis for Economic Decisions (Belgium)
AfDB	African Development Bank
AFIRD	Agency for Integrated Rural Development (Uganda)
4B-F	Biogas Business Boost Benefitting Farmers (EnDev project)
BCE	Biodigester Construction Enterprise
BEAF	Biogas Enterprise Acceleration Facility (Kenya)
BEMO	Activity Appraisal document (DGIS, MoFA, Netherlands)
BESP	Biogas Extension Service Provider (Kenya)
BMH	Biogas Marketing Hub
BOAD	West African Development Bank
BSUL	Biogas Solutions Uganda Limited (Uganda)
CAMARTEC	Centre for Agricultural Mechanization and Rural Technology (Tanzania)
CCIBF	Chamber of Commerce (Burkina Faso)
CDM	Clean Development Mechanism
CER	Carbon Emission Reduction
CFC	Centre for Training of Catechists (Burkina Faso)
Ci-Dev	Carbon Initiative for Development (World Bank trust fund)
CNG	Climate Neutral Group (Netherlands)
CPF	Farmers Confederation (Burkina Faso)
CRCB	Centre for Resources and Construction of Biodigesters (Burkina Faso)
CSC	Customer Service Centre
DfID	Department for International Development (United Kingdom)
DGESS	Directorate General of Studies and Sector Statistics (MRAH) (Burkina Faso)
DGIS	Directorate General of International Cooperation (MoFA) (Netherlands)
DGPA	Directorate General of Animal Production (MRAH) (Burkina Faso)
DGRE	Directorate General of Renewable Energy (Burkina Faso)
DGPV	Directorate General of Vegetal Production (MAAH) (Burkina Faso)
ECOWAS	Economic Community of West African States
EECS	Enterprise Eco-Construction & Services (Burkina Faso)
EKN	Embassy of the Kingdom of the Netherlands
EnDev	Energising Development Partnership Programme
ERPA	Emission Reduction Purchase Agreement
ETB	Ethiopian Birr
EU	European Union
EUR	Euro
FCF	Fair Climate Fund (Netherlands)
FCFA	Franc of the West African Economic and Monetary Union
FCS	Farmers' Cooperative Society (Kenya)
FGD	Focus Group Discussion
F&S	Fair & Sustainable Consulting (Netherlands)
GACC	Global Alliance for Clean Cookstoves
GHG	GreenHouse Gases
GIZ	German Organization for Development Cooperation
GPS	Global Positioning System
GRAINE	Support Group for Investments and Savings (Burkina Faso)
Hivos	Humanist Institute for Cooperation with Development Countries (Netherlands)





HPI-U	Heifer Project International - Uganda
IGG	Inclusive and Green Growth (division of DGIS in MoFA) (Netherlands)
KBP	Kenya Biogas Programme
KENAFF	Kenya National Farmers Federation
KENDBIP	Kenya National Domestic Biogas Programme
KPI	Key Performance Indicator
MAAH	Ministry of Agriculture and of Hydraulic Management (Burkina Faso)
MAAIF	Ministry of Agriculture, Animal Industries and Fisheries (Uganda)
MCF	Multilateral Climate Funds
MDF	Market Development Fund
MEEVCC	Ministry of Environment, Green Economy and Climate Change (Burkina)
MEMD	Ministry of Energy and Mineral Development (Uganda)
MFI	Micro-Finance Institution
MMCE	Ministry of Mining, Mines and Energy (Burkina Faso)
MoFA	Ministry of Foreign Affairs (Netherlands)
MRAH	Ministry of Animal and Halieutic Resources (Burkina Faso)
MWMR	Ministry of Water and Mineral Resources (Ethiopia)
NBPE+	National Biogas Programme Ethiopia – Plus (Ethiopia)
NBSC	National Biogas Steering Committee
NDBP	National Domestic Biogas Program
NGO	Non-Governmental Organization
NIA	National Implementing Agency
NMI	Wageningen Nutrient Management Institute (Netherlands)
OCADES	Catholic Organization for Development and Solidarity (Burkina Faso)
OECD	Organization for Economic Cooperation and Development
PCCB	Prevention and Combating of Corruption Bureau (Tanzania)
PIF	Programme for Investments in Forestry (Burkina Faso)
PNB-BF	National Programme for Biodigesters (Burkina Faso)
QPI	Quality Performance Incentive (Kenya and Uganda)
QSP	Quality Service Provider
R&D	Research and Development
RBF	Result Based Finance
RBFF	Results-Based Financing for Low Carbon Energy Access Facility (RVO)
REA	Rural Energy Agency programme (Tanzania)
RVO	Netherlands Enterprise Agency
4S@Scale	Sustainable and Secure Smallholder System @ Scale
SACCO	Savings and Credit Cooperative Organization
SE4ALL	Sustainable Energy for All project
SNV	Netherlands Development Organization (Netherlands)
SPP	Simple Payback Period
TIDE	The Inclusive Dairy Enterprise (Uganda)
ToR	Terms of Reference
UGCPA	Union of Agricultural Marketing Groups in the Boucle de Mouhoun (Burkina)
UNIDO	United Nations Industrial Development Organization
UNPCB	National Union of Cotton Producers (Burkina Faso)
USD	United States Dollar
VER	Voluntary Emission Reduction
WB	World Bank





Executive summary

ES1. The Africa Biogas Partnership Programme (ABPP) supports biogas and biodigester market development in five countries in Africa. Phase 1 (2009-2013) supported the set-up of technical and institutional capacities for the promotion of biogas and the development of biodigester markets. ABPP-2 (2014-2019) focused on "market-oriented" development.

ES2. The relevance of biodigesters for smallholders in rural areas in Africa is high. Biodigesters contribute to the intensification of farm production, access to fertilizers and energy, savings on fuel and fuelwood, and the reduction of indoor air pollution. They strengthen the resilience and the prospects of households. Yet, access to biodigesters is severely limited by its costs and the household's socio-economic position.

ES3. ABPP has been successful in creating an institutional environment in which market-oriented biodigester sector development can take shape. Phase 1 programme subsidies were phased out and taken up by national governments in some countries (Burkina Faso and Ethiopia). Biodigester Construction Enterprises (BCEs) have been supported and emerged in all countries. The programme shows consistency in quality assurance and after-sale services for biodigesters.

ES4. ABPP-2 has not been able to meet the targets of 100,000 biodigesters installed and 600,000 people reached with renewable energy. After first year, ABPP noted "structural weakness of the institutional and organizational sector infrastructure in all countries" and re-oriented its interventions. Still, by 2018 production was at 35% of planning. Burkina Faso and Ethiopia have shown the most consistent installation of biodigesters, production in Kenya is volatile, in Uganda much below expectations, and the programme halted in Tanzania.

ES5. The up-front investment costs for end-users are high, in particular if no governmental subsidy is available. User benefits are relevant, yet the business case for investing in a biodigester is not yet elaborate. The ABPP calculation of a Simple Payback Period of 2-3 years is a key determinant of demand but needs verification and is not consistently used in marketing. Efforts to create access to credit were generally not successful.

ES6. The business case for BCEs also needs elaboration. According to interviews and estimates, in Burkina Faso the business is profitable, whereas in Uganda none of the BCEs currently sell digesters at a commercially viable level. Most BCEs in Uganda seem to depend on programme financial incentives while biodigester demand is too limited.

ES7. The biodigester technology sits on the nexus of energy, agriculture, soil fertility, water, climate, gender and sanitation. Other donors may likely be interested for this integrated technology. Climate funds and climate action provide new funding opportunities.

ES8. The government in Burkina Faso successfully co-organized with ABPP two international conferences about biogas and biodigester market development in Africa. In West Africa, a momentum for biodigester market growth and expansion is palpable.

ES9. Support to a third phase of ABPP is well justified if plans and approaches are explicit and realistic. Biodigester market development in the ABPP countries is relevant to the contexts, to national policies and to Dutch development policy priorities. For existing countries and for any new countries, clear start-up, up-scaling and exit strategies need to be designed. Gender and inclusion strategies are to be developed.





1. Introduction

1.1 Domestic biogas production in Africa

Domestic biogas production has been developed on a large-scale in Asia since the 1980s and 1990s. The Dutch development organization SNV was involved in biogas support programmes especially in Nepal, Cambodia and Vietnam, whereas the Dutch Non-Governmental Organization (NGO) Hivos supported biogas production amongst others in Indonesia. In some countries, today the number of biodigesters installed runs into the tens or even hundreds of thousands of units, and the greenhouse gas (GHG) emissions foregone through biogas production are being cashed in by the national biogas programmes through revenues from carbon credit trade mechanisms.

Since the mid-2000s, Hivos and SNV jointly aim for the development of biogas and biodigester markets in Africa. The Directorate General of International Cooperation (DGIS) of the Netherlands Ministry of Foreign Affairs (MoFA) has been supporting their work as prime donor. Since 2009, National Domestic Biogas Programmes (NDBP) have been established especially in East Africa, and also in West and Southern Africa.¹

1.2 Africa Biogas Partnership Programme (ABPP)

The Africa Biogas Partnership Programme (ABPP) has been instrumental in the establishment of biodigester market development in four countries in East Africa (Ethiopia, Kenya, Tanzania, Uganda) and two in West Africa (Burkina Faso, Senegal). The ABPP programme was started in 2009 after some initial small-scale pilots with biogas production in Africa since 2006. The ABPP programme has the following aim: *achieving the Millennium Development Goals by developing a commercially viable, market-oriented biogas sector that will support the use of domestic biogas plants as a local, sustainable energy source.*

Phase 1 of the ABPP programme was carried out in six countries between 2009 and 2013. Phase 2 (2014-2019) considers five of these countries: Burkina Faso, Ethiopia, Kenya, Tanzania and Uganda. The overall objectives of Phase 2 are *to improve the living conditions of households in five African countries through the multiple benefits of the construction of domestic biogas digesters; and to lay the foundations for the emergence and development of a market-oriented domestic biogas sector.*²

Towards the donor DGIS, ABPP has expressed its ambition to consolidate and expand, under a third phase, the biodigester markets developed.³ ABPP also proposes new biodigester market support programmes in West Africa (Benin, Mali, Niger, Nigeria) and Sudan. This country choice is tentative, and amongst other dependent on government engagement.

As ABPP-2 comes to an end, the donor DGIS, through its Department of Inclusive and Green Growth (IGG), has requested an external evaluation of the effects and outcomes of Phase 2 of the ABPP programme. Based on the outcomes of this evaluation, DGIS will decide in the course of 2019 about the (co-)financing of a follow-up third phase of the ABPP programme.

¹ Today, significant production exists in: Burkina Faso, Ethiopia, Kenya, Rwanda, Tanzania, Uganda, Zambia. ² See: ABPP (2013), Africa Biogas Partnership Programme (ABPP) – Phase 2 (2014-2017). Joint Proposal.

Hivos & SNV, September 2013, 54p.

³ See: ABPP (2018), Africa Biogas 2019-2023. A preferred smallholder household solution in the era of climate change. Draft Proposal. Hivos & SNV. August 2018, 71p.





In December 2018, Fair & Sustainable Consulting (F&S) was commissioned, through a consortium contract managed by ADE (Belgium), to carry out the external evaluation of ABPP-2. The evaluation covers the period of January 2014 through December 2018. The evaluation team was composed of the international consultants Peter Ton and Els Rijke and the national consultants Andrew Muganga Kizito (Uganda) and Lassina Konaté (Burkina Faso). Methodological support was provided by international consultant Ben Haagsma.

1.3 External evaluation of ABPP-2

The purpose of the evaluation is to assess the outcomes and impacts of the ABPP programme on households, communities, technology providers and the society at large and to examine the relevance, effectiveness and efficiency of the support strategies and institutional arrangements of the programme.⁴ The Terms of Reference (ToR) state three specific areas to assess:

- 1. Assess the relevance of DGIS support to domestic biogas programmes in Africa in the context of the global SDG7 agenda, DGIS policy objectives and the implementation of the Paris agreement on climate change;
- 2. Assess the realised outcomes and impact of the programme for households, communities, technology providers and the society at large. Include benefits in terms of access to energy, livelihoods, gender, agriculture, job creation, and the environment;
- 3. Assess the relevance, efficiency and effectiveness of ABPP's support strategies and institutional approaches at national and supra-national level, and of the roles of the different actors within them;

Additionally, the evaluation team was asked its view concerning the post ABPP-2 future:

- What is the perspective to have the programme be funded by multi-lateral financiers (e.g. World Bank, Green Climate Fund), private financing (e.g. FMO), or broad-based energy access programmes (e.g. Energizing Development (EnDev) programme)?
- What is the scope for ABPP to develop partnerships based on more integrated programmes on food security, water, climate action and addressing root causes of migration, as ABPP so far is mostly a single issue and single donor programme?
- Provide recommendation on the Theory of Change (ToC) and design of the Phase 3 proposal. Looking at the effects thus far, is the proposed continuation of support to existing countries and expansion to new countries in a third phase justified?

The evaluation has concentrated on the key evaluation criteria (relevance, effectiveness, efficiency, impact and sustainability) of the Organization for Economic Cooperation and Development (OECD) and on the specific areas 1-3. Regarding the additional issues, the evaluation has specifically looked at the third issue (ToC) and into elements of the second issue (scope for partnerships). The team could only touch upon the first issue (additional financing), for which a more in-depth analysis of the funding landscape would be required including interviews with a variety of donors.

⁴ See: IGG (2018), Terms of Reference for Effect Evaluation of the Africa Biogas Partnership Programme – Phase 2 (ABPP-2). Ministry of Foreign Affairs (MOFA), Netherlands, 29p.





1.4 Methods of research

The effect evaluation of the Africa Biogas Partnership Programme - Phase 2 (ABPP-2) is based on documentary review and on interviews with key stakeholders in the biogas sectors:

- The document review comprised the main programme documents: Proposal Phase 2, Evaluation of Phase 1, Mid-Term Review of Phase 2, annual reports (ABPP and countryspecific), monitoring reports, financial reports, audits, country project databases, Biogas User Surveys, Phase 2 activity reports (including those on the outcomes of the Ouagadougou International Conferences 2017 and 2018), the Draft Proposal Phase 3, and additional documentation received from different sources.
- In the Netherlands, interviews were held at start of work with the Ministry of Foreign Affairs (MoFA) and the implementing organizations Hivos and SNV. Additional face-to-face, telephone and Skype interviews took place with co-financer EnDev (Netherlands Enterprise Agency RVO and the German Organization for Development Cooperation GIZ) and with third parties informed about biogas support programmes (World Bank trust fund Carbon Initiative for Development Ci-Dev and the Dutch Fair Climate Fund FCF).
- In Kenya, the evaluation team interviewed the ABPP-2 Programme management based in the Hivos office in Nairobi. Meetings also took place, the same day, with the team of the Kenya Biogas Programme (KBP), with service provider TechnoBrain which is involved in Customer Service Centres (CSC; in Kenya, Tanzania and Uganda), with a group of four Kenyan Biogas Construction Enterprises (BCE), and with two Kenya-based distributors of imported prefabricated biodigesters.
- Most time was invested in visits to Uganda and Burkina Faso, to conduct interviews⁵ with the National Implementing Agencies (NIA) and the National Biogas/Biodigester Steering Committees (NBSC), with SNV staff, with authorities (e.g. Ministries of Energy, Animal Husbandry, Agriculture), with male and female owners and users of biodigesters, and with other stakeholders in the NDBP, including: BCEs, masons, CSC, Biogas Marketing Hubs (BMH), Biogas Extension Service Providers (BESP), Quality Service Providers (QSP), producer associations, banks, Micro-Finance Institutions (MFIs), Saving and Credit Cooperative Organizations (SACCOs), NGOs, and donor and support agencies.

For the field visits, a random sample of five (5) biodigesters was selected from the ABPP databases in Uganda and Burkina Faso. Time available to the evaluation team did not allow a large sample of sites to be visited; the team thus cannot claim any representativeness. Care was taken, however, to select biodigesters randomly, and to speak with all major actors involved in its installation, use and management. This way, a very diverse set of realities, views, experiences, opinions and observations was yielded, which informed our analysis below of the country programmes and the multi-country ABPP programme at large.

The evaluation team aimed for the inclusion of at least the two main regions in number of biodigesters; in Uganda the Eastern and the Western regions, in Burkina Faso the Centre-Est, Centre-Ouest and the Boucle du Mouhoun. The team visited the randomly-selected biodigesters to discuss with the owner and users (men and women), with neighboring owners and users of biodigesters, and with the market parties and service providers related to the specific biodigester (i.e. BCE, mason, supporting programme, project or NGO, etc.). In all meetings, care was taken to ensure that both women and men were represented and that women's voices were heard and recorded separately, especially regarding the pros and cons and the impacts and implications of biodigester installation and management. In a few cases it was possible to split the groups according to gender. After the exchanges, the biodigesters were visited to assess their functionality in terms of bioslurry/biocompost, and kitchens were inspected to assess functionality of the cookstoves and lamps. Overall, 26 biodigesters of varying age and status of construction were visited: 10 in Uganda, 16 in Burkina Faso.

⁵ The two country visits each lasted 10-11 days; 4-5 days of work in the capital and 6 days in-country.





The programme of the country visits and the list of resource persons are in Annex 1.⁶ The evaluation has benefitted from the wide availability of ABPP programme documents, and of the availability of the ABPP programme coordination in the Netherlands, Kenya, Uganda and Burkina Faso. The evaluation team has been able, and has been enabled, to carry out the evaluation independently. ABPP and SNV staffs facilitated the organization of meetings with actors selected by the evaluation team, and then left the site. The team was able to keep up its own programme, to select the interviewees, to guide the individual and group discussions, to discuss any subject and to ask any questions it judged appropriate. Interviews with users and groups were generally conducted in local language with translation by the national consultant.

The evaluation has been limited in following ways:

- As per the ToR, the team analyzed the overall ABPP-2 programme results and outcomes, and the specific results, outcomes and impacts in Uganda and Burkina Faso. The programmes in Ethiopia, Kenya and Tanzania were not covered in-depth;
- The main project documents were taken into account. ABPP has a large amount of documentation available, not all of which could be adequately considered by the team;
- Time available for the country visits was short but considered adequate. Time available for interviews with actors outside the programme countries (in the Netherlands and with international actors) was too limited to be able to respond to some of the specific issues mentioned in the ToR (see details above); even when more time was already invested in this by the team than had been planned;
- Insecurity in large parts of Burkina Faso, due to insurgence by jihadist groups, made most parts of the provinces Sahel, Central-North, North and East inaccessible; these are considered "red zones" by the Dutch Ministry of Foreign Affairs.^{7 8} From PNB-BF we learn that biodigester demand is affected by the insecurity, as local people hesitate to be associated with visitors. Yet, construction by BCEs is reportedly continuing. As more than half of the biodigesters installed in Phase 2 are in these provinces (including 24% of total in the Sahel and 15% in the East), it is advised to consider an alternative mode of evaluating the programme achievements in those provinces.
- The sample of biodigesters to be visited was also slightly influenced by insecurity. In Burkina Faso, one of five sites randomly selected (in Boucle du Mouhoun) could not be visited. Alternatively, the team visited two other sites close to a tar road.

In spite of the above, the Evaluation team considers to have been able to gain a clear and insightful picture of the status of biodigester market development and support by ABPP under the second phase of the Africa Biogas Partnership Programme (ABPP-2).

1.5 Report

This is the Final report of the Effect Evaluation of the Africa Biogas Partnership Programme – Phase 2 (ABPP-2). The report includes most of the comments and observations received on an earlier draft report. The report intends to provide an accurate, concise and comprehensive analysis of the results and outcomes of the ABPP-2 programme. It gives an assessment of the supply, the demand, the supporting environment and the functioning of the biodigester markets especially in Uganda and

mosques in the Centre-South (e.g. in Ouargay) against foreigners, teachers and governmental officers.

⁶ First results of the evaluation were discussed with stakeholders during Feedback and Validation workshops; in Kampala (Uganda) on 5 February 2019 and Ouagadougou (Burkina Faso) on 20 February 2019.

 ⁷ MoFA (2019), Reisadvies Burkina Faso (21 February 2019). Ministry of Foreign Affairs (MoFA), Netherlands.
 ⁸ Insecurity is also increasing in other parts of Burkina Faso. At the time of the visit, in the Centre-South ("yellow zone"), a border post to Togo was attacked leaving four dead. Also, threats were ousted by visitors of





Burkina Faso. It provides a series of conclusions and recommendations relevant for ABPP management and for decision-making about further Dutch development support to the strengthening and expansion of biodigester markets in Africa. The paragraphs start with a summary of the contents - in italics.

Chapter 2 presents the history, the set-up and the objectives of Phase 2 of the ABPP programme. Chapter 3 describes the main results and outcomes of ABPP-2. Chapter 4 assesses the ABPP-2 programme according to the OECD criteria of relevance, effectiveness, efficiency, impacts and sustainability. Chapter 5 analyses the first draft proposal by ABPP to the Dutch Ministry of Foreign Affairs for financing of a third phase. Chapter 6 provides the main conclusions and recommendations. Bibliographical references are listed in Chapter 7.





2. Africa Biogas Partnership Programme (ABPP)

2.1 ABPP-1 programme (2009-2013)

Phase 1 aimed for the set-up of technical and institutional capacity for the promotion of biogas production and the development of biodigester markets. The Phase 1 evaluation was finalized well into Phase 2 and did not comprise a proper impact assessment. It valued positively the biodigester technology, yet stressed that the number of biodigesters was low.

Phase 1 (2009-2013) of the Africa Biogas Partnership Programme (ABPP) envisaged the promotion of biogas production and the development of a market for biodigesters. The aim was to provide rural access to energy for cooking and lighting. Phase 1 involved six countries in East (Ethiopia, Kenya, Tanzania, Uganda) and West Africa (Burkina Faso, Senegal⁹). Phase 1 focused on the set-up of National Implementing Agencies (NIA), the establishment of technical and programmatic skills and the promotion of the biodigester technology. The NIA collaborated with implementing partners (NGOs, government institutions or producer groups) to promote the biodigester technology, to conduct quality control and to monitor the masons.

The ABPP-1 evaluation¹⁰ took place in 2015 and included the first year of Phase 2 (2014), which had largely been financed from the left-over budget from Phase 1. The evaluation concluded that ABPP had succeeded in installing all biogas functions in the respective countries (promotion, masons' training, research and development, construction, after sales service, quality control, operations and maintenance, bioslurry extension, credit, programme coordination and monitoring), but that the targets for biodigesters were achieved only by 78% in Tanzania and 44% in Burkina Faso (by the end of 2014; the first year of Phase 2).¹¹

The recommendations of the Phase 1 evaluation included the following:

- The need for a pro-active and evidence-based advocacy towards governments, development actors and donors, and alignment with other development programmes;
- Communicate clearly on the (decreasing) availability of subsidies. A minimum subsidy could be maintained for quality control until other financing is identified;
- Develop an explicit strategy for the institutionalization of different biogas functions, (e.g. terms and duration of subsidies, quality control, certification system) and the roles of governments, the NIA, programme teams and implementing partners;
- More and longer term support is needed to assist the upgrading and professionalizing of masons and BCEs. Support should cover a mix of training, coaching and mentoring.
- Adjust to context the transfer of promotion and marketing responsibilities from implementing partners to BCEs. Collaborate with producers' organizations, women groups, local authorities and opinion makers on promotion.
- Further develop and implement gender and youth strategies, and provide incentives for keeping smaller BCEs in the market. Incentives should be clearly oriented towards development objectives such as reaching new market segments, orienting supply to poorer clients, innovations on efficiency of production and access to appliances and not be based on the number of biodigesters constructed in general.

⁹ ABPP withdrew from Senegal in 2012, following poor performance of the implementing agency.

¹⁰ See: ACE (2016), Evaluation of the Africa Biogas Partnership Programme (2009-2014). January 2016, 182p.

¹¹ The evaluation of Phase 1 focussed in-depth on Tanzania and Burkina Faso.





2.2 ABPP-2 programme (2014-2019)

The focus of Phase 2 was on "market-oriented development". Programme interventions continued to relate to the supply side, the demand side, technology performance and the institutional environment. ABPP aimed for some crucial functions of the programme to be taken over by market actors and the supportive environment. National programmes therefore were leaner and more hands-off.

The focus of Phase 2 was on "market-oriented development"; moving away from direct implementation and programme subsidization of end-users, and with a clearer role for SNV as technical assistant. Phase 2 (2014-2017) had a specific focus on private sector development, support to the set-up of mason cooperatives and Biogas Construction Enterprises (BCE), the introduction of improved quality assurance systems, facilitation of access to credit for end-users and private actors, promotion and institutionalizing of biogas and bioslurry, and the generation of carbon credit revenues.

The general objective of Phase 2 of the ABPP programme was: A) to improve the living conditions of households in five African countries through the multiple benefits of the construction of domestic biogas digesters; and B) to lay the foundations for the emergence and development of a market-oriented domestic biogas sector.

The specific objectives were as follows (with the main expected outcomes listed):

- Strengthen and increase the demand side of the biodigester markets:
 - a. Potential customers are aware of the technology and its multiple benefits;
 - b. Biodigesters are affordable and credit is available;
 - c. Maximization of benefits for biodigester customers;
 - d. Biogas use is diversified;

1.

- e. Universal and adequate bioslurry and compost use among biodigester customers.
- 2. Strengthen and increase the supply side of the biodigester markets:
 - a. Specialized providers (m/f) deliver quality biodigesters in sufficient quantity through viable companies;
 - b. Specialized suppliers deliver quality appliances in a cost-effective way;
 - c. Biodigester providers are properly linked up with appliance providers;
 - d. Consolidation of an effective quality assurance and customer protection system.
- 3. Improve biodigester operation and maintenance:
 - a. Customers (m/f) are well-trained in operation and maintenance;
 - b. Vocational training institutes offer technical biodigester construction training.
- 4. Creation of a supportive institutional environment:
 - a. Supportive policies, regulations and commitment with the biodigester sector:
 - Government energy policy includes promotion of biogas;
 - Government policies make biogas affordable for low income clients;
 - Government takes up its role in standardization and regulation;
 - b. Farmers' organizations and biodigester associations become actors:
 - Farmers' organizations claim affordable and reliable biogas services;
 - Biodigester providers are organized in a widely recognized association.

2.2.1 Theory of Change

The programme document did not include a Theory of Change or an elaborate Logical framework. The ToC at start and the revised ToC as of 2015 were reconstructed in 2018.





The Phase 2 programme document of December 2013 did not include a Theory of Change or an elaborate logical framework. It included overall and specific objectives with stated expected outcomes. It did not include an elaborate set of objectively-verifiable indicators, targets and sources of verification, although certain targets had been defined (see below). In 2018, the ABPP programme reconstructed its Theory of Change¹², differentiating between the start of the phase (January 2014) and the programme revision in 2015 – "after very poor results in 2014 and before the Mid-Term Review" (see Annexes 2 and 3). Assumptions are not explicit in the ToCs. Gender is also not referred to.

The assumptions underlying the revised Phase 2 ToC are multiple and include the following:

- 1. Biodigesters improve the living conditions of small-scale mixed farming households;
- 2. Expansion of biodigester installation will take place. Exponential growth is crucial;
- 3. The business case of biodigesters needs to be improved. Farmers will invest when they understand the business case and companies will enter when they see a market;
- 4. Private BCEs are required, instead of masons, to provide the supply of biodigesters;
- 5. Programme subsidies need to be removed to encourage commercial market development;
- 6. Governments will support biodigester market development in policies and with subsidies;
- 7. Cost reduction, credit availability and end user subsidies will improve affordability;
- 8. MFIs and SACCOs will provide credit to end-users and BCEs, when they understand biodigester technology and when financial barriers are removed;
- 9. Farmer organizations will support and claim biodigester services;
- 10. Lean programme management and Results-Based Financing (RBF) will create efficiency;
- 11. Programme implementation costs will decrease, and thus the donor cost per biodigester;
- 12. Financial sustainability of the ABPP programme will be achieved through carbon credit revenues, other donors and externalization of Research & Development (R&D);
- 13. With sufficient critical mass, the biodigester market will be able to sustain itself and donor subsidies will no longer be required.

The revised ToC shows some relevant changes as compared to the original ToC. This partly reflects the changes the ABPP-2 programme went through in 2014 and 2015 (see below):

- More attention for BCEs (roles, capacities, capabilities) and their business case;
- More attention for quality assurance, after-sales-services and integrity;
- More awareness that governmental subsidies to end-users are to be favored;
- The awareness that the programme implementer (i.e. the NIA) needs more ownership and drive, and that its role should switch towards market facilitation;
- The need to strengthen programme management capacity, particularly on finances.

2.2.2 Governance

The ABPP-2 programme is guided by a Programme Committee consisting of Hivos and SNV representatives, without any representation of national authorities, programme actors or third-party experts. Meetings were held regularly for exchange, analysis and decision-making. Extensive reports including country updates are available for all meetings.

ABPP is a partnership between Hivos, SNV, the national governments of the host countries and donor DGIS, which provides financial support through a contract with Hivos. Hivos subcontracts SNV for in-country technical assistance and for joint supra-national activities. Hivos manages ABPP through a team based in Nairobi, Kenya. The team consists of: the ABPP Programme coordinator, Monitoring & Evaluation and Gender officer, Finance manager, Carbon credit programme officer, Accountant and a Secretary. The team works closely with the SNV technical assistants/experts. At supra-national level,

¹² The reconstructed 'original' and 'revised' ToC were shared by the ABPP team in Kenya, yet they are not referred to in any Phase 2 programme documents such as in the Annual reports or Annual plans.





ABPP and SNV have developed monitoring and tracking tools, a Customer Service Centre (CSC)¹³, and took the lead in redesigning biodigesters for cost reduction. ABPP also undertakes advocacy, develops partnerships and is responsible for the generation of carbon credit revenues.

ABPP is guided by a Programme Committee which consists entirely of representatives of Hivos and SNV. There is no representation from any of the five ABPP programme countries, the authorities, programme actors or third-parties. The Programme Committee regularly held meetings.¹⁴ These served both for information exchange (about and beyond ABPP) and for decision-making on critical issues. Extensive reports are available for all meetings.

ABPP supports National Domestic Biogas Programmes (NDBP) led by a National Implementing Agency (NIA) which manages the funds and plays a facilitating and coordinating role among the prospective actors which include: masons, BCE, biogas associations, financial institutions (banks, MFI and SACCO), vocational training centers, development organizations and governments. National Biogas Steering Committees (NBSC) advise the NIA. They include representatives of different ministries, depending on country.

2.2.3 Monitoring & Evaluation

Monitoring & Evaluation has been elaborate, through quarterly "Traffic light" reports, Dashboards and Half-year and Annual reports. The key priority areas identified in 2015 are reported on, yet the KPIs agreed with donor are only partially. A new and elaborate web-based database was developed to increase oversight and integrity of the data.

At the end of Phase 1, ABPP established a Programme Monitoring and Evaluation (PME) Framework.¹⁵ It holds a list of 13 output and outcome indicators, but does not include baseline data and targets. The framework did not change in Phase 2, even when the orientation and the approach of the programme changed.

The **Key Performance Indicators** (KPI) agreed with donor DGIS are only partially reflected in the PME Framework. The five KPIs agreed at the start of Phase 2 are¹⁶:

- 1. Number of installations (total target 100,000 biogas digesters installed)
- 2. Company based: In 2015, at least 80% of the sales of biogas systems is realized by BCEs or other private parties in all countries but Ethiopia (where the target is 50%).
- 3. Cost reduction: All cost reduction options are identified and realized by end of 2015, delivering an expected cost reduction of 25-30%.
- 4. Credit availability: At least 40-60% of the systems will be financed with end-user credit.
- 5. Bioslurry: 90% of biodigester owners use their slurry for productive activities, or sell it. By the end of 2014 plans for bioslurry use are available for all countries.

The KPIs were not all planned with numerical targets for every country every year and neither are consistently reported on. Yet, almost full data are available for the KPIs 1, 3 and 4, and partial data for KPI 2 and 5.¹⁷.

¹³ TechnoBrain Kenya has been contracted to ensure the multi-country Customer Service Centre (CSC) for monitoring and after-sales service.

¹⁴ The DGIS department Inclusive Green Growth (IGG) tends to participate in the second half of the meetings.

¹⁵ See: ABPP (2013), Africa Biogas Partnership Programme (ABPP). Planning, Monitoring and Evaluation (PME) Framework. Hivos & SNV, July 2013, 25p.

¹⁶ See: DGIS (2013), ABPP Programme – Phase 2. Activity Appraisal Document. October 2013, 13p.

¹⁷ KPI 2 and KPI 5 are not fully clearly defined. For KPI 2, construction by BCEs is sometimes compared with individual masons, sometimes with implementing partners or NGOs. For KPI 5, the percentage of cost reduction sometimes relates to user costs, sometimes to overall costs (including subsidy and programme costs).





For monitoring progress, ABPP programme management actually relied upon the use of dashboards. The **dashboard** was elaborated in accordance with the PME Framework document. The indicators are listed in the ABPP-2 proposal. They are all quantitative (e.g. "average plant size", "number of active biogas masons") but do not have targets. The dashboard evolved over time. Dashboards are used in half-year and annual reporting. "Traffic light" reports are used for quarterly reporting. They indicate progress according to the priority areas agreed in the 2015 project review (see below) which are central to the reconstructed ToC: A) Affordability; B) Business case; C) Reputation; and D) Programme management.

From 2017 onwards, ABPP-2 used a mobile app (Taro) and a **web-based database** (Salesforce) to provide real-time data capture and management. As of December 2018, BCEs and programmes in all countries are able to insert data from the field with a tablet device into the web-based database, and to retrieve data for their own analysis and operations. All biodigesters installed in Phase 2 are included in the database. Extensive verification visits have been conducted.¹⁸ The database provides details on biodigesters and the related users, masons and BCE, plus the Global Positioning System (GPS) coordinates and a picture of the biodigester.¹⁹

2.2.4 Priority areas

Following poor performance in the first year of Phase 2, four key priority areas were defined in 2015 and specific budgets set aside for investment on: A) Affordability; B) Business case; C) Reputation; and D) Programme management.

ABPP-2 regarded 2014 as a disappointing first year of Phase 2. The programme remained significantly under the agreed target of biodigesters. Various reasons were mentioned including²⁰: the abolition of the end-user subsidy (in Kenya, Tanzania, Uganda); a reduction of credit availability and staff and management issues (in Ethiopia); poor plant functionality, mainly because of improper feeding, absence of biogas credit and absence of strong BCEs (Burkina Faso); and the disentanglement from Heifer as implementing agency (Uganda).

Root cause for the underperformance was "*the structural weakness of the institutional and organizational sector infrastructure in all countries*".²¹ The ABPP teams reportedly did not have the right skill set in place²² to support market-oriented development. In response, the ABPP Annual Plan 2015 ("Restoring Relevance and Viability") defined the four key priority areas for investment, and set aside specific budget for these, while temporarily reducing the production targets²³:

- Affordability:
 - Cost reduction: redesign of existing models and support of new, cheaper models;
 - Credit: better promotion of the technology among financial institutions, provision of incentives and guarantee funds, and linking to value chain organizations;
- Business case:
 - Bioslurry: include the bioslurry benefits in promotion to end-users;
 - Business Development: Develop BCE capacity through targeted training and capacitybuilding to improve performance (product and service quality) and business skills (sales

¹⁸ This also served carbon emissions reduction verification exercises.

¹⁹ Note that the evaluation team encountered some inconsistencies in the database; i.e. mistakes with names of villages (in Burkina Faso), spelling of villages and masons (in Uganda), and biodigester dimensions (in Burkina Faso). In Uganda, the number of digesters reported in the database does not match the numbers reported annually.

²⁰ See: ABPP (2014), ABPP 2015 Annual Plan. Restoring Relevance and Viability. December 2014, 48p.

²¹ See: ABPP (2014), ABPP 2015 Annual Plan. Restoring Relevance and Viability. December 2014, 48p.

²² See: VAN AALST, P. & 1 SKULER (2016), MTR of the ABPP – Phase 2. December 2016, 35p.

²³ See: ABPP (2014), ABPP 2015 Annual Plan. Restoring Relevance and Viability. December 2014, 48p.





skills). Introduce BCE ranking and incentives for good performance. Implementing Partners are no longer involved in production.

- Reputation:
 - Restore the reputation of the technology and the NDBP²⁴ through repair and maintenance of existing non-functional biodigesters and strict quality control; and
 - CSC for monitoring of functionality and provision of after-sale services.
- Programme management:
 - Dashboards were used to measure success on these priority areas;
 - Some new indicators were added (e.g. number of plants repaired, after-sale services provided), while others disappeared (e.g. gender, implementing partners).
 - Country-specific measures concerning planning, management, staff and M&E.

2.2.5 National Implementing Agencies

The National Implementing Agencies changed in 2015 in two countries. Hivos and SNV themselves now host the NDBP in Kenya and Uganda. The programme in Tanzania was put on a hold in mid-2017 following the discovery of irregularities. The national programme in Ethiopia has been scaled up and taken over with EU funding.

ABPP-2 envisaged continuing collaboration in all countries with the NIA of Phase 1. However, already per July 2014, the contract with the NGO Heifer Project International (Uganda) was discontinued. Heifer was considered by ABPP not to be adequately productive, collaborative and communicative. Budget control was labeled "very poor".²⁵ The NIA role was taken over as of October 2014 by Biogas Solutions Uganda Ltd. (BSUL), which formally is a private company but which is 100% owned by Hivos and SNV, hosted by SNV, and does not have any other business than ABPP programme implementation. Hivos and SNV planned to transfer their shares 100% to a local structure within 2 years²⁶, however, this has not materialized. According to ABPP management, the results were not yet up to expectations.

In Kenya, the contract with hosting farmer organization KENAFF as NIA was discontinued in late-2015 after the discovery of irregularities.²⁷ The Kenya Biogas Programme (KBP) was then established as a temporary vehicle for programme implementation. KBP is not legally registered. It is entirely owned and managed by Hivos and KSP staff. The KENAFF disengagement process was labeled by ABPP as "*very contentious and protracted*"²⁸ and has still not been finalized.

In Tanzania, the contract with the governmental Centre for Agricultural Mechanization and Rural Technology (CAMARTEC) was put on a hold as of mid-2017 following the discovery of irregularities.

The two countries where the ABPP NIA remained the same entity are Burkina Faso and Ethiopia. The programmes each are led by a governmental body under the wings of the Ministry of Animal Resources (Burkina Faso) and the Ministry of Water and Mineral Resources (Ethiopia). Burkina Faso and Ethiopia are also the only countries that have continued to provide end-user subsidies for biodigester acquisition throughout Phase 2.

²⁴ Thus far, functionality of the biodigesters installed had not been part of the ABPP planning or key performance indicators, and in general had not been considered as an assumption or a risk.

²⁵ See: ABPP (2014), Minutes of Programme Committee meeting (25 June 2014). October 2014, 15p.

²⁶ See: ABPP (2014), Minutes of Programme Committee meeting (25 June 2014). October 2014, 15p.

²⁷ See: ABPP (2015), Minutes of Programme Committee meeting (16 & 19 October 2015). October 2015, 14p.

²⁸ See: ABPP (2017), Minutes of Programme Committee meeting (11-12 May 2017). May 2017, 9p.





In Ethiopia, the NDBP formally ended Phase 2 implementation in March 2019 and continued as of mid-2018 a new, similar but separate EU-funded biodigester support programme (EUR 23 million) in which SNV provides technical assistance.²⁹ ABPP as such was not involved in plan development, but in April 2017 it agreed with the EU on general terms for transition of the ABPP-2 programme activities towards the new National Domestic Biogas Programme Ethiopia Plus (NBPE+) project.³⁰ The ABPP staff continued work with EU-funded project. Ethiopia only figures in the Phase 3 proposal for stove innovation and market development.

2.2.6 Finances

The planned ABPP-2 budget was EUR 27 million. Cost extension in 2019 has been requested. Cofunding was received from the EnDev programme promoting Results-Based Financing (RBF), but only half of this materialized due to the low number of biodigesters installed. ABPP-2 is lined up for receiving carbon credit revenues; most revenues for carbon credits as of 2013 are yet to be received. Audited financial statements are available for all years.

The initial financing strategy for Phase 2 was targeted at deriving additional income from carbon credit emission rights. However, the 2012 crash of the international carbon market make this no longer a viable strategy. The national governmental contributions did also not come through as expected, at least not in Kenya and Uganda.^{31 32} Financial support from the DGIS was requested for Phase 2 to further strengthen and develop the private sector.

ABPP-2 was to run from 2014 till 2017, with a planned total budget for programme activities of EUR 27 million, of which EUR 22.6 million by DGIS (EUR 20.1 million for Phase 2 plus EUR 2.5 million balance of Phase 1).³³ This includes all programme support costs by National Implementing Agencies (NIA), technical assistance by SNV and fund management by Hivos. The programme budget does not include the subsidies by national governments or the own contributions by households; an estimated total of EUR 24.8 million.³⁴

Co-funding was expected from the German GIZ-managed multi-country trust fund Energizing Development (EnDev) under a DfID-funded Results-Based Financing (RBF) project (EUR 2.5 million), from carbon credit revenues (EUR 1.5 million) and from Multilateral Climate Funds (MCF) (EUR 0.4 million).³⁵ In 2015, ABPP was prolonged until 31 March 2019 (no cost extension). A cost extension until 31 December 2019 was requested from DGIS late-2018, for EUR 3.8 million (cost extension).^{36 37} The request has not yet been awarded.

The EnDev co-funding materialized as of March 2015. It covers the costs of the RBF project Biogas Business Boost Benefitting Farmers (4B-F), which supports the private sectors in Kenya, Tanzania and Uganda to develop markets for renewable energy. RBF is designed to develop markets in contexts where there is no end-user subsidy; hence the 4B-F programme covers only these three countries. The

²⁹ Hivos is not associated for reasons unclear to the Evaluation team.

³⁰ See: ABPP (2017), Minutes of Programme Committee meeting (11-12 May 2017). May 2017, 9p.

³¹ The Kenyan government withdrew a financial support proposal from parliament following the KENAFF case.

³² The Tanzanian government finally invested with end-user discounts in 2016 and first semester of 2017.

³³ See Budget summary in: ABPP (2013), DGIS budget for ABPP-2 (30 September 2013). Excel sheets.

³⁴ The household investments are estimated by ABPP at a total of EUR 17 million. The government support was estimated to be EUR 5 million of subsidies (Burkina Faso: 2 million; Ethiopia: EUR 3 million), and EUR 2.8 million of other support (regional/woreda support, conferences, travel, transport etc.).

³⁵ See Budget summary in: ABPP (2013), DGIS budget for ABPP-2 (30 September 2013). Excel sheets.

³⁶ See: ABPP (2019), ABPP Extension Proposal, April-December 2019 (version 3 March 2019), 16p.

³⁷ The requested 9-months' budget of EUR 3.8 million is equivalent to the estimated ABPP-2 expenditures in the year 2018 (EUR 3.9 million) (ABPP, Silvanus MUTINDA, 18 January 2019).





EnDev co-funding was intended to be EUR 3.5 million at 4B-F project start, but is expected to be EUR 1.6-1.7 million by end of project, due to the lower number of biodigesters installed and credit loans provided.

An additional EUR 2 million for Hivos and SNV was included in 2014 in the ABPP subsidy agreement with DGIS for the Sustainable Energy for All (SE4ALL) project³⁸ but managed separately.³⁹ These funds are therefore not considered by this evaluation.

Audited Financial statements of the ABPP-2 programme are available for the years 2014-2017. They also cover the EnDev-funded 4B-F programme in Kenya, Tanzania and Uganda (January 2014 - December 2019), and the DGIS-funded Strengthen Civil Society Engagement with the Sustainable Energy for All Initiative (SE4ALL) (October 2014 - December 2017). The Annual and Financial reports 2018 were not yet available at the time of the evaluation.

2.2.7 Mid-Term Review

The 2016 Mid-Term Review concluded that ABPP-2 should evolve from being a "market developer" and biogas technology pioneer into a "market facilitator". Recommendations were to focus on the business case for end-users, to make access to credit a top priority, to withdraw the programme from marketing, and to create a dual ABPP structure with an "enterprise" and an "alliance". The recommendations were generally accepted by ABPP.

The Mid-Term Review (MTR) of ABPP-2 took place in the second half of 2016, with report delivered by December 2016⁴⁰; i.e. 2.5 years after programme start. The objective was to review and expand the building blocks and the development path of the ABPP programme to ensure it achieves its 2019 goals. These goals were summarized as bringing the biogas markets to the sustainability and scalability levels required to guarantee future viability, continuity and autonomy in the countries of operation. The MTR did not assess gender issues.

The MTR concluded that ABPP-2 should evolve from being a "market developer" and biogas technology pioneer into a "market facilitator". The main recommendations were: to focus on the business case for end-users, to make access to credit a top priority, to withdraw the programme from marketing, and to create a dual ABPP structure with an "enterprise" for critical support functions and an "alliance" for promotion and awareness-raising.

The recommendations were generally accepted by ABPP, but the degree of application differed per country⁴¹. The NDBP in Burkina Faso and Ethiopia did not support the idea to develop their NIA into a social business enterprise. Burkina Faso and Ethiopia consider the biodigester as a very relevant tool for agriculture which should be integrated in the production system of rural and peri-urban household. The other ABPP countries consider it as a market commodity, the dissemination of which should be left to market forces.

Otherwise, ABPP generally took up the challenges and refined the strategies and activities of the overall ABPP programme and the national programmes.⁴²

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³⁸ The 3-year global SE4ALL project is being implemented by SNV in partnership with Hivos and ENERGIA and funded by DGIS, to strengthen civil society engagement in the United Nations (UN) SE4All initiative.

 ³⁹ See: ABPP (2015), Minutes of Programme Committee meeting (21-22 October 2014). February 2015, 14p.
 ⁴⁰ See: VAN AALST, P. & 1 SKULER (2016), MTR of ABPP – Phase 2. December 2016, 35p.

⁴¹ See: DGIS (2018), Terms of Reference for Effect Evaluation of the Africa Biogas Partnership Programme –

Phase 2 (ABPP-2). Directorate General of International Cooperation (DGIS), MOFA), Netherlands, 29p.

⁴² See: ABPP (2017), ABPP Management Response to the MTR of ABPP Phase 2. June 2017, 26p.





3. ABPP-2 Results and Outcomes

3.1 Overall production

ABPP-2 has not been able to meet the targets of 100,000 biodigesters installed and 600,000 people reached with renewable energy. By 2018, production was at 35% of planning. Burkina Faso and Ethiopia have shown the most consistent installation of biodigesters. Production in Kenya is volatile, in Uganda much below expectations, and in Tanzania halted following irregularities.

Annex 4 presents the biodigester production per country since the start of ABPP in 2009. ABPP-1 resulted, retrospectively, in the installation of 33,000 biodigesters (planned: 70,000). ABPP-2 will result as of end 2018 into around 35,000 installed biodigesters⁴³ (planned: 100,000). In effect, Phase 2 was needed to achieve the number planned in Phase 1 (per 2013).

Table 1 presents biodigester production per country. ABPP-2 was to be a "phase of expansion and upscaling"⁴⁴ with exponential growth in order to achieve "critical mass" or tipping point for autonomous market development and growth. ⁴⁵ However, such has not occurred. ABPP-2 started with a strong drop in production in all countries.⁴⁶ The disappointing figures led to a strategic reorientation as of 2015 (see paragraph 2.2.4). Yet, production remained low, and by the end of 2018, even with a oneyear extension, only 35% of total had been achieved. Annual production was stable at some 7,000 biodigesters per year.

Table 2 presents the ABPP-2 biodigester production per country. Only Burkina Faso is showing a steady growth up to 2017 (42% of target). Ethiopia has a stable and relatively high annual production (60% of target).⁴⁷ The Kenyan numbers fluctuate between years, and although the country produced most digesters, it achieved only 32% of target. Ugandan production is constant and low (some 650 biodigesters per year) at 23% of target. Tanzania has the lowest production (11%) due to freezing of program activities after 2016.

Clearly, the original ABPP-2 production target had been set too ambitiously. The unrealistic planning of biodigester installation per country had been pointed at during the ABPP-1 Evaluation (2015) and the ABPP-2 Mid-Term Review (2016), but this did not lead to formal review of the target. The one-year no-cost extension in 2018 did not change the picture.⁴⁸ The November 2017 ABPP-2 forecast of 42,000 biodigesters by the end of 2018 was not achieved. The cost extension period in 2019 is also not expected to bring substantial growth. As a result, the total number of beneficiaries of biogas and bioslurry/biocompost will be an estimated 200,000 persons reached (planned: 600,000).

The ABPP-2 proposal mentioned the following "pre-conditions" for the ambitious target of 100,000 plants to be achieved⁴⁹. It was assumed that this would bring exponential growth of the market:

- Sufficient financial support to and ownership of the programme by national governments;
- The availability of accessible credit facilities and investment subsidies for farmers;
- The availability and pricing of construction materials and skilled labour;
- Sufficient demand for carbon credits generated by the various country programmes;

⁴³ The ABPP Annual report 2018 was not yet available. The figure is based on latest data shared (8 March 2019).

⁴⁴ See: ABPP (2013), ABPP – Phase 2 (2014-2017). Joint Proposal. Hivos & SNV, September 2013, 54p.

⁴⁵ See: PARTICIP (2017) Evaluation of the RBFF within EnDev. Particip, Germany, 49p.

⁴⁶ In 2014, the actual construction was only 45% of the targeted 16,900 biodigesters.

⁴⁷ Even when Burkina Faso and Ethiopia are hampered in some regions by insecurity and political unrest.

⁴⁸ Except for Kenya, where a large number of prefab biodigesters were reportedly installed in 2018.

⁴⁹ Next to external factors (political stability, natural calamities etc.).





 Table 1.
 Production of biodigesters and planning by ABPP-2 programme (2014-2018)



Source: ABPP programme (8 March 2019).

Table 2.Chart of production of biodigesters per country per year (2014-2018)



Source: ABPP programme (8 March 2019).

The Evaluation team considers, however, that these are not "pre-conditions" that can be considered external to the programme. ABPP-2 was designed to create those conditions through specific interventions. Cost reduction, access to credit, governmental subsidies, governmental policies and carbon credit revenues all figured explicitly as ABPP-2 intervention areas.

3.2 Biodigester technology

For a new market to emerge and expand, the biodigester technology for sale needs to be adapted to customer needs, capacities and capabilities. Technically, everyone having two cattle (or four pigs) may have a biodigester. In practice, daily feeding of the biodigester with sufficient fresh dung and water, in the right ratio, often proves to be a challenge. This may result in non-functionality of the biodigester and reputational risks to the technology and the programme. ABPP successfully managed to increase functionality through integrated quality management; to a rate of over 90% in all countries, for newly-established biodigesters.





ABPP-2 has principally promoted fixed-dome underground biodigesters, of different types and sizes depending on country.⁵⁰ The biodigesters are built on the spot by masons and BCEs trained by the programme. Different appliances are attached: a cookstove⁵¹, a biogas lamp, a pressure meter, a dung mixer (in Uganda, not in Burkina Faso), etc. Toilets may be attached, through an additional inlet to the biodigester. In recent years, ABPP has started to also include the promotion of prefabricated above-ground biodigesters.⁵²

The **biodigester** itself consists of three main structures: the mixing chamber (for mixing fresh dung and water), the dome (for biogas storage) and the expansion chamber (for bioslurry discharge). The expansion chamber is connected to two compost pits for biocompost production. The cost-price per m³ biodigester reduced over time (see paragraph 3.4).

Household energy products that are designed in collaboration with end-users (often women) are more likely to meet user expectations and thus increase the likelihood of technology adoption.⁵³ ABPP did not have any particular strategy to ensure user participation in the design and the testing of the biodigesters and its appliances. This may have contributed to some mismatches between users' expectations and needs and the actual product offered. Examples are: some biogas lamps are not user-friendly (very fragile), biodigesters lacking a mixer (users consider it dirty to mix by hand), the perception that certain dishes cannot be cooked on biogas, and generally, the discontinued use for a relevant percentage of users.

The **technical potential** for biodigester uptake is defined by ABPP by the number of people having at least two cattle (or four pigs) for a 4m³ biodigester. Feasibility studies have been conducted in all countries prior to Phase 1 to assess this technical potential. Yet, in practice the demand for biodigesters is much more limited due to factors such as the availability of water⁵⁴, fuelwood, livestock management systems, etc.; and consumer awareness, ability and willingness to pay, gender dynamics in households, etc. Also, there is more to successful biodigester management than just ownership of sufficient numbers of cattle (or pigs).

Regularity of feeding is essential for the digestion process and the production of biogas and bioslurry to be continuous. Regularity is required to prevent non-functionality. Therefore, customers should have easy access to fresh dung, ideally through stabling, preferably in zero grazing units. In many areas, however, full-time stabling and zero grazing are not common.

The **ratio of dung to water** (1:1) is important in order not to overloaded the biodigester with dung (clogging) or water (poor digestion). The mixing requires routine and takes some 15-45 minutes per day. Time involved increases significantly in places where owners do not have easy access to fresh dung, or where water is not readily available. This is an issue especially in dry areas (e.g. Sahelian and Savannah-like), in elevated areas (e.g. in hilly coffee-growing areas) and during the dry season (of which length differs per country and location).

In practice, even when most customers may fit the ABPP profile of the "ideal" biodigester household, a relevant number does not. Some of the customers visited in Uganda and Burkina Faso did not have cattle near the house and spent a lot of time collecting dung in the field, while others had challenges with water and/or complained about the labour involved. Again others did not correctly manage the

⁵⁰ Models differ per country and have changed over time. Sizes can e.g. be 4, 6, 9 or 13 m³; most are 4 or 6 m³.

⁵¹ Cookstoves come in different types, sizes and origins. Usually they are double burners; most are imported, some are produced locally.

⁵² The prefab biodigesters also come in different models, types and sizes, depending on company.

⁵³ See: GACC (2013), Scaling adoption of clean cooking solutions through women's empowerment: a resource guide. Global Alliance for Clean Cookstoves (GACC). UK Aid, 90p.

⁵⁴ In principle, according to ABPP households should have year-round water availability at less than 12 minutes walking distance. However, prolonged dry spells may can cause periodic non-use of the digester.





mixing process and/or interrupted it over time, with non-functionality as a result. The allocation of the various tasks involved needs good management at household level. The activities are divided over women and men, and sometimes children or paid workers. User trainings need to address those doing the actual daily mixing.

Functionality is one of the best selling points of new technology for which no market previously existed. In ABPP-1, payment of BCEs and masons was linked to the delivery of an operational biodigester; assuming that it would be used and be functional. Functionality, however, became a key issue at the end of Phase 1 and the start of Phase 2, when the ABPP programme realized that nonfunctionality of biodigesters was high.^{55 56} The reputation of the technology and the entire programme were at stake. For example, some biogas credit pilots (in Uganda, Tanzania and Ethiopia) had to be interrupted because of default on loan repayment due to non-functional plants.⁵⁷ Reasons for nonfunctionality were diverse and included construction failures, the use of poor materials or appliances and poor masonry work. Quality surely differs per BCE.⁵⁸ Yet, in about 70% of the cases, poor feeding by users was identified to be the main cause of non-functionality.⁵⁹

Reputation was acknowledged by ABPP as being a critical factor in market consolidation and expansion. As of 2015, it became a priority area for investment. The results-based co-financing by EnDev induced the introduction of the functionality benchmark "gas in the kitchen". Later on, and at least in Burkina Faso, part of payment was connected to proper functioning of the biodigester after 6, 12, 18 and 24 months. Biodigester functionality indeed improved over the years. The overall ABPP-2 functionality rate of all year biodigesters (2014-2017) in Burkina Faso is 75% (54% in 2014), in Uganda 76% (60% in 2014), in Kenya just above 70%, and in Ethiopia below 60% (60% in Phase 1).⁶⁰

ABPP-2 managed to increase functionality in all countries, to a current level of over 90% for newlyinstalled biodigesters.⁶¹ For this to occur, important integrated efforts were made that strengthened the system of monitoring biodigester quality and construction, ensured a focus of BCEs and masons on technical quality, created feed-back mechanisms on user experiences, and put in place remediation measures for non-functional biodigesters.

3.3 **Business case for biodigesters to users**

The business case of biodigesters needs to be clear to users. Bioslurry and biocompost are good and nutrient-balanced fertilizers, and are likely to contribute to significant yield improvements and income. Further work is required to assess the economic impacts of biodigesters and bioslurry/biocompost, in order to strengthen both the business case and its understanding by stakeholders and third parties.

Biodigesters have long been appreciated especially for their contribution to renewable energy access in rural areas. This has also been the main motivation for DGIS to support ABPP. In Phase 1, the business case for biodigesters at user level was the reduction of expenses on fuelwood, charcoal and fossil fuels, and the livelihood impacts of biogas in terms of gender, health and the environment. In Phase 2, the attention has shifted more towards the productive use of bioslurry, which is discharged from the biodigester by the pressure of the biogas.

⁵⁵ See e.g.: WASIKE et al. (2013), Case Study on the Non-functionality of Plants in Burkina Faso. January 2013.

⁵⁶ See: ABPP (2013), ABPP – Phase 2 (2014-2017). Joint Proposal. Hivos & SNV, September 2013, 54p ⁵⁷ See: ABPP (2015), Annual report 2014. April 2015, 33p.

⁵⁸ In Uganda, for example, according to BSUL BCE grading, one-third of BCEs assessed in 2017 built biodigesters with functionality rate of less than 85%, while 2 BCEs were at over 90% functionality. ⁵⁹ See: ABPP (2017), Annual report 2016. April 2017, 56p.

⁶⁰ See: ABPP (2017), Annual report 2016. April 2017, 56p.

⁶¹ See: ABPP (2018), Africa Biogas 2019-2023. Draft Proposal. Hivos & SNV. August 2018, 71p.





In Kenya and Uganda, the bioslurry is increasingly being used by households on their own lands, or sold as an organic fertilizer. In Burkina Faso, already in Phase 1, double compost pits had become integrated elements of the biodigesters installed, enabling the efficient use of the bioslurry nutrients for making biocompost. Bioslurry and biocompost are good and balanced fertilizers, and can contribute to significant yield improvements and income. Access to energy remains an important motivation for biodigester acquisition, yet the productive use of bioslurry/biocompost for food and income generation has become more dominant.

ABPP has inventoried the possibilities of bioslurry and biocompost for productive uses, such as in the production of crops, pigs, chicken, fish and mushrooms.⁶² Field studies have taken place.^{63 64} The evaluation team has not encountered, however, an in-depth ABPP programme document regarding the business case of bioslurry or biocompost in terms of productivity, income and cost savings.^{65 66}

The business case of biodigesters for end-users needs to be documented and communicated. ABPP estimated the financial benefits in terms of payback time⁶⁷ at the end of Phase 1, but no further documentation was received by the team or encountered in promotional materials. The savings or income increase experienced by customers is not measured in users' surveys.^{68 69}

3.4 Strengthening demand

ABPP-2 reportedly has achieved the target for biodigester cost reduction (around 20-30%). Governmental subsidies were available in Burkina Faso (at maximum 50% of biodigester cost) and Ethiopia (25-40%), but not in Kenya and Uganda. Biodigesters have been subsidized by third parties in many places, and can be additional to, or replace, governmental subsidy. ABPP-2 has hardly been able to bring financial institutions on board to provide credit for underground biodigesters, due to the nature of the product and the general banking environment. In Kenya, lease-to-own credit is provided by some companies for above-ground biodigesters.

⁶² See: WARNARS, L. & H. OPPENOORTH (2014), Bioslurry: A Supreme Fertiliser. March 2014, 50p.; POSTMA, R. & X. ZHANG (2016), Towards general guidelines for the management of bioslurry in Kenya, 45p.; PNB-BF (2016?), Démarche pour la réalisation d'un bassin piscicole familial dans un ménage / une ferme, 6p.; KBP (2017), The Bioslurry Story in Kenya, 17p.; TURYAGYENDA et al. (2017), Effect of different forms of bioslurry on performance of crops in Western Uganda, 49p.; and KBP (2018?), Bioslurry: Superior Organic Fertilizer. Utilisation and Management Handbook. 13p.

⁶³ The trials aimed at determining the effect of different forms of bioslurry (composted, liquid and dried) on the performance of crops (especially on maize, cabbages and coffee) and on soil quality.

performance of crops (especially on maize, cabbages and coffee) and on soil quality. ⁶⁴ See: TURYAGYENDA et al. (2017), Effect of different forms of bioslurry on performance of crops in Western Uganda. SNV & NARO, Uganda, 49p.

⁶⁵ The best reference encountered is by Warnars & Oppenoorth (2014): "Farmers in Tanzania can increase their crop revenues with an average of 25 per cent by actively using bioslurry as a fertiliser. With a plot of arable land of between 0.2 and 2 ha, (...) the break-even point of the biogas plant (the payback time) is less than 22 months. (...) As such, one can conclude that a biogas plant, together with the use of bioslurry, is highly profitable and interesting for small and medium-scale farmers."

⁶⁶ In response to a draft of this report, ABPP stated that promotors and extension workers use Excel templates for calculating pay-back period, as a tool for calculating the business cases taking into consideration the specific contexts of a potential household (potential cost saving energy, cost saving fertilizer, revenue increase from improved crop quantity/quality, etc.). The evaluation team has not been able to review and validate these.
⁶⁷ See: ABPP (2013), ABPP – Phase 2 (2014-2017). Joint Proposal. Hivos & SNV, September 2013, 54p.

⁶⁸ However, there is anecdotal evidence, e.g. for Burkina Faso, that some farmers managed to sell biocompost to fellow farmers for up to EUR 50-60 per ton.

⁶⁹ The complexity of the matter does not allow the evaluation team to present own calculations on the business case for end-users. This requires a separate exercise by ABPP or third parties.





The high up-front investment for users is one of the main barriers for dissemination of biodigesters. ABPP-2 aimed to strengthen the demand for biodigesters by increasing affordability, through cost reduction, subsidies to end-users and access to credit. Where no subsidies and credits are available, the market for biodigesters will likely remain small.

Cost reduction was measured by ABPP in m³ biodigester to enable comparison between countries as the average biodigester size may be different. The cost is determined by many variables, which differ per country, including the prices of cement, bricks and labour, and the amount of materials required, etc. This complicates the interpretation of data.

According to Table 3, cost reduction per m³ biodigester was achieved between 2014 and 2017 in Burkina Faso (minus 26%) and in Kenya (minus 16%). Yet, biodigester costs went up significantly in Ethiopia since 2014 (plus 29% in 2017; but much more in 2015 and 2016). Production costs also fluctuated heavily in Uganda and Tanzania between years, suggesting that overall the cost reduction monitoring data are just not very consistent.⁷⁰

Still, from other documentation and interviews with staff, the picture emerges of an overall 20-30% cost reduction⁷¹, thanks to a rationalized use of cement (e.g. from 11 to 8 bags of cement bags for a 4m³ biodigester in Burkina Faso)⁷² and a shorter construction period (e.g. 6-8 instead of 10-12 days). The process of cost reduction started in 2015 (24-31% depending on country⁷³). In 2017over 60% of total production was of the cost reduced model.⁷⁴ The new design does not automatically translate into reduced costs for all households: in Uganda, for example, only one-third of all plants constructed Phase 2 were of the new model.⁷⁵

For customers, the cost of biodigesters depends especially on volume. In Burkina Faso we note a move away from the 6m³ biodigesters in Phase 1 to 4m³ biodigesters in Phase 2.⁷⁶ Smaller biodigesters need less dung and water per day, thus facilite usage. In Uganda, however, we noted a move away from the 4m³ biodigesters towards 6m³ biodigesters or larger.⁷⁷ This leads to lower average costs per m³ biodigester (the KPI for ABPP-2), but to much higher up-front investment costs. As a result, in Burkina Faso biodigesters are now more widely available (lower upfront costs, less cattle is needed), whereas in Uganda the trend is inverse. Burkina Faso currently considers developing 2.5m³ or 3m³ biodigesters.

Subsidies to end-users were provided by ABPP in Phase 1 but discontinued in Phase 2. In Burkina Faso and Ethiopia, governmental subsidies replace ABPP subsidies. Burkina Faso subsidizes a fixed amount, which equals 50% of the costs of a 4m³ biodigester. Ethiopia provides a subsidy of about 25-40% of total.⁷⁸ The subsidies are paid to the BCE or masons, without involvement of the end-users. Tanzania also provided some subsidy to end-users in 2016 with Norwegian funding, through the Rural Energy Agency (REA), but the programme was halted the same year. Kenya and Uganda do not have governmental subsidies, despite lobby and advocacy by ABPP towards the respective ministries and institutions.

⁷⁰ For example, data for Uganda are not consistent. The average costs per biodigester have gone up from EUR 398 in 2015 to EUR 478 in 2018 according to BSUL (4 March 2019). Annual reports use other figures: in 2015 EUR 437 (1,8 million UGX), in 2016 EUR 526 and in 2017 EUR 415 (1,7 million UGX). Yet, ABPP's dashboard states that costs were EUR 620 in 2014 and EUR 180 (?) in 2017.

⁷¹ See: ABPP (2017), ABPP Management Response to the MTR of the ABBP-2 programme. June 2017, 26p.

⁷² In Phase 1, cement use had already diminished significantly, switching from a concrete to a brick-made dome.

⁷³ See: ABPP (2016), Annual Report 2015. Hivos & SNV, May 2016, 64p.

⁷⁴ See: ABPP (2018), Annual Report 2017. Hivos & SNV, June 2018, 50p.

⁷⁵ See: Uganda Phase 2 Database.

⁷⁶ According to the PNB-BF database, the 4m3 biodigesters make up 43% of total in Phase 2, but 78% of total in 2018. The 6 m3 biodigesters make up 56% of total in Phase 2, but only 21% in 2018.

⁷⁷ According to BSUL (2017), the percentage of larger digesters (9-13 m³) increased from 18% to 39% of total.

⁷⁸ Today, the subsidy is ETB 7,000 (EUR 219), or 25% of the costs of a 6m³ and 38% of a 4m³ biodigester.





Table 3. Production costs per m ³ of biodigester, per country and per year (in EUR: 2012-2017)		2		
	Table 3. Production	costs per m ³ of biodigeste	r, per country and per year	(in EUR; 2012-2017)

Specific construction costs	2012	2013	2014	2015	2016	2017
Ethiopia	123	111	112	193	156	144
Kenya	130	98	119	n/a	126	100
Tanzania	154	114	139	145	87	n/a
Uganda	205	140	185	133	180	79
Burkina Faso	210	175	185	155	145	137
Average	164	128	148	157	139	115

Source: ABPP programme (8 March 2019).

In addition to, or instead of, governmental subsidies, there are other programmes and projects with an interest in biodigester market development. In Uganda, about one-third of biodigesters were subsidized by NGOs, programmes or projects.⁷⁹ These subsidies come in different sizes and forms. Many biodigesters were constructed under World Vision (391) and UNIDO (200) programmes with full end-user subsidies. In Burkina Faso, the NDBP worked amongst others with the AfDB-funded governmental Programme for Investments in Forestry (PIF) to promote biodigester use in areas adjacent to nature reserves. The PNB-BF plan for 2019 is to facilitate the construction of no less than 1,500 biodigesters with PIF end-user subsidy support, consisting of half the cement bags and iron required for construction. Third-party subsidization is a contextual fact in most countries; it is both a challenge (market distortion) and an opportunity (demand creation) for developing a biodigester market.

Access to credit would facilitate people's access to biodigesters, but is generally weak in rural areas in the countries of operation. Micro-finance institutions (MFIs) and Savings & Credit Organizations (SACCOs) aim to lower the bar, by using social cohesion and social control as back-up mechanisms for reimbursement (replacing collateral).

Despite a range of efforts made, ABPP has not been able to generate significantly more access to credit. The target was to have at least 40-60% of biodigesters financed with end-user credit. Only in Ethiopia this target was reached (in all years but 2017); although the percentage decreased since 2014. The overall percentage, however, is about 15% on average for fixed-dome biodigesters; and it rather decreases than increases (see Table 4). The picture changes if Lease-to-Own figures for prefabricated biodigesters are also considered.⁸⁰ For Kenya the percentage of biodigesters financed with end-user credit was 23% in 2017 and 61% in 2018. For Uganda, this would be 13% in 2018. Overall, 25% of all biodigesters is Lease-to-Own.

ABPP had hoped to be able to boost credit uptake, for example with the EnDev 4B-F programme⁸¹ which was implemented in Kenya, Uganda and Tanzania. In the same countries, a pilot was started with Hivos Credit Fund, and in 2017 a partnership commenced with Innovare Advisors (USA) to mobilize investment funds for end-user credit and to establish the entity "Biodigester Finance Africa Ltd". However, at the time of the evaluation, only small successes with limited numbers of credit beneficiaries had been realized.^{82 83}

⁷⁹ Exact figures are not available.

⁸⁰ Based on data provided by ABPP (15 April 2019).

⁸¹ See: ABPP (2015), Annual report 2014. April 2015, 33p.

 ⁸² According to ABPP, recent success in Kenya is that FMO (Netherlands) has agreed to avail EUR 0.5 million as starting capital for designated biodigester credits under a partnership with Equity Bank and ABPP-KBP.
 ⁸³ Even where credits are available, the interest rates tend to be at least around 1.5% per month for 6-12 months;

i.e. 9-18% in total. This is quite low in African banking terms, but still is a significant cost and risk to customer.





Table 4.	Share of biodigesters finan	ced by MFI/SACCO, per	r country and per y	vear (2012-2017)

Share of biodigesters financed by MFI/SACCO								
	2012	2013	2014	2015	2016	2017		
Ethiopia	58%	64%	54%	49%	44%	26%		
Kenya	31%	27%	28%	30%	3%	4%		
Tanzania	1%	2%	1%	6%	18%	n/a		
Uganda	2%	2%	0%	3%	8%	7%		
Burkina Faso	3%	0%	0%	0%	4%	2%		
Average	19%	19%	17%	18%	15%	10%		

Source: ABPP programme (8 March 2019).

From interviews with banks and MFIs, it is clear that the fixed-dome biodigesters promoted by ABPP cannot be considered collateral. The wealth that customers may have generally consists of cattle, which is also not considered collateral due to its mobile nature.⁸⁴ The relatively low number of biodigesters per country and the practical difficulties of managing credits and ensuring reimbursement in rural areas, do not motivate, or justify for, financial institutions to create specific biodigester credit facilities.⁸⁵ In general, MFIs are not found to be the drivers of markets when it comes to energy access products.⁸⁶

The conditions for credit to end-users are better with prefabricated biodigesters. In Kenya, in recent years a range of private actors have started to sell prefab biodigesters, of varying types and models. Prefab biodigesters are not currently any cheaper than fixed-dome biodigesters. Prefab biodigesters are above-ground plastic or canvas structures which are easy to install and maintain.⁸⁷ Credit providers may in principle retrieve the prefab biodigesters in case of non-reimbursement by user, but they provide little collateral once installed.⁸⁸

The installation of prefab digesters is increasing rapidly in Kenya since 2017. Demand is created by newly entering international companies, such as SimGas, Takamoto and Sistema Bio; some of which provide credit facilities, e.g. Pay-As-You-Go or Lease-to-Own. These are all start-ups in Kenya, so it is still early to assess the success and sustainability of their delivery schemes. Prudence is required. SimGas experienced serious quality issues with the design of some of its biodigesters. It withdrew from Tanzania (in 2015) and went bankrupt in the Netherlands (in 2018).⁸⁹ Takamoto discontinued the promotion of prefab biodigesters following technical failures and non-reimbursement of credit.⁹⁰ Sistema Bio, however, is very active. It installed 1,500 biodigesters since 2017, and it plans for 3,500 biodigesters in 2019.⁹¹

⁸⁴ Yet, according to ABPP, a few SACCOs do accept cattle as collateral.

⁸⁵ Actors interviewed mentioned several challenges: lengthy construction period, usage-related problems, the digester cannot be used as collateral, high transaction costs, difficult product to market and sell.

⁸⁶ See: EnDev (2018) Results-based Financing for Energy Access: How to design and implement projects: Lessons from the field. Energizing Development (EnDev). February 2018, 27p.

⁸⁷ Disadvantages are that bag biodigesters (above-ground) need more space and gas pressure is lower.

⁸⁸ Sistema Bio and HomeBiogas give a buy-back gurantee of 50% of the new value (ABPP (15 April 2019).

⁸⁹ See: SPROUT (2018), Waarom SimGas failliet ging met biogas voor Afrika (20 November 2018).

⁹⁰ Source: Harrison Ikunda, Takamoto (22 January 2019).

⁹¹ Source: Richard Chephwony. Sistema Bio (22 January 2019)





3.5 Strengthening supply

ABPP-2 has successfully supported the emergence and growth of biodigester construction companies. Today, all countries have private sector partners offering good quality services. The business case for BCEs needs elaboration; in Burkina Faso the business is profitable, yet most BCEs in Uganda depend on programme financial incentives. Support services have improved through Customer Service *Centres (CSC), quality assurance and communication.*

On the supply side of the market, the main KPI is that at least 80% of total sales are done by BCEs or other private parties.⁹² ABPP-2 aimed to move away from own implementation by the NIA and Implementing Partners (NGOs, etc.) in favour of the private sector. The percentage of sales by BCEs did not increase but remained stable at 60-65% (see Table 5).⁹³

Until 2016, the NDBP mainly supported the **development and strengthening** of supply capacities (technical training of masons, business development services to cooperatives and BCEs, etc.) and generic promotional activities.⁹⁴ From then on the focus was on "targeted training and capacity building to improve their performance (product and service quality) and business skills (particularly sales skills).³⁵ Financial incentives were introduced.

Masons were first encouraged and enabled to establish cooperatives and BCEs in order to create a private sector supply market. In Burkina Faso, masons previously working with implementing partners such as NGOs, established themselves independently and started to run a business. Some were able to; others were not. Later on, PNB-BF oriented its support to BCEs, while many (not all) cooperatives were not functional. Over time, a high but unknown percentage of the masons withdrew from the national programmes.

The **business case for masons and BCE** to construct biodigesters needs to be sound and clear, while masons and BCE also face other employment opportunities, e.g. in construction in urban areas. The business case may be measured as a proxy through the production per BCE. ABPP used the following indicators to assess productivity: break-even is at 5 biodigesters per month or 60 per year⁹⁶; the ideal productivity is at 10 per month or 120 per year⁹⁷; and the business is profitable at 8 monthly or 96 per vear.98

Interviewees in Burkina Faso, however, held the ABPP indicators for low. They stated that the business is profitable only from about 2-3 biodigesters per mason and 10-15 biodigesters per BCE per month, or 120-180 biodigesters per year. This would allow the masons to work full-time on biodigester construction, and the BCE to take care of all other activities next to biodigester installation; i.e. marketing, demand collection, regular monitoring and after-sale services, etc. The BCE would really become profitable and ready for expansion at 3-4 biodigesters per mason per month on average.

The business case for BCE in Burkina Faso is clear. There were ten BCEs in 2017, selling a total of 1,760 digesters⁹⁹; i.e. 176 biodigesters per year on average, or 15 per month. In principle, this number is adequate for profitability and growth. Uganda, in turn, has 17 'active' companies each producing 34

⁹² See: ABPP (2013), Africa Biogas Partnership Programme (ABPP) – Phase 2. September 2013, 54p.

⁹³ Note that this indicator is measured differently per country. E.g, in Uganda the production by BCEs is compared to that of individual masons; in Kenya it refers to a production of more than 36 biodigesters per year.

⁴ See: ABPP (2017), Annual report 2016. April 2017, 56p. ⁹⁵ See: ABPP (2016), Annual Report 2015. May 2016, 64p.

⁹⁶ See: ABPP (2014), ABPP 2015 Annual Plan. Restoring Relevance and Viability. December 2014, 48p.

⁹⁷ See: ABPP (2013), Africa Biogas Partnership Programme (ABPP) – Phase 2. September 2013, 54p.

⁹⁸ See: ABPP (2016), ABPP 2017 Annual Plan. November 2016, 47p.

⁹⁹ See: ABPP (2018), Revised Annual report 2017. Hivos & SNV, June 2018, 50p.





Table 5.	Share of biodigesters sold by BC	E, per country and p	per vear (in % of total	l; 2012-2017)

BCE share in total production								
	2012	2013	2014	2015	2016	2017		
Ethiopia	20%	19%	18%	24%	19%	23%		
Kenya	32%	55%	69%	96%	45%	53%		
Tanzania	71%	83%	85%	91%	94%	n/a		
Uganda	95%	99%	99%	96%	73%	67%		
Burkina Faso	27%	39%	56%	92%	75%	99%		
Average	49%	59%	65%	80%	61%	61%		

Source: ABPP programme (8 March 2019).

biodigesters on average. Only two are at break-even point. Biomel does best with 84 biodigesters (out of 663). Fifteen companies produce between 10-59 digesters. None of the companies reaches the target of 120 biodigesters per year.

ABPP aims for BCEs to gradually take over some core functions in the market, such as awarenessraising, promotion and quality control. With co-funding from the 4B-F project, financial incentives for BCEs were developed in Kenya, Uganda and Tanzania. The programmes provide BCEs with a "Promotion Incentive" for demand collection and a "Quality Performance Incentive" (QPI) based on functionality. The QPI is effective for developing after-sales-service, helps in market penetration and attracting new customers, and it also leads to a higher functionality.¹⁰⁰ However, the incentives cover costs that in a developed market should be covered by the BCEs. The ABPP exit strategy for incentives was based on increasing scale¹⁰¹, which has not happened.¹⁰² It is unclear how ABPP will proceed. The interviewed BCEs say that they depend on the programme's financial incentives.¹⁰³ **Ouality assurance** is key to the reputation of the biodigester technology and ABPP. ABPP-2 invested a lot of time, energy and funds into the establishment of appropriate and effective monitoring and verification systems. It also started a campaign to repair non-functional biodigesters (from both phases) in order to sustain the reputation of the technology. This was a management response to the high degree of non-functional biodigesters, and a requirement to meet strict carbon emission reduction verification criteria. It was also a follow-up to the irregularities that had emerged in different countries, and which urged for closer monitoring and verification, and for improved administrative and communication systems.

An initially expensive, but reportedly cheap and effective^{104 105}, way of monitoring digester construction, functionality and after-sales service provision, through a commercial **Customer Service Centre** (CSC), has been designed and implemented in all five countries. Data of biodigesters and their users are entered into tablets by the BCEs and uploaded to an online database. The CSC uses the data for follow-up calls to customers, to register user experiences.

¹⁰⁰ See: PARTICIP (2017) Evaluation of the RBFF within EnDev. Particip, Germany, 49p.

¹⁰¹ See: PARTICIP (2017) Evaluation of the RBFF within EnDev. Particip, Germany, 49p.

¹⁰² According to ABPP (15 April 2019), exception should be made for Kenya where production doubled from 2017 to 2018, thanks primarily to the prefab biodigesters, and is expected to double again in 2019.

¹⁰³ SNV in Burkina Faso (13 February 2019) confirmed that in the current system the renumeration of the BCEs is not very attractive: *"We should have transferred part of the cost reduction on biodigesters to the BCEs."*

¹⁰⁴ According to ABPP, the integration of M&E and quality assurance systems reduced the running costs significantly and enhanced the effectiveness of the programmes. M&E costs more than before, but quality assurance costs far less. After initial investment, it saved ABPP a lot of money, time and effort.

¹⁰⁵ Currently, the costs are USD 2 (Kenya) and USD 4 (Uganda) per successful contact (ABPP, 15 April 2019).





An indicator of growth and potential in the biodigester market is the **entry of new market players**. Kenya experienced new market entry and rapid growth of companies selling non-masonry, prefabricated biodigesters, which tend to come attached with credit facilities. The increased competition may stimulate creativity and innovation amongst local BCEs. Yet, others might be pushed out of the market. Most of the prefab brands are non-Kenyan, having access to (foreign) funding and lower-cost credits, and using modern marketing techniques.

Awareness-raising and general promotion of the biodigester technology were planned to be taken over by the BCEs. However, these are emerging structures, which generally lacked the competence, the expertise and the experience for promotion beyond face-to-face and village meetings. The NDBP continued to do some promotional work at national level, including the production of posters and leaflets (e.g. on bioslurry/biocompost use), the organization of fairs and of biogas conferences, etc. Yet, overall the activities towards end-users were limited.¹⁰⁶

Communication in Phase 2 was to lead to websites and info-sharing at country level. BSUL in Uganda created quite an attractive website, including videos on different elements of the productive use of the bioslurry and biocompost (for agriculture, coffee production, chicken-raising and pig farming, aquaculture and mushroom production). The website for Burkina Faso (in French) is less elaborate. It has good but more general biodigester video materials and the focus is on biogas - not so much on bioslurry/biocompost.

3.6 National supportive environment

ABPP has been successful in generating governmental subsidies for end-users in Burkina Faso and Ethiopia, but not in Kenya and Uganda. The markets in Kenya, Uganda and Tanzania are not protected by regulatory policies. Farmer organizations are involved through Biodigester Marketing Hubs. Partnerships with specific value chains have not been very conclusive. ABPP counts on the BCE marketing and business capacities for generating demand for biodigesters. National biogas/biodigester associations are gradually emerging.

ABPP has always been aware of the importance of governments in the establishment and the growth of the biodigester market, both through laws and regulations and through government subsidies to end-users. ABPP has worked towards creating **government subsidies** for end-users. In Phase 1, this was successful in Ethiopia, where the government paid part (some 25-40%) of the biodigester costs (ETB 6-7,000; or EUR 190-220). Tanzania, where the programme is attached to a governmental institute (CAMARTEC), agreed to some subsidy to end-users as of 2016, just when the biodigester programme fell into disarray.

In Burkina Faso the government engaged in subsidizing in 2013. The subsidy is XOF 160,000 (or EUR 244), or around half of the total 4m³ biodigester costs (XOF 312,000; or EUR 475).¹⁰⁷ Payment is made to BCEs result-based and linked to regular monitoring visits – every 6 months until 2 years after installation; to ensure after-sales services and functionality. The NDBP is hosted by the Ministry of Animal Production and Fisheries (MRAH) under budget line "Programme 082". The tasks of the NBSC were taken over in January 2019 by the overarching Programme 082 Review Committee.

Kenya initially proposed to subsidize biogas and biodigester production. However, the proposal was withdrawn from Parliament in 2015 following the KENAFF case regarding irregularities. Uganda has

 ¹⁰⁶ PNB-BF stated that their requests for specific annual budgets for promotion were not generally awarded by ABPP. In Uganda, the BCEs also expressed the need for more support in promotion and marketing.
 ¹⁰⁷ Biogas was part of the election campaign of current Burkinabé President Roch Kaboré, who promised to install a total of 40,000 biodigesters by 2020. His predecessor also supported biodigester development.





not agreed on subsidizing biodigesters, but it stated political support. The Ministry of Energy counts on BSUL for achieving its policy target of 100,000 people reached with domestic biodigesters. Both in Kenya and in Uganda, the government chairs the National Biogas Steering Committees (NBSC).

Governmental regulations help to shape the biodigester market. In Burkina Faso, the national programme decides upon the biodigester technology to be promoted and upon the entry and withdrawal of BCEs for biodigester construction. New and existing companies in Burkina Faso may apply to become new entrants in the biodigester market, and existing players may be discarded if quality of services is poor. In Kenya, standards for digesters were developed and approved with support of ABPP, but have however not been developed into a common framework for biodigester market development. The same holds true for Uganda.

In Ethiopia, all programmatic decisions about biodigester market development are made by public actors; at national, regional, zonal or district (woreda) level. Host is the Ministry of Water and Mineral Resources (MWMS). The target of biodigesters is shared equally between the Tigray, Amhara, Oromia and SNNPR regions. Masons and BCEs are paid by government; farmers pay for the building materials. The private sector is limited but emerging.

ABPP-2 also aimed for the **involvement of farmers' organizations** especially in promising value chains. In Kenya and Uganda, Biogas Marketing Hubs (BMH) were created in 2016 with the aim of bringing together different stakeholders (e.g. BCEs, MFIs, farmers and value chain actors like farmer organizations, CBOs, NGOs). The programme pays for officers to do this work; the hubs are thus not operating independently and at own cost. In Uganda, other collaborations exists in specific value chains with Kawacom and the Hivos 4S@Scale coffee value chain programme and with TIDE (dairy).

The aim to attach biodigester sales to producer organizations has not yet been conclusive. In Burkina Faso, attempts were made to link with the dairy and cotton value chains, but the leading producer organizations Farmers Confederation (CPF) and the National Union of Cotton Producers (UNPCB) did not show any particular interest in biodigester development unless being paid for services provided. The PNB-BF considered this not a viable model as it was itself aiming for market orientation in biodigester market development. The PNB-BF has continued work with producer organizations at regional and local levels.¹⁰⁸

Biodigester providers, i.e. masons and BCEs, are increasingly being organized in **biogas or biodigester associations**. In Uganda there are National and Regional Biogas Associations; with mixed results in terms of performance, representativeness and leadership. In Burkina Faso, the BCEs are organizing into a new consortium, of which the juridical form and status have yet to be agreed upon. The national associations will become promoters of the biodigester technology and key partner for the NDBP, but are not yet able to play this role.

3.7 Regional supportive environment

The government in Burkina Faso successfully co-organized with ABPP two international conferences about biogas and biodigester market development in Africa. In West Africa, a momentum for biodigester market growth and expansion is palpable.

¹⁰⁸ .For example with Union des Groupements pour la Commercialisation des Produits Agricoles (UGCPA). UGCPA provides financing facilities to members wishing to acquire a biodigester.





ABPP has successfully brought the potential of biogas and biodigesters to the attention of policymakers in and beyond the ABPP countries.¹⁰⁹ ABPP (co-)organized three International Biogas conferences in Ethiopia (2016)¹¹⁰ and Burkina Faso (2017¹¹¹ and 2018).

The first West African biogas/biodigester conference in 2017, organized on the initiative of the Burkina Faso government, resulted in the Declaration of Ouagadougou¹¹² in which eleven countries in the region expressed their interest in, and their support for, the promotion of biodigesters.

The 2018 conference followed up to this¹¹³, bringing together ministers from eight countries (Benin, Burkina Faso, Côte d'Ivoire, Guinea, Mali, Niger, Senegal, Togo) who decided to jointly establish a regional West and Central African Alliance for Biodigesters (AB/AOC).¹¹⁴ Support to the establishment of new national biodigester programmes is central to the ABPP Phase 3 project proposal (see Chapter 5).

¹⁰⁹ This also relates to biogas and biodigester work by Hivos in Zimbabwe, and by SNV in Rwanda and Zambia. SNV was also solicited by Benin, Guinée-Conakry and Mali to support the set-up of new national programmes. ¹¹⁰ The conference was co-organized with the Global Alliance for Clean Cookstoves (GACC). See: ABCCC

^{(2016),} Report on the Africa Biogas and Clean Cooking Conference (Addis Ababa, Ethiopia, 5-7 April 2016). ¹¹¹ See: PNB-BF (2017), Rapport de la Conférence Internationale sur la Technologie du Biodigesteur

⁽Ouagadougou, Burkina Faso, 10-12 octobre 2017). PNB-BF, November 2017, 80p.

¹¹² See: ICBT (2017), The Ouagadougou Declaration. International Conference on Biodigester Technology (Ouagadougou, Burkina Faso, 10-12 October 2017), 3p.

¹¹³ See: BIKIENGA, I.M. (2018), Rencontre des Points Focaux Pays pour la Mise en Oeuvre de la Déclaration de Ouagadougou. Rapport de Synthèse. MRAH, Burkina Faso. July 2018, 54p.

¹¹⁴ See: AB/AOC (2018), Convention portant creation de l'Alliance pour le Biodigesteur en Afrique de l'Ouest et du Centre (AB/AOC) (4 October 2018). Ouagadougou, Burkina Faso, 12p.





4. Evaluation according to OECD criteria

4.1 Relevance

4.1.1 Relevance to target groups

The relevance of biodigesters for smallholders in rural areas in Africa is high. Biodigesters contribute to the intensification of farm production, access to fertilizers and energy, savings on fuel and fuelwood, and to reduction of indoor air pollution. Yet, the access to biodigesters is severely limited by its costs and the household's socio-economic position. Targeting the right customer is key to biodigester market development, and is to be elaborated upon.

Biodigesters have multiple benefits for households. In the first phase, the focus was much more on cooking gas and lighting with bioslurry as a by-product. In this second phase, the accent has become increasingly stronger on slurry and compost use. Biogas lamps are no longer promoted and ABPP now advices households to opt for solar lamps which have many advantages compared to gas lamps. Bioslurry and biocompost are now being promoted by ABPP for different productive uses; i.e. in agriculture, horticulture, chicken-raising, pig farming, aquaculture and mushroom production.

Soil fertility is a very relevant issue in Africa, where agriculture is often the dominant mode of access to food and income. Biocompost production is arguably the best way to recycle nutrients. In Burkina Faso, the current biodigesters have double compost pits, in order to fill the one pit while the other is completing the 2-3 months decomposition period. Each m³ biodigester then results in about 10 tons of biocompost per year; or 40 tons for a 4m³ and 60 tons for a 6m³ biodigester.¹¹⁵ These are very relevant annual volumes for fertilizing land. Some farmers also earn income selling bioslurry and biocompost to fellow farmers.

Targeting the right customer is key to market development, as access to biodigesters is severely limited by costs and by the household's socio-economic position. Feasibility studies were done prior to Phase 1 (not covered by the evaluation), which focused on the technical potential for biogas. The ultimate beneficiaries were not described or analyzed in the Phase 2 proposal. ABPP did not conduct any other needs assessment or market study in Phase 2.

4.1.2 Relevance to DGIS policies

ABPP aligns well with the Dutch development cooperation policy priorities, especially private sectorled development, food security and agricultural production, access to energy, climate adaptation and mitigation, and women, youth and technological innovation. ABPP relates to many different SDGs and thus fits in very well in integrated approaches towards development on the nexus agriculture, food security, water, energy and climate action.

At the start of Phase 2, the relevant **Dutch policy documents** for the Ministry of Foreign Trade and Development Cooperation were "A World to Gain" (2013)¹¹⁶ and the letter to Parliament on renewable

¹¹⁵ See: PNB-BF (2016?), Manuel des Utilisateurs. National Biodigester Programme, Burkina Faso, 23p.

¹¹⁶ See: DGIS (2013), A World to Gain. A New Agenda for Aid, Trade and Investment. April 2013, 72p.





energy (2015).¹¹⁷ In 2018 a new policy was adopted: "Investing in Global Prospects".¹¹⁸ These policies emphasize private sector development.

ABPP addresses many "A World to Gain" policy lines including its focus on private sector development, sustainable inclusive growth, soil degradation, climate change, agricultural and livestock production, and food security; the attention to women's productive activities and addressing women's direct needs; and to strengthening entrepreneurship. Access to energy only became a policy priority in 2015, when the Netherlands signed up to the new Sustainable Development Goals (SDG) and formulated the new goal of reaching 50 million people in developing counties by 2030 with access to renewable energy.¹¹⁹

ABPP contributes to many different **Sustainable Development Goals** (SDGs) and therefore fits in very well in integrated approaches towards development on the nexus of agriculture, food security, climate, water and energy. The ABPP programme contributes in particular to increased access to clean and renewable energy (SDG 7), to increased agricultural productivity and incomes of small-scale food producers and strengthened capacity for adaptation to climate change (SDG 2), to good health and well-being (SDG 3), to combating deforestation and promoting the use of bio-slurry (SDG 15), and to job creation and growth of micro-, small- and medium-sized enterprises (SDG 8). To a lesser extent, ABPP contributes to eradicating poverty (SDG 1; the poorest are not reached – see below) and gender equality (SDG 5; women's practical needs are addressed but not gender equality – see below).

As of 2018, the Dutch development policies have a more specific focus on sustainable and inclusive growth and on climate action; including sustainable energy management and the circular economy. Energy, food security and environmental degradation are dealt with in an integrated manner, and reference is made to the need for an energy transition in view of international climate action. ABPP aligns well with "Investing in Global Prospects" as to the choice of countries and themes: food security and agricultural production, climate change and environmental degradation, women and youth. ABPP also makes use of the latest ICT and innovations for web-based database management, quality assurance and customer services.

ABPP-2 was funded by the DGIS department Inclusive Green Growth (IGG), which focuses on the integrated themes: climate, water, food security, and energy, raw materials and the polar regions. Gender is not specifically mentioned, yet the 2018 policy document requests attention for **gender equality** in all activities. ABPP-2 benefits women especially in their practical needs, but it does not stand out for its approach on gender mainstreaming or women's strategic needs (see paragraph 4.4.3).¹²⁰

The evaluation team considers that the **ABPP programme aligns well** with the Dutch development cooperation policy priorities, especially from 2018 onwards when sustainable and inclusive growth and international climate action were reinforced. Gender and inclusion should have been dealt with more specifically, especially for a better understanding of its customers and customer groups. New opportunities for funding arise from National Funds for Climate and Development for poor countries and focus areas, and from the aim "to make Dutch knowledge of water security, climate-proof agriculture, sustainable energy technology and the circular economy more accessible to developing countries."¹²¹

¹¹⁷ See: DGIS (2015), Met Hernieuwde Energie. Letter to Parliament (23 November 2015), p.10.

¹¹⁸ See: DGIS (2018), Investing in Global Prospects. May 2018, 107p.

¹¹⁹ See: DGIS (2015), Met Hernieuwde Energie. Letter to Parliament (23 November 2015), p.10.

¹²⁰ E.g. by including women in employment generation and as entrepreneurs; a DGIS point of attention.

¹²¹ See: DGIS (2018), Investing in Global Prospects. May 2018, 107p.





4.1.3 Relevance of the ABPP programme

The ABPP programme has been successful in creating an institutional environment in which marketoriented biodigester sector development can take shape. Phase 1 programme subsidies were phased out and taken up by national governments depending on country. BCEs have been supported and emerged in all countries. The programme shows consistency in quality assurance and after-sale services for biodigesters.

The Phase 1 biodigester subsidies provided by ABPP to end-users were withdrawn in Phase 2. They were partially replaced by national governmental subsidies in Burkina Faso and Ethiopia, to some extent in Tanzania, but not in Kenya and Uganda. The focus on **private-sector led market development** was strengthened. The assumption that the private sector would be able to take over many, if not all, of the programme activities by the end of Phase 2 was not realistic. In fact, ABPP had to support, from scratch, the set-up of mason cooperatives and later BCEs to build private sector networks capable of installing biodigesters. By today, these foundations have been laid.

Yet, ABPP's focus on the private sector seems to have drawn away attention from the key **role of governments in regulating markets**. The new biodigester market needs regulation on product quality and quality assurance. It needs recognition from governments for demand to increase and for financial institutions to gain an interest. And above all, at current cost-price of biodigesters, it needs governmental support through subsidies to end-users and BCEs. Governmental involvement was well achieved in Burkina Faso and Ethiopia, but not in Kenya and Uganda, where the ABPP efforts towards government also seem to have been limited.

The ABPP programme was conceived as a **multi-country programme**, with a programme coordination unit in Kenya providing services to all five countries. The programme has provided for learning on biodigester market development in quite different country, geographical and institutional settings. ABPP-2 managed to (co-)organize relevant and appreciated information and knowledge exchange conferences, and annual meetings between the country programme coordinators and some of the technical staff. As such, learning and fine-tuning has taken place between country programmes.

The different institutional settings in Burkina Faso and Ethiopia, and the additional EnDev RBF-funds for Kenya, Tanzania and Uganda, have generated some distinction between the **private-led and the government-embedded** country programmes. This is exemplified, for example, by the rejection by Burkina Faso and Ethiopia, following the 2016 MTR recommendations, to transform the NIA into a business. Of the five countries, the Burkina Faso programme also is a bit different due to language and geographical location.

Otherwise, the country programmes show **consistency in quality assurance and after-sale services** for biodigesters. The Evaluation team was pleased to encounter a high degree of homogeneity of biodigesters and (generally very positive) user experiences in the field, from women and men. The team was also pleased that in the government-embedded environment in Burkina Faso, due space is available for BCEs to develop and grow.

4.2 Effectiveness

ABPP-2 has not achieved its targets. New private-led biodigester markets did emerge, but the number of biodigesters is well behind target (at 35%), and so is the number of people reached with sustainable access to energy. ABPP's ability to generate access to credits was over-estimated, and the BCEs' capacity to generate demand was low. The Market Development Score card shows that ABPP still has a long way to go to reach the desired situation of market development. A reality check is required as is improved planning.




The ABPP-2 programme has been characterized by **flexibility and improvisation** to reach the partial overall objective of creating a market-oriented biodigester sector. It has contributed in some countries (Burkina Faso, Kenya, Uganda) to an emerging private-led biodigester market, and in others (Ethiopia) to a government-led biodigester market of substantial scale.

ABPP-2 was confronted from start with a number **of serious challenges and remnants of Phase 1**: A) non-functionality due to poor quality and poor usage; B) non-existence of biodigesters due to irregularities and poor administration; and C) implementing institutions and staff capacities that did not fit with the market-oriented approach. Together with overly-optimistic planning and the simultaneous introduction of Results-Based Financing (RBF), this led to over-stretching the NDBPs.

By the end of 2018, the ABPP-2 programme had been able to deliver only on two of the five **Key Performance Indicators** (KPI) that were convened with donor DGIS:

- 1. Number of biodigesters installed (100,000): an estimated 35.000 (i.e. 35%)
- 2. Company-based sales (at least 80% of total): an estimated 60-65%
- 3. Cost reduction (25-30%): an estimated 20-30%
- 4. Credit availability (at least 40-60% of total): an estimated 15-25%¹²²
- 5. Bioslurry use (90% of total users): an estimated 90%.

In effect, the ABPP-2 programme has been unable to perform on its main overall objective which is to create sustainable access to energy for 600,000 persons in total. ABPP-2 reached an **estimated total of around 200,000 persons** with sustainable access to energy and additional access to organic fertilizers, through the facilitated installation of some 35,000 biodigesters in 5 years, and an estimated current average functionality rate of over 90%.¹²³ This underperformance in numbers should have implications for the planning of a new phase, and should lead to an overall review and re-assessment of the biodigester technology, its cost-price, the attached BCE and programme services, and the targeting of potential clients and demand. Scaling-up needs a thorough plan. ABPP does not currently have one.

Next to the above KPIs, the ABPP-2 programme was expected to deliver **livelihood impacts** at the level of end-users, and to create a viable infrastructure for the up-scaling of demand and the installation of biodigesters on a large scale. These are discussed below (paragraph 4.4).

The second sub-objective of ABPP-2 was to lay the foundations for the emergence and development of a market-oriented domestic biogas sector. Annex 5 presents a self-assessment by ABPP of the **state of biodigester market development**. Without going into the methodology used, it is evident from the colours and scores that all countries have a long way to go before reaching a mature market:

- Most cells in the Demand-side score-card are red or orange, suggesting that there is no viable market yet. The "Willingness to pay" is poor in all countries but Ethiopia. The indicator "Systems in use" raises concerns for all countries but Burkina Faso (green) and Uganda (yellow). Both countries score better than the others on almost all indicators.
- The Supply-side scorecard paints a slightly rosier picture. Especially Burkina Faso and Ethiopia score well on "Sales volume" and 'Value chain development". Note, however, that on "Price, costs and profits" all countries turn red except for Kenya (yellow). The indicator "Entrepreneurial skills" is also worrisome; all countries score red or orange.
- The ABPP achievements on the Enabling Environment score card come out best. Positive and encouraging conditions exist in Burkina Faso and Kenya, mixed results in Uganda, and multiple concerns both in Ethiopia and Tanzania.

¹²² According to ABPP, today in Kenya this would be around 25% due to Lease-to-Own prefabricated biodigesters.

¹²³ Using the overall functionality rate of all plants in the period 2014-2017 (68%; see Chapter 3), the number of households benefitting from biogas and bioslurry/biocompost would be 23,000, or an estimated 138,000 persons.





The results on the Market Development Score card bring up a number of questions which need to be replied to by ABPP management. Is ABPP actually on track for scaling-up in the countries of intervention? What can realistically be done, what should be done, in each and any of the current countries in order to arrive at a desirable market situation in which ABPP could progressively disengage? The score card also brings up concerns as to whether ABPP is actually able to influence and achieve all elements of market development? What time-line would need to be attached to such a trajectory, knowing that the current score card already reflects a full decade of work on the subject?

The Evaluation team is of the opinion that ABPP is not on track for scaling-up in the current ABPP countries; possibly with the exception of Burkina Faso (steady increase in numbers) and Kenya (recent growth in prefabricated above-ground biodigesters marketed with lease-to-own credit). There is insufficient proof that demand growth, which is essential for achieving a sustainable biodigester market, will take off soon. There is also little proof that the current ABPP strategies for demand enhancement produce the desired results. The Evaluation team considers that more demand orientation is required including customer analysis, market surveys and development of the business case.

4.3 Efficiency

The ABPP-2 programme has spent almost all funding received. The overall programme cost per biodigester installed reduced by 15%, from EUR 833 in Phase 1 to EUR 703 in Phase 2. The high programme cost per biodigester is directly linked to the low number of biodigesters installed (35% of target). The average programme costs per biodigester differ per country and fluctuate over years. They are much higher in Uganda than in Burkina Faso.

The ABPP programme is understood to have used almost all Phase 2 funds available from DGIS (EUR 22.6 million) and co-funding (EUR 2.0 million) by the end of 2018; i.e. a total of EUR 24.6 million. A request has been made by ABPP, but not yet been awarded, for prolongation of Phase 2 in the remainder of 2019 with a cost extension of EUR 3.6 million.

The total of funds available in Phase 2 (2014-2018) was lower (at 91% of total) than budgeted (EUR 27 millions).¹²⁴ The co-financing by EnDev (EUR 3.6 million) was results-based, thus adjusted downwards (to EUR 1.6 or 1.7 million) due to the low number of biodigesters. The revenues from carbon credits (EUR 357,000) were much lower than planned (EUR 1.5 million) due to the low number of digesters and the lengthy procedures (most payments for 2012-2018 are still due; see paragraph 4.5.4). The expectation that Multilateral Climate Funds (MCF) would bring in EUR 400,000, did not materialize.

The efficiency of ABPP can be measured in the overall programme costs per biodigester, which reduced by 15%, from EUR 833 (Phase 1)¹²⁵ to EUR 703 (Phase 2)¹²⁶. This includes all costs made for programme and fund management and all technical assistance of Phase 2. It does not include the cost of the biodigester to the end-user and the governmental subsidies. The overall programme costs per biodigester are high, compared to construction costs of around EUR 560 for a 4m³ biodigester, and around EUR 840 for a 6m³ biodigester.¹²⁷ The high cost is a direct consequence of the low number of biodigesters. However, the investments are not a one-off, but will continue to provide benefits to households, communities and society at large for the life-time of the biodigester (i.e. 15-20 years).

¹²⁴ See: ABPP (2013), DGIS budget for ABPP-2 (30 September 2013). Excel sheets.

¹²⁵ This is the ABPP-1 budget of EUR 27.5 million (EUR 30 million minus the balance of Phase 1), divided by 33.005 biodigesters. In Phase 1 the technical assistance by SNV was financed with other DGIS funds.

¹²⁶ This is the actual total budget of EUR 24.6 million, divided by the estimated number of 35,000 biodigesters.

¹²⁷ At an average 2014-2017 biodigester construction cost of EUR 140 per m³ (see Table 3).





Annex 6 presents the Phase 2 programme costs per year and per country, as presented by ABPP, and the average programme costs per biodigester.¹²⁸ The average costs differ per country and fluctuate over the years.¹²⁹ Since 2015 the trend is consistently downwards. The programme costs per biodigester are high anyway at EUR 617 on average per biodigester. The average costs are disproportionally higher in Uganda than in Burkina Faso.

4.4 Impacts

4.4.1 Impacts on households and communities

Bioslurry and biocompost are the main motivation today for people to acquire a biodigester. The aim is to fertilize own land, to substitute for synthetic fertilizers, or to sell it for income generation. Biogas for cooking is also mentioned frequently by users; but lighting less so because of solar alternatives. Time saved on fuelwood collection is in part replaced by time lost in daily collection of dung and water and in feeding the biodigester. Yet, overall time savings are likely significant, which impacts especially on women and children. Indoor and outside air pollution is reduced with biogas use. Where toilets are connected to the biodigester, sanitation will improve, but toilets are not frequent.

The ABPP programme promotes biodigesters in order to achieve following impacts:

- save fuel and fuelwood
- reduce fuel costs;
- reduce the workload for women and children;
- reduce the exposure to indoor air pollution;
- produce and use bioslurry and biocompost for productive use;
- improve hygiene through toilet connection (and cleaner farmyards);
- use biogas lamps to extend the day.

These impacts can only be achieved if **biodigester functionality** is good; i.e. the biodigester is technically fit and the end-users ensure its proper and regular operation. Functionality was a serious concern at start of Phase 2 (see paragraph 3.2), but thanks to specific targeting by ABPP-2, the functionality of newly constructed biodigesters has improved and is now at an estimated 90% of total. Impacts were thus higher at the end of Phase 2 than at start.

Users' needs for **fuelwood** (and also charcoal and fossil fuel) are reduced if biogas is used for cooking. Few households do all cooking on biogas. Users prefer using traditional fuels and stoves to prepare certain meals (e.g. the Ethiopian injera, the Ugandan matoke, beans and roasted foods in all countries). The reduction of use of fuelwood, charcoal and fossil fuel comes with cost savings.

Work load reduction is achieved especially for women and children, who are normally responsible for collecting wood, which can be very time-consuming. The time reduction depends on the availability of fuelwood, which varies strongly per location. Transport usually is manual (on the head) which is very time-consuming, but households having the resources may ease the work using ox-carts, bicycles or motorbikes. On the other hand, time needs to be invested to collect dung and water. Again, situations differ between households. Dung can be close-by when cattle is stabled, but this is not always the case. Water may also be distant, especially in the dry season. Time invested may therefore differ importantly. Yet, from the testimonies by users, we conclude that on average the time saved on

¹²⁸ See: ABPP (2018), Answers to potential questions (version 2). December 2018, 4p.

¹²⁹ The data are difficult to interpret while, for example, the average biodigester size may differ per country. E.g. Uganda tends to build $6m^3$ biodigesters, whereas Burkina Faso increasingly focuses on $4m^3$ biodigesters





fuelwood collection exceeds the time invested on collection of dung and water for biodigester operation.

Air pollution is significantly reduced by the use of biogas. This certainly generates positive health impacts with the women cooks and their family members. Yet, few interviewees mentioned this impact in favour of the biodigester technology. Exposure to air pollution may well not be considered a key threat to health in the contexts the users live in.

Bioslurry is not anymore a by-product of the biodigester technology but has become a core product. Interviewees (men, but also women) especially refer to **bioslurry and biocompost** when explaining why they engaged into biodigester acquisition. Production is proclaimed by users to increase about 20%, 30% or even 50% when bioslurry or biocompost is applied. According to the 2017 users' survey, the majority of Ugandan households apply bioslurry as a fertilizer, and state that the application of bioslurry has led to an improvement in the quality of their crops and yields. There are thus significant impacts on food availability, food security and income generation through increased production. Some biodigester owners have started to generate income selling the bioslurry and biocompost as such to other producers in the region. The potential for significant income from bioslurry/biocompost sales seems to be high.¹³⁰

Several users considered that bioslurry and biocompost may replace the use of synthetic fertilizers, which then translates into a significant cost reduction on fertilizers. Bioslurry and biocompost provide better quality, while containing many trace elements and contributing to soil health and soil moisture retention through organic matter content.

Biodigesters may be **connected to toilets** to also use and dispose of human excrements. This would improve sanitation around houses, with positive impacts at community level. Latrines are not very common in rural Burkina Faso. In Uganda, many households own latrines, however, people consider it a taboo to connect their toilet to the biodigester. ABPP has stopped promoting bio-toilets as actively as in Phase 1. It still promotes biodigester designs which are easy to connect to toilets if the corresponding inlet (a simple tube) is integrated during construction. Yet, most biodigesters visited did not have a toilet connection.¹³¹ BCEs are often not interested to discuss toilets for cultural reasons. ABPP and the national programmes should consider partnerships with NGOs etc. promoting sanitation, since the taboo may best be dealt with in a developmental rather than a commercial setting.

The amount of fresh dung in the farmyard will reduce with biodigesters. Yet, other (dried) dung generally remains present. Therefore, the impact of less farmyard dung on sanitation is relative. The practice of daily manual feeding of the biodigester with dung, moreover, increases risks of contamination.¹³² Standard precaution measures (cleaning hands with water and soap) seem to be common practice with biodigester users.¹³³

Biogas lamps provide a sustainable source of **lighting** where no lighting is available. The lighting is of better quality and more stable than light from regular petrol lamps. However, solar lamps provide an even better quality of light (more intense and clearer) and are easier in use.¹³⁴ Portable solar lamps have become common also in remote areas.

¹³⁰ Yet, it cannot be assumed that all household members benefit equally from productivity or income increase. There has been no study into gender dynamics and the use of slurry: who in the household applies slurry and on what crops (cash or household nutrition), and who decides?

¹³¹ In Uganda, the number of attached toilets has increased to 18%, but it has not reached the target of 40%.

¹³² Most people do this by hand, while mechanical solutions (e.g. an iron mixer) are considered expensive and not technically performing.

¹³³ It might be less common with farm workers, who often do this work in Uganda.

¹³⁴ The biogas lamps are fragile and break easily, whereas spare parts are generally not available locally.





4.4.2 Impacts on poverty

The ABPP programme aims to improve the living conditions of households, but it had no specific objectives oriented towards poverty alleviation, food security or income generation. Observations during field visits indicate that biodigester owners are not among the poorest.

ABPP aims to improve the living conditions of households, but it had no specific objectives towards poverty alleviation, food security or income generation.

Biogas and biodigester programmes, especially in a market-oriented set-up, do not automatically contribute to "leave no one behind". People need to have at least a couple of cattle for operating the biodigester, and need to have financial resources to make the up-front investment. In the three countries where no governmental subsidy is available (Kenya, Tanzania and Uganda), farmers have to invest almost EUR 700 upfront; generally without any particular access to credit loans.

It is hard to assess the socio-economic status of the actual beneficiaries, since the programme database or surveys do not capture such data. Uganda's Phase 1 beneficiaries were farmers and business owners with incomes, landholdings and a number of cows well above the national average. The Biogas User Survey (BUS) that was conducted in 2017 showed that the average number of animals (dairy cattle) was 5.9 per household, but other socio-economic data is not reported on. Observations during field visits confirmed the impression that many biodigester owners are not poor.^{135 136}Yet, many of the "more wealthy" people in villages may still be considered "poor" from a global perspective.

The assumption in Phase 2 that biodigesters would become much more affordable - and thus more accessible for the poor - has generally not materialized. In Burkina Faso and Ethiopia the governmental subsidies significantly lowered the bar to acquisition. In the other countries, e.g. in Uganda, we noted a parallel trend to build larger biodigesters on average, which increases substantially the up-front investment costs.¹³⁷ The assumption that ABPP-2 could improve the access to credit loans could also not be confirmed.

The ABPP programme does not have a specific strategy on inclusiveness beyond encouraging subsidization and creating access to credit. It is to be stressed that ABPP never claimed to be targeting the poorest of the poor. Other biodigester subsidizing institutions, such as World Vision in Uganda, may have had that objective (and were thus motivated to provide full subsidies), but ABPP and the NDBP programmes did not. Opportunities for inclusiveness would lay though, for example, in the marketing of smaller volume biodigesters (which is being considered in Burkina Faso) and in more attention for gender (see below).

¹³⁵ In Burkina Faso, we encountered amongst the users: the president of a producer union with antenna and solar panels on a brick house (in Tankuy); two traders (in Goala and Wakuy); two old men stating each to have seven wives (in Kiébo); a beneficiary of multiple development projects at a time (new biodigester, toilet, kitchen, vegetable garden, pigs and pig stable) (in Kalwenga); two owners having savings from mining (in Mali and Equatorial Guinea) (in Bangou Kirkou Djama), one owner having a new Chinese transport vehicle (in Bangou Kirkou Djama), and two owners having adolescent girls studying in tertiary school (in Tankuy).

¹³⁶ In Uganda, we encountered several households that cannot be considered poor at all, including a high level commissioner and two retired public servants, living in large brick houses with landscaped gardens, electricity, and who all employ workers. On the other hand, we also visited one household that benefited from World Vision subsidy, did not own any livestock and lived in grass-thatched mud houses.

¹³⁷ The increase in size in Uganda from 6m³ to 9m³ between 2017 and 2018 is due to the project partners such as UNIDO and UECCC that specifically required the construction of 9m³ digesters (ABPP, 15 April 2019)





4.4.3 Impacts on gender

The ABPP-2 programme document included specific goals, planned interventions and indicators for gender mainstreaming. However, as of 2015 countries no longer reported on their gender interventions. ABPP-2 has achieved important welfare results for women and women have participated in trainings. At the level of production and productivity, and empowerment/equality, no results could be observed.

The ABPP-2 programme document included a chapter on gender mainstreaming¹³⁸ and stated some **specific goals, planned interventions and indicators**.¹³⁹ The focus was on:

- improving women's participation in all activities for more effective programming;
- improving the use of bioslurry by women (for improved farm productivity);
- targeting women as potential biodigester clients (using specific sales arguments like: time savings, convenient cooking, modern kitchen, fertilizer); and
- increasing the availability of credit for female clients (households and entrepreneurs).

The benefits for women as biodigester users (reduced workload and improved health) were considered "obvious" and did not receive specific attention.

The Phase 2 proposal gave **little guidance to programmes** on how to improve women's participation in activities or to increase the availability of credit, and no targets were set. The gender mainstreaming activities were not budgeted specifically. ABPP did not request country teams for information on gender interventions or outcomes, and there has been no Technical Assistance support from either SNV or Hivos to strengthen gender capacities. The Annual reports only mention gender interventions and results for the first year of Phase 2 (2014). The MTR did not assess gender issues.

Yet, the dashboard reports (except for 2017), do provide visual information on the agreed gender indicators. Based on the available information, it can be concluded that:

- ABPP has managed to achieve a sufficient **women's participation** especially in O&M trainings. Uganda and Burkina Faso engaged some 50% women in bioslurry trainings.
- The female share of **credit loans** was decreasing and stayed at 20% in 2016 (no information was available on 2017). It is high in Kenya and low in Ethiopia and Burkina Faso. There were no interventions to increase women's access to loans.
- The share of **women among active biogas masons** is quite high for Kenya (22% of total in 2015) but very low elsewhere (Uganda: 3 women or 5% of total). Masons need to travel long distances and to remain at the construction site for several consecutive multiple days. This is a barrier to women, who generally also have other responsibilities at home. Single women may also face cultural barriers; and once trained the BCEs risk to lose them upon marriage. Husbands may obstruct women to travel and work.
- As far as women have benefited from ABPP-2 through **employment**, this is mostly in other positions; e.g. as extension service provider, promotor/marketer, appliances dealer, secretary or CSC staff at BCEs, or as programme staff at the NIA.
- The market entrance of companies selling prefab biodigesters may provide opportunities for women to get involved in production. Installing a prefab system requires much less time (the same day) and different skills.¹⁴⁰

¹³⁸ Based on: HIVOS (2013), Gender Mainstreaming Policy Guidelines for Domestic Biogas and Improved Cook stoves programmes.

¹³⁹ See: ABPP (2013), Africa Biogas Partnership Programme (ABPP) – Phase 2 (2014-2017). Joint Proposal. Hivos & SNV, September 2013, 54p.

¹⁴⁰ Interestingly, Sistema Bio in Kenya employs much more women (38%) than do regular BCEs. This has to do with the different skill set required (sales staff) and the company's deliberate policy to recruit women





ABPP did not specifically target **women as potential biodigester clients**, even when gender is known to affect decision-making and uptake. Women are more interested in biogas, but they are often dependent on their husbands to finance the biodigester or to get a credit loan. Men are primarily interested in the bioslurry. Risks are that women are not involved or less involved (and thus do not use the biodigester, as was observed in a few cases in Uganda), or that women do not use bioslurry on crops they are responsible for (e.g. in kitchen gardens). Such issues are not currently considered in ABPP strategies.

User benefits for women (e.g. reduced workload and improved health) are measured in the Biogas User Surveys (BUS). The Uganda BUS validates the assumption that workload has reduced and health has improved for women and children. The benefits are experienced more by women because of their traditional roles (cooking and firewood collection). At the level of production and productivity, and on empowerment/equality¹⁴¹, however, no results could be observed. The programme did not go beyond a basic gender-mainstreaming approach.

4.4.4 Impacts on technology providers and society at large

The ABPP-2 programme has created jobs and employment for an estimated 250-300 persons, including 170 active masons. The biodigester technology has benefits for the society at large, including the reduction of greenhouse gas (GHG) emissions, reduced public health costs, increased capacities and reduced deforestation.

The ABPP-2 biodigester market support programme also has impacts beyond households and communities, for the technology providers and for society at large. The programme creates jobs and employment (for masons, BCE and staff), diminishes the pressure on forests and vegetation for fuelwood, and reduces the related greenhouse gas (GHG) emissions.

Through the programme activities and interventions, ABPP-2 expected to create direct **employment** for 10,500 person-years. This would imply the creation of an average 2,000 full-time jobs. ABPP-2 does not measure the number of jobs and employment created. According to the 2017 dashboard, there were some 90 "active masons" in Ethiopia, 20 in Kenya and Uganda, and over 40 in Burkina Faso. The total of active masons then is 170. ¹⁴² Some additional jobs were created per BCE through overhead (e.g. management, CSC, extension, promotion, quality service provision, etc.), but generally their number is limited as activities are combined for reasons of efficiency. Additional jobs were created through programme staff, including guards, cleaners, drivers, secretaries, financial officers, technical officers, programme officers and coordinators. As such we would estimate the total number of jobs created by ABPP-2 to be around 250-300, and mostly for men.

The biodigester technology also has benefits for the **society at large**, including: reduction of greenhouse gas (GHG) emissions (see paragraph 4.5.4), reduced public health costs following lower indoor and outdoor air pollution, capacity-building through technical and business development trainings, and reduced deforestation. These benefits are difficult to measure though and would need specific studies. In all cases, it is clear that the low number of biodigesters installed directly influences the size and relevance of all those expected impacts.

¹⁴¹ See: HIVOS (2013), Gender Mainstreaming Policy Guidelines for Domestic Biogas and Improved Cook stoves programmes.

¹⁴² Note that most masons are not employed, but work on commission basis.





4.5 Sustainability

4.5.1 Economic viability

According to ABPP data, investment in a biodigester is economically viable, with a simple payback period of only 2-3 years. Independent verification of these calculations is recommended as this is a key selling point and the basis of the business case to farmers.

ABPP's proxy indicator for financial and economic viability of biodigester purchase is the Simple Payback Period (SPP). The SPP of the investment depends on which benefits are taken into account. According to ABPP calculations, on energy benefits only, a biodigester has a payback period of 7 years.¹⁴³ The Evaluation team estimates that this period is likely too long for smallholders in rural settings to do investments.

According to ABPP, smallholder households that make good use of the bio-slurry, however, reduce their payback period to three years. Adding workload reduction, avoided health expenses and carbon credit revenues, would reduce the SPP to two years. The return on investment concerns both cost saving and revenue components. Cost savings come from substituting wood fuels with biogas and mineral fertilisers with bioslurry, or mixing bioslurry into animal feedstock (chicken, pigs, fish). Income may increase through better crop quantity and quality (due to improved fertilizing practices) and the sale of bioslurry or biocompost.

If the SPP is between 2-3 years, and the technical lifetime of a biodigester is up to 15-20 years, the biodigester investment must be economically viable, and large-scale uptake of biodigesters would be expected. Independent verification of the ABPP calculations is recommended, as this is a critical determinant of biodigester demand and market growth.

4.5.2 Functionality and longevity

Underground fixed-dome biodigesters are expected by the ABPP programme to last 15-20 years. In practice, this may apply to the later models installed. At start of Phase 2, technical sustainability was not always ensured. The evaluation team considers that biodigesters can last a long time, if the quality at construction is monitored well and if the biodigester is operated correctly. ABPP-2 put in place new policies and procedures to ensure such.

Underground fixed-dome biodigesters built with support of the ABPP programme are expected to last 15-20 years. Yet, conditions are different per location, and many factors influence functionality and longevity. In Burkina Faso, for example, we found that some 2013 (Phase 1) biodigesters were technically still in order, but had been non-functional due to poor feeding (in Tankuy and Dialgaye). This problem was resolved in 2018 by the programme's campaign to repair biodigesters. Elsewhere we came across biodigesters that were built in 2015 (start of Phase 2) but were non-functional because of serious cracks (in Bangou Kirkou Djama).¹⁴⁴ They had not yet been listed for repair.

The evaluation team considers that the biodigesters built can last long time, if the quality at construction is monitored well and if the biodigester is operated correctly. The fact that the functionality rate of newly-constructed biodigesters has increased to over 90% in latest years, provides

¹⁴³ See: ABPP (2018), Africa Biogas 2019-2023. Draft Proposal. Hivos & SNV. August 2018, 71p.

¹⁴⁴ According to the mason involved the cracks were due to the lack of a sand layer under the biodigester: "This was a structural error with many 2015 biodigesters, which has been corrected since."





confidence that technical quality is fine and that user trainings on biodigester management are increasingly effective. The two-year warranty policy in Burkina Faso and the 6-months' monitoring visits, contribute to increased functionality. Additional visits take place e.g for trainings on bioslurry/biocompost production and application.

4.5.3 Institutional sustainability

The biodigester technology sits on the nexus of energy, agriculture, soil fertility, water, climate, gender and sanitation. The ABPP and NDBP governance structures should be reviewed per country to ensure appropriateness and to also involve knowledge institutes and private sector. ABPP's dependency on DGIS presents a risk. Other donors may likely be interested for this integrated technology. (Co-)Funding might also come from Climate Funds.

In governmental and donor circles, support to biogas sector development has especially been associated with the aim for sustainable access to renewable energy. However, this does not sufficiently cover and describe the **integrated livelihood development potential** and the actual impacts of biodigesters, which are multiple and diverse. In fact, the biodigester technology sits on the nexus of energy, agriculture, soil fertility, water, climate, gender and sanitation. New funding opportunities may be found once the full impacts of biodigesters are understood at different levels. Biodigesters imply an intensification of the agricultural and farming systems, farm modernization, an opportunity to recycle and upgrade locally-available resources, to save on time spent in fuelwood collection, to reduce costs on fertilizers and energy, and to gain income through the improved use or sale of dung, bioslurry/biocompost.

Governmental support to biodigester development programmes such as ABPP has been provided through Ministries of Energy and Animal Production. Today, other ministries (e.g. Agriculture, Forestry, Gender, Climate change, Green Economy) should be associated. In most countries, various departments are associated and represented in the National Steering Committees (NBSC) but with varying degree of success. Cross-ministerial cooperation is key for the successful roll-out of programmes and should be intensified. The **governance structure** of NDBP may therefore need revision. Solutions may differ per country. An interministerial body or initiative could be considered per country. Assuming that private-oriented market development remains the key objective, the NBSC could also involve expertise in market development, from knowledge institutes and/or private sector.

The Netherlands has been a loyal supporter of biogas and biodigester development in Africa since 2005. The ABPP programme has principally been funded by the **Dutch Ministry of Foreign Affairs** through DGIS. In total, DGIS thus far invested over Euro 50 million in ABPP-1 and ABPP-2. Biodigesters and biogas appear to be considered by other donors as a specialty of the Netherlands. This is both a strength and a weakness. It provides an opportunity for the Netherlands to distinguish itself in the field of access to renewable energy in rural areas. Yet, it makes the sectors highly susceptible to Dutch national policy revisions.

The impression of the evaluation team is that more efforts should be made to **interest other donors** for co-funding of the biodigester support programmes. For ABPP and the NDBPs, the dependency on one main donor presents a significant risk. DGIS would also have an interest in involving third parties. ABPP as a programme has been exchanging with actors such as the World Bank, BOAD, ADB, EU, Swiss Contact, Sida, DFID and others. More specific and targeted efforts may be required both from ABPP, donor DGIS, and the national governments. The new national and international Climate Funds, and other funding sources for climate action, may provide new funding opportunities for biodigester market development.





The Evaluation team greatly values the expertise, the enthusiasm and the many efforts made by SNV and Hivos to develop the biogas and biodigester technology in Africa. Yet, **the circle of enablers and implementing agencies** should be enlarged in order to generate much more policy support and constructive critical thinking, and to favour up-scaling and innovation. This would also help the NDBP, SNV and Hivos to invest in planning, instead of losing much funds, time and efforts in problem-solving (which was the case in the first part of Phase 2).

4.5.4 Financial sustainability

The perspectives for national government end-user subsidies for biodigesters are positive in Burkina Faso and in Ethiopia; but not in the other ABPP countries. Carbon credit revenues were expected already many years back, but the process towards recognition and verification of claims etc. has been long. Significant payments are still in the pipe-line. As yet, no donor other than DGIS was identified for funding a follow-up phase. Climate funds and climate action may provide new funding opportunities for biodigester market development.

The financial sustainability of the ABPP programme in all five countries depends on the availability of governmental subsidies (to end-users, BCE and the NDBP), on the availability of funding for specific support functions and activities, and on carbon credit revenues.

The perspectives for continuation of **national government end-user subsidies** for biodigesters are positive in Burkina Faso and in Ethiopia. In both countries, the political and administrative support for biodigester market development support is high. As long as the cases of irregularities in Tanzania and Kenya have not been resolved, there are no government subsidies to be expected. These may still take many months or even years to be resolved. Uganda is not expected to come through with governmental subsidies in the short term.

From a sustainability point of view, the perspectives for continuation of NDBP **financial incentives to BCEs and masons** at the current level are poor. The national programmes will have to gradually decrease and eventually abandon most of the financial incentives that are currently still available for promotion and functionality. This will translate into higher BCE costs per biodigester (probably transferred to end-users) or into less promotion and lower functionality rates. Economies of scale could bring down costs if uptake increased.

Carbon credit revenues were expected by ABPP already many years back, but the process towards recognition and verification of claims etc. has been long. In part, and depending on country, this is due to the programme's initial state of M&E and the irregularities that emerged in Tanzania (severe), Kenya (middle) and Uganda (minor) and had to wait resolution. By the time of the evaluation, ABPP had once received revenues (EUR 357,000) for carbons credits earned in Tanzania.¹⁴⁵ According to Hivos¹⁴⁶, carbon credit revenues¹⁴⁷ to the value of several millions of Euros are still in the pipeline, now that three countries have been registered and had their claims verified.^{148 149 150}

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¹⁴⁵ Each functional biodigester is estimated to save around four (4) tons of CO_{2eq} . per year. See: ABPP (2013), Africa Biogas Partnership Programme (ABPP) – Phase 2 (2014-2017). Joint Proposal. September 2013, 54p. ¹⁴⁶ Isternieu mith Harry Clargester of Using Content of Lines of the Distribution of (15 January 2010).

¹⁴⁶ Interview with Harry Clemens of Hivos Carbon Finance, the Netherlands (15 January 2019).

 ¹⁴⁷ For functional biodigesters, carbon credits are issued each year, for a maximum period of 21 year (3x7 years).
¹⁴⁸ Large part of the carbon credit certificates issued in Tanzania (to the value of Euro 243,000) had to be

withdrawn following irregularities. These are now the subject of legal issues between Hivos and CAMARTEC.

¹⁴⁹ In Kenya, the carbon credit certificates until 2015 are held by KENAFF, which has not yet wished to release these pending legal issues between KENAFF and Hivos.

¹⁵⁰ The carbon credit certificates from Burkina Faso are upheld for the time being, due to administrative complications between UNFCCC, Ci-Dev and SNV.





ABPP has invested large funds to ensure registration, recognition, monitoring and verification of the carbon credit emission reduction claims per country.¹⁵¹ This is in part due to the fact that two different carbon credit revenue mechanisms are involved. In Kenya, Tanzania and Uganda, the carbon credits are sold in the voluntary market through Hivos¹⁵², and certified to the Verified Gold Standard (VGS) as a premium quality standard.¹⁵³ In Burkina Faso, SNV markets the carbon credits earned through the Carbon Emission Reduction (CER) mechanism linked to the Clean Development Mechanism (CDM) of the Kyoto Protocol; through a bilateral Emission Reduction Purchase Agreement (ERPA) with the World Bank trust fund Carbon Initiative for Development (Ci-Dev).¹⁵⁴¹⁵⁵ In Ethiopia, the carbon credits are sold through an ERPA between the National Development Bank of Ethiopia and Ci-Dev.¹⁵⁶ Voluntary carbon credits can be achieved retrospectively as from 2012, but this is not possible under the CDM mechanism.

The market for carbon credits under the Kyoto Protocol fell into crisis as of 2012, when the average price plummeted (to less than USD 1 per ton CO_{2eq}) due to initial over-allocation in countries in transition and the economic crisis as of 2009.¹⁵⁷ The bilateral CER mechanism of SNV with the Ci-Dev programme, however, leads to a much higher, but non-disclosed¹⁵⁸, price. The price is estimated by sources at somewhere around double the price in the voluntary market (which currently stands at around USD 5-7 per tonne CO_{2eq}).¹⁵⁹ Yet, the voluntary market price is highly dependent on the buyer and thus may well be much higher (upto USD 15 or even USD 20 per CO_{2eq} is reported for some sustainable energy projects¹⁶⁰).

On the **expenditure** side, the national programmes may be able to gradually cut down on personnel and operational costs now that a lot of investment in system development (e.g. in establishment of the Customer Service Centres and the web-based database) is paying off in higher efficiency. Efficiency is also expected to increase at BCE level, which would allow them to increase profits and to use these in part for compensating lower financial incentives. Furthermore, the high carbon credit verification costs are expected to pay off in the coming months or years through carbon credit revenues over previous years, which will contribute to much lower relative costs per certified ton CO_{2eq} in the coming years.

The perspectives for financial sustainability are clearly better in Burkina Faso and Ethiopia, where the volumes of biodigesters are considerable and where governments are committed to end-user subsidies. Kenya may also have some prospects, but is likely to lean much upon the success (to be confirmed) of the prefab biodigester companies. Gradual reduction of the programme subsidies still available will further increase cost-price and limit markets and market expansion. The Ugandan programme is unlikely to be financially sustainable in the middle to long run, because of the low number of biodigesters. For Tanzania, a new programme may be established once the legal issues are solved.

¹⁵¹ SNV (2018) considers: "Due to high upfront costs, high monitoring costs, carbon revenue is only feasible for project that are large (>5,000 biodigesters)." Uganda has not yet passed this threshold; the other countries have.

¹⁵² For Tanzania (since 2016), Kenya (since 2017) and Uganda (since 2018), the Hivos department Carbon Finance markets carbon credit certificates earned through the Voluntary Emission Reduction (VER) mechanism. Most certificates are sold through Carbon Neutral Group (CNG, Netherlands) and MyClimate (Switzerland) (Interview with Harry Oppenoorth of Hivos, the Netherlands; 15 January 2019).

¹⁵³ See: SNV (2018), Carbon Finance of Biodigester Programmes. Presentation (.ppt) at Biogas Compact Workshop (Oldenburg, Germany, 4-7 July 2018). July 2018, 26p.

¹⁵⁴ See: MRAH & SNV (2016), Convention (sous-ERPA) dans le cadre de l'Emission Reduction Purchase Agreement (ERPA) entre le SNV-BF et la Banque Mondiale. Ci-Dev, November 2017, 10p.

¹⁵⁵ See: SNV (2017), SNV signs agreement for Burkina's biogas carbon credits. January 2017, 2p.

¹⁵⁶ See: ABPP (2017), Annual report 2016. April 2017, 56p.

¹⁵⁷ See: SNV (2018), Carbon Finance of Biodigester Programmes. Presentation (.ppt) at Biogas Compact Workshop (Oldenburg, Germany, 4-7 July 2018). July 2018, 26p.

 $^{^{158}}$ SNV states not to be allowed by the World Bank under this contract to disclose the carbon credit price paid

by Ci-Dev. For transparency and accountability this is regrettable, while both agencies are publicly-funded.

¹⁵⁹ Interview with Harrie Oppenoorth of Hivos (15 January 2019).

¹⁶⁰ Interview with Neera van der Geest of the Fair Climate Fund (FCF) (18 January 2019).





5. Phase 3 proposal

Below, we provide our observations and recommendations on the draft ABPP Phase 3 proposal as has been shared with DGIS in August 2018. The draft proposal is entitled "Africa Biogas 2019-2023: A preferred smallholder household solution in the era of climate change (AB19-23)".¹⁶¹ Indicative budget for DGIS is EUR 35 million. The proposal is a first draft.¹⁶²

5.1 Objectives and Theory of Change

The AB19-23 programme aims "to contribute to inclusive and resilient livelihoods among rural smallholders in the Sahel and Horn of Africa by making biodigesters the preferred solution for clean cooking and higher agricultural yields". The objective is to be achieved through the further development of biodigester markets towards the stage of market penetration/maturity¹⁶³, while implementing specific activities that optimize biodigester benefits for women and youth and enhance the resilience of participating communities.

The Theory of Change (ToC) (Annex 2 of the proposal) presents a concise overview of three main pillars of market development: A) conducive enabling environment; B) sustainable demand; and C) viable supply. The market development is to result in "inclusive resilient livelihoods": more income, increased well-being, reduced vulnerability, improved food security, and sustainable use of resources. The ToC is simplified in the text, where the order of pillars is changed and a fourth pillar ("Credit and finance") has been added, without further details.¹⁶⁴ Here, three "scaling instruments" are also referred to: A) Alliance, B) Market Development Fund; and C) Leveraging finance.

The ToC is not sufficiently detailed and does not make explicit some relevant issues which deserve continued attention, such as (non-)functionality and end-user credit¹⁶⁵, which are crucial for market development. Also assumptions related to gender, such as *"women and youth can access jobs and increase income in biogas markets"*, do not appear in the ToC.

AB19-23 is to follow two pathways: inclusive resilient livelihoods (horizontal pathway) and biodigester market development (vertical pathway). It is not clear from the proposal what the relation is between the pathways. It is assumed that biodigester market development will lead to inclusive resilient livelihoods, but this needs elaboration, since market development does not automatically lead to inclusion.

It is recommended to develop a more comprehensive ToC that explains the relations between the two main pathways and the pillars that are part of market development. The ToC formulation process can be very helpful for complex programmes with different actors and diverse views, to discuss, align and agree on the programme objectives, activities and approaches. Key underlying assumptions are to be made explicit in the process and can be used and revised during implementation of the programme. It is advised to also develop country-level ToCs with relevant stakeholders, including male and female end-users.

¹⁶¹ See: ABPP (2018), Africa Biogas 2019-2023. Draft Proposal. Hivos & SNV. August 2018, 71p.

¹⁶² Inteview with SNV / Wim van Nes (16 January 2019)

¹⁶³ Four phases of market development are distinguished: A) Market creation (initiating); B) Market establishment (pioneering); C) Market facilitation (expanding); and D) Market penetration (maturing).

¹⁶⁴ See page 16 of: ABPP (2018), Africa Biogas 2019-2023. Draft Proposal. Hivos & SNV. August 2018, 71p.

¹⁶⁵ The ToC does refer to farmers understanding and accessing "financial solutions", in a general sense.





5.2 Approach

The general approach laid out in the ToC is not very different from that in Phases 1 and 2: strengthening markets by developing a conducive enabling environment, sustainable demand and viable supply. "Biodigester market development" is intended to serve as an "*anchor around which resilience in communities can be enhanced and women and youth can access jobs and increase income*" ("inclusive resilient livelihoods").

More than before, the focus is on integrating biodigesters in agricultural value chains and maximizing the production benefits within a framework of "inclusive resilient livelihoods". Biodigesters are now seen as a total solution for small-scale farmers, with bioslurry becoming more important than biogas. This shift has already started in Phase 2 and is very relevant as households (and especially the one(s) who decide on the financial investment) especially appreciate the biodigester's contribution to overall farm productivity.

With more focus on the role of biodigesters in the farming system and on the use of bioslurry for productive activities, more efforts will be required to ensure that all household members, and especially women, are included in all activities and benefit from the programme. The immediate benefits of biogas are more relevant for women because of their traditional roles in the household (e.g. fuelwood collection, cooking). Where demand creation is more based on promoting productive use, women risk being less included in decision-making.

The programme should go beyond "training women on the use of bioslurry and compost", to strongly focus on "stimulating and coaching women to embark on biodigester-related productive use businesses (next to bioslurry and biocompost use, this includes biogas appliances; e.g. milk chilling, broilers, fertigation, food processing)" and "in appropriate functions (administration, marketing, sales, management) within the biodigester sector".

Gender dynamics in households and value chains are to be addressed. Compared to Phase 2, the Phase 3 proposal improved in terms of allocating staff and experts to gender inclusion. The collaboration with Energia to optimize the share of women-led jobs is important, and should also comprise other aspects so that women and men both benefit from biodigesters.

AB19-23 proposes three "scaling" instruments:

- 1) the Market Development Fund (MDF) that stimulates innovation and scaling, and facilitates private sector delivery of biodigester products and services;
- 2) the Africa-wide Alliance that will promote biodigesters beyond the 10 programme countries and enhance longer-term sustainability of the sector; and
- 3) a credit and finance leveraging facility that will attract other financiers to invest.

The Market Development Fund (MDF) includes the different financing modalities towards the Biodigester Coordination Platforms (BCOP) and Biodigester Supply Companies (BSC).¹⁶⁶ Financial support that will be offered to biogas companies includes grant funding (seed and working capital to BSCs) and result-based financing. The BCOPs are supported in their core (staff) costs, can apply for funding of critical market development support functions, and will also receive result-based financing. The MDF is more detailed than before and may allow the programme to steer more towards market development.

¹⁶⁶ The Biodigester Supply Companies (BSC) comprise both the Biodigester Construction Enterprises (BCE) and the suppliers of prefabricated biodigesters.





The Africa-wide alliance is expected to take over some of the tasks previously carried out by Hivos and SNV and aims to have a wider perspective and outreach. The credit facility is supposed to take away financial barriers for MFIs and SACCOs to provide end-user credit. However, it is unclear what lessons have been learnt from Phase 2 and how these feed into the proposed facility. In Uganda and Burkina Faso the limited engagement of the financial sector was found to be due to other barriers beyond mere financial ones. These need to be better understood so that new, appropriate financing mechanisms can be developed for end-users.

Phase 3 would continue to consolidate and expand the biodigester markets developed in Burkina Faso, Ethiopia, Kenya, Tanzania and Uganda, and establish new biodigester support programmes in other countries in West and East Africa (Benin, Mali, Nigeria, Niger and Sudan). The Evaluation team considers this plan unrealistic in its current form, and recommends to better detail both the plans for consolidation and for expansion.

The biogas and biodigester markets in the existing ABPP countries are still in their initial ('pioneering') stages of development and further support and capacity-building will be required to consolidate market development, to stimulate further growth and expansion, and to ensure a smooth exit strategy. The scaling-up to new countries is informed by the growing interest in biodigesters in countries signatories to the Ouagadougou Declaration on biodigester technology.¹⁶⁷ The Phase 3 proposal does not detail the different approaches envisaged for existing and new countries, and how the three "scaling instruments" are to be applied for each country. Up-scaling and exit strategies are yet to be specified as per the full and revised proposal.

5.3 Programme management

In the Phase 3 draft proposal, the roles between SNV and Hivos are proposed to change, with SNV taking the lead in overall programme management, innovative finance, capacity-building and technology, and Hivos being in charge of carbon and M&E activities, inclusion (gender) and alliance work. This change of roles is not clearly motivated in the proposal.

Strategic guidance of the Phase 3 programme is proposed to be provided by the Programme Committee with two Programme Directors and one DGIS representative. The evaluation team considers that DGIS should not be part of the Programme Committee but remain critically engaged from some distance for reasons of transparency and accountability.

New and existing country programmes are proposed to be managed by Biodigester Coordination Platforms (BCOPs), similar to the NIA in previous phases. Their juridical status and their processes of operation and decision-making are to be specified for each country. It is recommended to clearly distinguish programme management from stakeholder and expert consultations. Steering Committees should be established with all stakeholder groups.

A pool of backstopping experts is to provide specialized support to the programme: technical, inclusion and gender, managerial, carbon, alliance, communication, and knowledge development and learning. The proposal should detail whether this mode of operation is different from the past, or a continuation of current practice. The Evaluation team would encourage ABPP to increasingly engage both new and external experts in order to significantly enlarge the circle of biodigester experts. The capacity on biodigester technology and biodigester support programme management urgently needs to expand in order to be able to live up to the ambitions formulated for Phase 3. The involvement of external experts may also favour biodigester technology promotion towards donors and third parties.

¹⁶⁷ See: ICBT (2017), The Ouagadougou Declaration. International Conference on Biodigester Technology (Ouagadougou, Burkina Faso, 10-12 October 2017), 3p.





5.4 Contribution to DGIS policy priorities

The Dutch policy on Foreign Trade and Development Cooperation, "Investing in Global Prospects" (2018) focuses on sustainable and inclusive growth and climate action, preventing conflicts and combating instability and insecurity. The West African Sahel, the Horn of Africa, North Africa and the Middle East have become the focus regions for Dutch development cooperation. Improving the position of women and girls is a key objective in all areas of DGIS policy. The SDGs provide the overall framework for DGIS policy.

The AB19-23 proposal aligns very well with some of the Netherlands' policy intentions:

- more emphasis than before on the Sahel and Horn of Africa belt, in countries that are considered most fragile and vulnerable to climate change;
- the contribution to "inclusive resilient livelihoods": well-being, income, reduced vulnerability, food security, and sustainable use of resources;
- the contribution to climate change adaptation and mitigation as biodigesters improve households' resilience against climate shocks and reduce GHG emissions.

The AB19-23 result areas are organized along the lines of their contribution to the SDGs. Since Phase 3 is planned to focus more on the role of biodigesters in the farming system and on the use of slurry for productive activities, the programme will contribute primarily to SDG 2 (zero hunger). It will also contribute to other SDGs, in particular: SDG 7 (affordable and clean energy), 3 (good health and wellbeing), 13 (climate action), 15 (life on land), 8 (decent work and economic growth), 1 (no poverty) and 5 (gender equality).

Although the AB19-23 proposal aims for "inclusive resilient livelihoods", the proposal does not include a strategy for inclusiveness and to "leave no one behind". The issue of inclusion refers both to the targeting of resource-poor households, to vulnerable persons including women, and to the inclusion of women in the value chain and as decision makers.

Biodigesters play a critical role in livelihood improvement in rural areas. Where livelihood conditions are a root cause for migration, the programme may contribute to slowing down migration. Yet, the Evaluation team considers that there is no direct causal relation between the two, and that migration cannot likely be influenced with biodigester market development.

The Netherlands intends to help more young people and women in the focus regions to find stable employment and regular income. The AB19-23 proposal will contribute to developing new markets and thereby new companies and jobs will be created. Given the demography of the countries targeted, many of these companies and jobs will benefit youth. A clear gender strategy is required to ensure that women benefit from biodigesters' impacts on productivity.

5.5 Funding prospects

The integrated approach of Phase 3, from biogas to the full benefits of biodigesters, provides good prospects for the inclusion of new countries and new donors. Potentially, the biodigester programme could develop many partnerships around food security, water, climate action and - to a lesser extent - addressing root causes of migration. For this to occur, the programme will need to be more outward-looking and actively needs to enlarge the circle of supporters, experts and expertise. Additional capacity will be required in terms of BCEs and staff.





According to ABPP, impact investors, multilateral development institutions and financial institutions have shown increased investment appetite in biodigester market development, which has resulted in the conclusion of a number of significant investment agreements. Yet, the Evaluation team has not found much evidence that impact investors and financial institutions are indeed ready to engage with biodigesters. Exception is made for the prefabricated biodigesters in Kenya, where millions of Euro are currently being invested, with support of ABPP, but which are too young to be evaluated on sustainability of the schemes.

Several governments in West and Central Africa have indicated their intent to invest in biodigester market development as spelled out in the Declaration of Ouagadougou. Financial commitments from governments will be one of the key criteria for ABPP support in new countries. The African Development Bank (AfDB), the West African Development Bank (BOAD) and the Economic and Monetary Union of West Africa (UEMOA) have reportedly confirmed their willingness to support the signatory countries of the Declaration of Ouagadougou, in the development of a multi-country biodigester facility for West Africa.





6. Conclusions and Recommendations

6.1 Conclusions

ABPP programme

1. The ABPP programme supports biogas and biodigester market development in five countries since 2009. The second phase focused on "market-oriented" development. ABPP aimed for some crucial functions of the programme to be taken over by market actors and actors in the supportive environment. National programmes therefore were leaner and more hands-off. This was in line with the outcomes of the Phase 1 evaluation and the Phase 2 Mid-Term Review.

2. The ABPP-2 programme is guided by a Programme Committee consisting of Hivos and SNV representatives, without any representation of national authorities, programme actors or third-party experts. Meetings were held regularly for exchange, analysis and decision-making. Extensive reports are available.

3. The programme document did not include a Theory of Change or an elaborate Logical framework. Monitoring & Evaluation has been elaborate but not entirely consistent, through quarterly "Traffic light" reports, Dashboards and Half-year and Annual reports. A new and elaborate web-based database was developed to increase oversight and integrity of the data. Audited financial statements are available for all years.

4. Following poor performance in the first year of Phase 2, four key priority areas were defined in 2015 and specific budgets set aside for investment on: A) Affordability; B) Business case; C) Reputation; and D) Programme management. The selection of these key priorities is explained well and seems accurate.

5. The National Implementing Agencies changed in 2015 in two countries. Hivos and SNV themselves now host the NDBP in Kenya and Uganda. The programme in Tanzania was put on a hold in 2017 following the discovery of irregularities. The national programme in Ethiopia has been scaled up and taken over with EU funding.

6. The ABPP-2 budget for programme activities was EUR 27 million. Cost extension in 2019 has been requested. Co-funding was received from EnDev promoting Results-Based Financing (RBF), but only half of this materialized due to the low number of biodigesters installed. ABPP-2 is lined up for receiving significant carbon credit revenues.

ABPP-2 Results and Outcomes

7. ABPP-2 has not been able to meet the targets of 100,000 biodigesters installed and 600,000 people reached with renewable energy. After first year, ABPP noted "structural weakness of the institutional and organizational sector infrastructure in all countries" and re-oriented its interventions. Still, by 2018 production was at 35% of planning. Burkina Faso and Ethiopia have shown the most consistent installation of biodigesters. Production in Kenya is volatile, in Uganda much below expectations, and in Tanzania the programme was halted following irregularities.

8. ABPP successfully managed to increase biodigester functionality through integrated quality management, repair and trainings, to a reported rate of over 90% for newly-established biodigesters. Daily feeding of the biodigester with sufficient fresh dung and water remains a challenge and a concern. In about 70% of non-functionality cases, poor feeding by users is the main cause. ABPP's





quality assurance approach seems to be effective thanks to results-based financing. However, thus far it drives largely on programme (financial) incentives.

9. The business case of biodigesters needs to be clear to users. Bioslurry and biocompost are good and nutrient-balanced fertilizers, and are likely to contribute to significant yield improvements and income. Further work is required to assess the economic impacts of biodigesters and bioslurry/biocompost, in order to strengthen the business case and its understanding by stakeholders and third parties.

10. The high up-front investment for users is one of the main barriers for dissemination of biodigesters. ABPP-2 has achieved its target for biodigester cost reduction (around 20-30%). Governmental subsidies were available in Burkina Faso (at maximum 50% of biodigester cost) and Ethiopia (25-40%), but not in Kenya and Uganda. Biodigesters have been subsidized by third parties in many places. Third-party subsidies tend to be temporary, thus can distort market development. ABPP-2 has hardly been able to bring financial institutions on board to provide credit for biodigesters, due to the nature of the product and the general banking environment. In Kenya, lease-to-own credit is provided by some companies for above-ground biodigesters.

11. On the supply side of the market, ABPP-2 has successfully supported the emergence and growth of Biodigester Construction Enterprises. Today, all countries have private sector partners offering good quality services. The business case for BCEs needs elaboration; in Burkina Faso the business is profitable, yet most BCEs in Uganda depend on programme financial incentives. Support services improved through Customer Service Centres (CSC), quality assurance and communication.

12. ABPP has been successful in generating governmental subsidies for end-users in Burkina Faso and Ethiopia, but not in Kenya and Uganda. The markets in Kenya, Uganda and Tanzania are not protected by regulatory policies. Partnerships focusing on specific value chains have not (yet) brought the expected results. National biogas/biodigester associations are gradually emerging and may come to play an important role in market development.

13. The government in Burkina Faso successfully co-organized with ABPP two international conferences about biogas and biodigester market development in Africa. In West Africa, a momentum for biodigester market growth and expansion is palpable.

Evaluation according to OECD criteria

Relevance

14. The relevance of biodigesters for smallholders in rural areas in Africa is high. Biodigesters contribute to the intensification of farm production, access to fertilizers and energy, savings on fuel and fuelwood, and the reduction of indoor air pollution. They strengthen the resilience and the prospects of households. Yet, access to biodigesters is severely limited by its costs and the household's socio-economic position.

15. ABPP aligns well with the Dutch development cooperation policy priorities, especially with regard to private sector-led development, food security and agricultural production, access to energy, climate adaptation and mitigation, and women, youth and technological innovation. ABPP relates to many different SDGs and thus fits in very well in integrated approaches towards development on the nexus agriculture, food security, water, energy and climate action. Where livelihood conditions are a root cause for migration, the programme may contribute to slowing down migration.





16. ABPP has been successful in creating an institutional environment in which market-oriented biodigester sector development can take shape. Phase 1 programme subsidies were phased out and taken up by national governments in some countries. BCEs have been supported and emerged in all countries. The programme shows consistency in quality assurance and after-sale services.

Effectiveness and Efficiency

17. ABPP-2 has not achieved its targets. New private-led biodigester markets did emerge, but the number of biodigesters is well behind target (only at 35%), and so is the number of people reached with sustainable access to energy. ABPP's ability to generate access to credits was over-estimated, and the BCEs' capacity to generate demand was low. The Market Development Score card shows that ABPP still has a long way to go to reach the desired situation of market development. A reality check is required, as is improved planning.

18. ABPP is not on track for scaling-up in the current ABPP countries; possibly with the exception of Burkina Faso (steady increase in numbers) and Kenya (recent growth in prefabricated above-ground biodigesters marketed with lease-to-own credit). There is insufficient proof that demand growth, which is essential for sustainable biodigester market development, will take off soon. There is also little proof that the current ABPP strategies for demand enhancement produce the desired results. More demand orientation is required including customer analysis, market surveys and development of the business case.

19. ABPP-2 has spent almost all funding received. The overall programme cost per biodigester installed reduced by 15%, from EUR 833 in Phase 1 to EUR 703 in Phase 2. The high programme cost is directly linked to the low number of biodigesters installed (35% of target). The average programme costs per biodigester differ per country and between years.

Impacts

20. Bioslurry and biocompost are the main motivation today for people to acquire a biodigester. The aim is to fertilize own land, to substitute for synthetic fertilizers, or to sell it for income generation. Biogas for cooking is also mentioned frequently by users; but lighting less so because of solar alternatives. Time saved on fuelwood collection is in part replaced by time lost in daily collection of dung and water and in feeding the biodigester. Yet, overall time savings are likely significant, which impacts especially on women and children. Indoor and outside air pollution is certainly reduced with biogas use. Where toilets are connected to the biodigester, sanitation will improve, but toilets are not common.

21. The ABPP-2 programme document included specific goals, planned interventions and indicators for gender mainstreaming. However, as of 2015 countries no longer reported on their gender interventions. ABPP-2 has achieved important welfare results for women and women have participated in trainings. At the level of production and productivity, and empowerment/equality, no results could be observed.

22. The ABPP programme had no specific objectives oriented towards poverty alleviation, food security or income generation. Observations during field visits indicate that biodigester owners are not among the poorest. ABPP-2 has created employment for an estimated 250-300 persons (mostly male). The biodigester technology has benefits for the society at large, including the reduction of greenhouse gas emissions, reduced public health costs, increased capacities and reduced deforestation.





Sustainability

23. According to ABPP data, investment in a biodigester is economically viable, with a simple payback period of only 2-3 years. Independent verification of these calculations is recommended as this is a key selling point and the basis of the business case to customers.

24. Underground fixed-dome biodigesters are expected by the ABPP programme to last 15-20 years. This may apply to the later models installed; at start of Phase 2, technical sustainability was not always ensured. The evaluation team considers that biodigesters can last a long time, if the quality at construction is monitored well and if the biodigester is operated correctly. ABPP-2 put in place new policies and procedures to ensure such.

25. The biodigester technology sits on the nexus of energy, agriculture, soil fertility, water, climate, gender and sanitation. The ABPP and NDBP governance structures should be reviewed per country to ensure appropriateness and to also involve knowledge institutes and private sector. ABPP's dependency on DGIS presents a risk. Other donors may likely be interested for this integrated technology. Climate funds and climate action may provide new funding opportunities for biodigester market development

26. The perspectives for national government end-user subsidies for biodigesters are positive in Burkina Faso and in Ethiopia; but not in the other ABPP countries. Carbon credit revenues have been upheld by the long process towards recognition and verification of claims etc. Significant payments are still in the pipe-line.

6.2 Recommendations

R1. **Support a third phase of ABPP.** Support is justified if plans and approaches are explicit, elaborate and realistic. Biodigester market development in the ABPP countries is relevant to the contexts, to national policies and to Dutch development policy priorities. A reality check is required, because of poor achievements in Phase 2 on KPIs agreed with donor.

R2. **Develop a more comprehensive ToC** with a narrative that makes key underlying assumptions explicit. Ensure that a consistent monitoring plan is in place. Indicators should measure market development, in terms of demand and supply, and progress in the supportive environment. Indicators should be gender responsive.

R3. **Enhance demand orientation.** Elaborate the business case of biodigesters for households and BCEs in all countries. Pay more attention to customer analysis, including their needs, perceptions and socio-economic position. Carry out market surveys. Target specific customer segments and value chains.

R4. **Plan moderately** in terms of production, market development, finances, and households reached. Based on previous ABPP experiences, the evaluation team considers it is not realistic to expect new countries enter into an expansion phase within 5 years. Production targets need to be based on market studies. Develop upscaling plans and exit strategies from the start. Ensure that sufficient capacity is in place to operationalize the plans.

R5. **Ensure that the national programmes are run independently by national actors**, with strong support of governments. Disengage SNV and Hivos from country programme management; i.e. in Kenya and Uganda. Expand the ABPP programme committee to include representatives of national programmes and the alliance. Create a framework for consultation between ABPP, national





programmes and line ministries. Favour the creation of national steering committees that involve all stakeholders including users and external experts.

R6. **In the existing countries, develop programme pull-out strategies** to have the core programme functions be financed and sustained. Ensure that a relevant number of companies can sustain viable business and implement core functions without financial incentives. Develop the capacities of the national biogas associations.

R7. **In new countries, ensure strong support to private sector development**, strengthening BCEs capacities in construction and service provision, marketing and business development, putting in place quality control mechanisms. Make sure that the running costs of user trainings and quality assurance are borne by the market.

R8. **Develop gender and inclusion strategies** to ensure poor households and vulnerable persons, including women and youth, are targeted. Ensure gender integration while gender influences uptake and proper use and maintenance. Address gender dynamics in activities and households. Favour women taking up technical and managerial roles.

6.3 Observations regarding Phase 3 proposal

Objectives and Theory of Change

O1. ABPP proposes a third phase of DGIS donor support for the continued strengthening of biodigester market development in four of all existing countries except Ethiopia, and for support to the establishment of new biodigester markets in another five countries in West and Central Africa. The ToC of the Phase 3 proposal presents a concise overview of three main pillars of market development: A) conducive enabling environment; B) sustainable demand; and C) viable supply. The ToC is not sufficiently detailed and comprehensive.

Approach

O2. The general approach laid out in the ToC is similar to that in Phases 1 and 2. More than before, the focus is on integrating biodigesters in agricultural value chains and maximizing the production benefits within a framework of "inclusive resilient livelihoods". More efforts are required to ensure that all household members, especially women, are included in all activities and benefit from the programme. Gender dynamics in households and value chains are to be addressed.

O3. Phase 3 would continue to consolidate and expand the biodigester markets developed in Burkina Faso, Ethiopia, Kenya, Tanzania and Uganda, and establish new biodigester support programmes in other countries in West and East Africa (Benin, Mali, Nigeria, Niger and Sudan). The Evaluation team considers this plan unrealistic in its current form, and recommends to detail both the plans for consolidation and for expansion. The proposal does not currently propose different approaches for existing and new countries. Up-scaling and exit strategies are to be specified.

Programme management

O4. The roles between SNV and Hivos are proposed to change, with SNV taking the lead in overall programme management, innovative finance, capacity-building and technology, and Hivos being in charge of carbon and M&E activities, inclusion (gender) and alliance work. This change of roles is to be motivated in the proposal. DGIS should not be part of the Programme Committee but remain critically engaged from some distance for reasons of transparency and accountability.





O5. The legal status and processes of operation and decision-making of the proposed Biodigester Coordination Platforms (BCOPs) are to be specified per country. It is recommended to clearly distinguish programme management from stakeholder and expert consultations.

O6. The Evaluation team encourages ABPP to significantly enlarge the circle of biodigester experts. Knowledge and skills with regard to biodigester technology and biodigester support programme management urgently needs to expand in order to be able to live up to the ambitions formulated for Phase 3.

Contribution to DGIS policy priorities

O7. The Phase 2 proposal aligns very well with some of the Netherlands' policy intentions. The result areas are organized along the lines of their contribution to the SDGs. Although the proposal aims for "inclusive resilient livelihoods", it does not include a strategy for inclusiveness and to "leave no one behind". A clear gender strategy is required to ensure that women benefit from biodigesters' impacts on productivity.

Funding prospects

O8. The integrated approach of Phase 3, from biogas to the full benefits of biodigesters, provides good prospects for the inclusion of new countries and new donors. Potentially, the biodigester programme could develop many partnerships around food security, water, climate action and - to a lesser extent - addressing root causes of migration. For this to occur, the programme will need to be more outward-looking and enlarge the circle of supporters, experts and expertise. Additional capacity will be required in terms of numbers of BCEs and staff.

O9. Several governments in West and Central Africa have indicated their intent to invest in biodigester market development. Ownership and financial commitments by governments should be key criteria for ABPP support in new countries since this has shown to be a key driver for biodigester development.





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Annex 1. Programme and List of resource persons

Netherlands

Date	Resource person
Thursday 20 December 2018	IGG / Frank VAN DER VLEUTEN
	Hivos-NL / Harrie OPPENOORTH
	SNV-NL/ Wim VAN NES
Tuesday 15 January 2019	SNV-NL / Felix TER HEEGDE
	Hivos-NL / Harrie OPPENOORTH
	Hivos-NL / Harry CLEMENS
Wednesday 16 January	IGG / Frank VAN DER VLEUTEN
	SNV-NL / Wim VAN NES
Friday 18 January	FCF / Neera VAN DER GEEST
Monday 25 February	World Bank / Ci-Dev / Nick BOWDEN (Skype)
Friday 1 March	RVO / EnDev / Marcel RAATS (Skype)
Tuesday 12 March	GIZ / EnDev / Elina WEBER





Kenya

Date	Resource person
Monday 21 January 2019	Travel Amsterdam - Nairobi
Tuesday 22 January	Nairobi
	Hivos / ABPP2 / Program coordinator / Jean-Marc SIKA
	SNV / ABPP2 / Technical assistant / Bert VAN NIEUWENHUIZEN
	Hivos / ABPP2 / M&E / Victoria NDUNGU
	Hivos / ABPP2 / Finance / Silvanus MUTINDA
	TechnoBrain / Director Vinay SUBBARAMAIAM
	TechnoBrain / SNV Account manager / Nkatha MURUNGI
	TechnoBrain / ABPP Group leader / Cynthian MATAGARO
	KBP / Country Manager / Kevin KINUSU
	KBP / M&E / Salomé WAHOME
	KBP / Quality Manager / Michael WASONGA
	KBP / Finances / Isaiah GICHANA
	KBP / External relations / Caroline MICHUKI
	KBP / Business developer / Tim MUNGAI
	CIDES / Joseph KURIA
	Biotech & Services / Joshwa MARUNGA
	Ndima Renewable Energy / Julius Wachiri MURIMI
	GreenLeaf Renewable Energy / Grace RIE
	Takamoto Biogas / Harrison IKUNDA
	SistemaBio / Raymond CHEPKWONY
	Hivos East Africa / Regional Director / Mendi NJONJO
Wednesday 23 January	Travel Nairobi - Kampala





Uganda

Date	Resource person
Wednesday 23 January	Travel Nairobi - Kampala
	Consultant / Andrew Muganga KIZITO
	BSU / Program Director / Michel MVULE PINTO
	BSU / M&E / Barbara Gelyn KUNIHIRA
	BSU / Quality manager / Walter Anthony OKELLO
	BSU / Business Developer / Florence N'KINTU
	BSU / Finance / Stella AGWENG
	BSU / Logistics / Anton AKATURUNGURA
	SNV / Technical Assistant / Peace KANSIIME
	SNV / Energy advisor / Ruth KUTEESA
Thursday 24 January	Kampala
	MEMD / Acting Commissioner / Wafula WILSON
	MEMD / Michael AHIMBISIBWE
	MEMD & NBSC / John?
	Postbank / Manager Credits, Microloans & Projects / Augustine MUKASA
	SNV / Country Director / Phomolo MAPHOSA
	AFIRD / Deputy Director / J.J. Musimenta
	AFIRD / Staff member
Friday 25 January	Kampala
	EKN / Regional Senior Exper Climate Change / Elizabeth CARABINE
	Kawacom Uganda / Financial Controller / Richard BAGUMA
	Kawacom Uganda / Senior Accountant / Lydia NAMUTEBI MUNGEREZI
	VI Agroforestry / Country Manager / Sara DAHL
	VI Agrotorestry / Deputy Country Manager / James WALUSIMBI
	Ecosate / Quality Service Provider / Isaac BAMADOLA
	BSU/ Program Director / Michel MOVOLE PINTO
	SNV / Technical Assistant / Peace KANSIIVIE
	Travel Kampala - Amsterdam (Peter Ton)
Saturday 26 January	Travel to Mbale (Eastern Uganda)
	MREC / director / Laston Oloo
	MREC / male mason / Richard Khamaro
	MREC / female mason / Chebita Harriet
	EREA / director /Khamalwa Edward
	EREA / female mason / Cheptok harriet
Sunday 27 January	Day off





Monday 28 January	Travel to Soroti
	MECOD / managing director / John Ewidu
	MECOD / male mason / David Okoik
	MECOD / supervisor / David Okwii
	MECOD / office manager. promoter / Esther Asakali
	MECOD / male mason / David Adengo
	MECOD / female client
	MECOD / client (children)
	Soroti Teachers SACCO (STECOS) / credit officer / Charles Enou
	Soroti, Tubur / Meeting with female users / Esther Akol
	Soroti, Tubur / Meeting with female users / Aguero Robina
	Soroti, Tubur / Meeting with female users / Abuko Magdalane
	Soroti, Tubur / Meeting with male users / Edatu Lawrence
Tuesday 29 January	Bushika IACE / chair / Wakinya Samuel
	Mbale, Bungokho North / Meeting with female users / Nabu Kwasi
	Mbale, Bungokho North / Meeting with female users / Margaret Were
	Mbale / Meeting with female users / Namwenge Mulegi
	Mbale, Bungokho North / Meeting with female users / Anita Mwambu
	Mbale, Bungokho North / Meeting with female users / Kisumu Kwale
	Mbale / Female users / Helen Awor (Hinamundi Kassim's wife)
	Mbale, Bungokho North / Meeting with female users / Esther Nigesa
	Mbale, Bungokho North / Meeting with male users / James Were
	Mbale, Bungokho North / Meeting with male users / Mulegi Perezi
	Mbale, Bungokho North / Meeting with male users / Kisari Haruni
	Travel to Kampala
Wednesday 30 January	Travel to Mbarara (Western Uganda)
	Conserve Nature / director / Abel Karugaba
	Conserve Nature / male mason / Sebaganda Emmanuel
	Conserve Nature / admin assistant / Anpili Sara
	Conserve Nature / co director / Fiona
	Samaritans Purse / Program manager livelihoods / Ismail Gaina
Thursday 31 January	EBO SACCO / Business Development manager / Elias Byaruhanga
	KIGARAMA FARMERS SACCO / director / Wicliffe Mutunge
	Mbarara municipality / Meeting with female users / Joventa Waryumu
	Mbarara municipality / Meeting with female users / Margaret Rwakima
	Mbarara municipality / Meeting with female users / Mauri Chepaka
	Mbarara municipality / Meeting with female users / Jozerine Bwerere
	Mbarara municipality / Meeting with male users / Moses Tadyenda
	Mbarara municipality / Meeting with male users / Kesi Kubiriba
	MAAIF / Principal Agric Officer / FS&N Security / Stephen Biribonwa
	UNIDO / national project coordinator / Rebecca Nanjala





	Travel to Duck and
Friday 1 February	Travel to Bushenyi
	BEADA / director / Asimu Bonaventure
	BEADA / office assistant & head of projects / Kamasco Stella
	BEADA / male mason / Frank Turnau
	BEADA / female mason / Igonyo Adrinah
	Butuuro SACCO / Accountant / Sunday Margaret
	Butuuro SACCO / Credit manager / Dennis Komunda
	Butuuro SACCO / male client
	Bushenyi, Igara / Meeting with female users / Creai Bashasha
	Bushenyi, Igara / Meeting with female users / Tuhwerirwe Victor's wife
	Bushenyi, Igara / Meeting with male users / Tibayongwa Frank
	Bushenyi, Igara / Meeting with male users / Bartolome Yoram
	Bushenyi, Igara / Meeting with male users / Kampikaho Bernard
	The state of the s
Saturday 2 February	Iravel to Isingiro and back to Kampala
	Isingiro, Masha / Meeting with female users / Betty Sabitti
	Isingiro, Masha / Meeting with female users / Namugenyi Idah
	Isingiro, Masha / Meeting with male users / Kabango Kashumba Stephen
Sunday 2 Echruary	Day off
Sulluay S rebluary	
Monday 4 February	Heifer International Uganda / Country Director / William Matovu
	UNBA / Administrator / Agatha Nalumansi
	UECCC / Desmond Tutu
	UECCC / Roy Nyamutale Baguma
	Makarere University / May Ssengendo
Tuesday 5 February	Feed-back and Validation workshop:
	BSUL / Program coordinator / Michel Muvule
	BSUL / M&E / Barbara Kunihira
	BSUL / Quality manager / Anthony Walter Okello
	BSUL / Business development and marketing / Florence Kintu
	BSUL / Finance and admin / Stella Agweng
	BSUL / logistics / Anton AKATURUNGURA
	SNV / Energy advisor / Ruth Kuteesa
	SNV / advisor / Peace Kansiime
	SNV / Country Director / Phomolo MAPHOSA
	ECOSAFE / Managing Director / Bannadda Nswa
	Wekembe / Thomas Mayeke
	Enercom / Vicor
	ECOSAFE / Kenneth Kiseenyu
	ECOSAFE / Peter Kityo
	DEK / Esther Senene
	MEMD / Kyarre
	KWDT / Leonard Kulumba
	Travel Kampala - Nairobi (Els Rijke)





Burkina Faso

Date	Resource person
Sunday 10 February	Travel Amsterdam - Ouagadougou (Peter Ton)
	Travel Nairobi - Ouagadougou (Els Rijke)
Monday 11 February	Ouagadougou
	Consultant / Lassina KONATÉ
	PNB-BF / Program coordinator / Xavier BAMBARA
	SNV-BF / Technical assistant / Jan LAM
	PNB-BF / Deputy Program coordinator / Sylvie YAMEOGO
	PNB-BF / M&E / Lin DA
	PNB-BF / Private Sector Development / Dothié SOMA
	MRAH / DGESS / Abdoulaye SIBA
	MRAH / DGESS / Aminata GOUBA HIE
	MRAH / DGESS / Brahima SOULAMA
	MRAH / DGESS / Anliéhédin Gustate SOME
	SNV-BF / Country Director / Jeannette DE REGT
	SNV-BF / Renewable Energy / Martin VAN DAM
Tuesday 12 February	
	PNB-BF / Technical officer / Gladys SANDWIDI
	MAAH / DG Production Végétale / Patrice TONDE
	Min Finances / DG Coopération / Mahamadou DEYAMBA
	KCS / Frédéric KABRE
	PNB-BF / Agircultural extension / Serge SOMDA
	MRAH / Ministre / Sommanogo KOUTOU
	MEMD / DG Renewable Energy / Bruno KORGO
	MEMD / DG Renewable Energy / Biomass / Mamadou OUEDRAOGO
	Prime Ministry / Policy officer / Dieudonné TRAORE
	Prime Ministry / Agric & Sanitation & Energy / Clément BAMBARA
Wednesday 13 February	Ouagadougou
	Chambre du Commerce / Natéwendé Martin OUEDRAOGO
	EGT / George TAPSOBA
	PIF / National coordinator / Sibiri KABORE
	PIF / Conseiller / Samuel YEYE
	PNB-BF / M&E / Lin DA
	PNB-BF / Xavier BAMBARA
	PNB-BF / Sylvie YAMEOGO
	SNV-BF / Technical assistant / Jan LAM
	Travel Ouagadougou - Amsterdam (Els Rijke)
Thursday 14 Cakerson	Kaudaugau
Inursday 14 February	Koudougou
	Travel Ouagadougou - Amsterdam (Els Kijke)
	ITavel Ouagadougou - Koudougou - Imasgo - Goala - Koudougou
	CC / Director / Gerdru Bdyillid BANA
	Goala / Vicit of 2nd highing ctor noarby (currer not available)
	Goara / visit of zhu blougester hearby (owner hot dvallable)





Friday 15 February	Centre-Quest
FILLAY IS FEDILIARY	Travel Koudougou - Tenado - Kiébo - Dédougou
	FCC / Director Gérard Pavima PAMA
	Kićbo / Mooting with usor Pakala PALL and his wifo (1 of 7)
	Kiébo / Mooting with usor Batána BALI and his wife (1017)
	EECC / Director / Aristide SOMDA
	LEDA / Director / Algin DIALLO
	HERA / Director / Aldin DiALLO
	HERA / Filidicial officer / Ousfildine COULIDALY
	UGCPA / Sidibe ADAMA
	UGCPA / Training officer / Marcel KAN
Saturday 16 February	Boucle du Mouhoun
	Travel Dédougou - Tankuy - Wakuy - Koudougou
	EECS / Director / Aristide SOMDA
	Tankuy / Meeting with users / Souleymane TIAHO
	Tankuy / Meeting with users / Kalif SANGARE
	Tankuy / Meeting with users / Joseph SANGARE
	Tankuy / Meeting with users / Belem SAHIOUBA
	Tankuy / Meeting with users / Mouhou SABWE
	Tankuy / Meeting with users / Fidofini SAWA
	Tankuy / Visit to 3 biodigesters (2 from 2013; one in progress)
	Tankuy & Wakuy / Meeting with users / Dofinita LOHERA
	Tankuy & Wakuy / Meeting with users / Howé LOHERA
	Wakuy / Visit of 2 biodigesters
	EECS / Maçon / Aboubacar TRAORE
	MRAH / Agent de l'Élevage / Lassané OUEDRAOGO
Sunday 17 February	Travel Koudougou - Koupéla
, ,	CRCB / Alexis GUIGUIMDE
Monday 18 February	Centre-Est
	Travel Koupéla - Dialgaye - Kalwenga - Koupéla
	CRCB / Director / Alexide GUIGUIMDE
	CRCB / Chef Maçon / Bénoit DAMBRE
	CRCB / Agent Appui-Conseil / Lassané POUGDA
	CFC / Dialgaye / Director / Pascal SILGA
	CFC / Dialgaye / Teacher / Roger LABER
	Dialgaye / CFC / Meeting with users Didier KABRE and wife Sousian OUEDRAOGO
	Dialgaye / CFC / Meeting with users Philippe BONKONGO and wife Janine BERE
	Dialgaye / CFC / Visit of 3 biodigesters (1 repaired, 1 in repair; 1 cracked)
	Kalwenga / Meeting with users Paul YAMEOGO and wife Nadège VELERDAN
	Kalwenga / Visit of 1 biodigester (with toilet) + vegetable garden + pig house
	GRAINE-Koupéla / Valérie BOUDA
	OCADES-Koupéla / Deputy Secretary / Joseph POUYAN





Tuesday 19 February	Centre-Est
	Travel Koupéla - Bagré - Zabré - Bangou Kirkou Djama - Ouagadougou
	CRCB / Director / Alexide GUIGUIMDE
	CRCB / Chef Maçon / Bénoit DAMBRE
	Bangou Kirkou Djama / Meeting with users Issouf SANGO and wife Mariam SION
	Bangou Kirkou Djama / Meeting with users Sibidou SANGO and wife
	Bangou Kirkou Djama / Meeting with users Philémon SANGO and wife
	Bangou Kirkou Djama / Visit of 3 biodigesters (2 functional; 1 cracked)
Wednesday 20 February	Ouagadougou
	MRAH / DG Production Animale / Issa SAWADOGO
	GRAINE-Siège / Chief of Operations / Boureïma BADO
	GRAINE-Siège / Training and Project officer / Serge BONKOUNGO
	SNV-BF / Technical assistant / Jan LAM
	Feed-back & Validation workshop
	Travel Ouagadougou - Amsterdam (Peter Ton)
Thursday 21 February	Travel Ouagadougou - Amsterdam (Peter Ton)


Annex 2. Reconstructed Theory of Change of ABPP2 at the start of the programme (after original proposal)







Annex 3. Reconstructed Theory of Change of ABPP2 in 2015 (after poor results in 2014 and before the MTR)







Annex 4. Production of biodigesters per country (2009 – 2019)

Biodigester Production			ABPP										
-										Oct-Dec			
									Jan Sept Projection Projection				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018	2019	Total
Ethiopia	30	731	1.641	2.511	3.150	2.463	2.260	2.553	2.591	2.141	700	-	20.771
Kenya	3	837	2.399	3.510	4.830	2.533	2.008	1.434	1.006	1.715	600	3.000	23.875
Burkina Faso	1	111	609	1.292	2.001	1.454	1.306	1.730	1.760	1.354	500	2.600	14.718
Uganda	43	583	1.276	1.181	2.085	504	665	573	546	423	150	1.000	9.029
Tanzania	105	714	895	1.203	1.264	785	447	890	138	-	-	150	6.591
	182	2.976	6.820	9.697	13.330	7.739	6.686	7.180	6.041	5.633	1.950	6.750	74.984
										PHASE 1			33.005
										PHASE 2			41.979
													74.984

Source:

ABPP (2019), ABPP Extension Proposal, April-December 2019.





Annex 5. ABPP assessment of biodigester market development

Demand	ETH	KEN	TAN	UGA	BUR	Avg
Product and service diversity	8	22	12	15	11	14
Market penetration	3	10	6	11	13	8
Willingness to pay	28	15	10	15	9	15
Systems in use	10	15	8	20	30	16
Replacement and repair	7	13	5	19	23	13
Consumer aware & perception	8	17	10	20	23	15
Demand	9	15	8	17	20	14

Demand-side score card indicators, aggregated

Supply-side score card indicators

Supply	ETH	KEN	TAN	UGA	BUR	Avg
Suppliers	14	21	18	20	23	19
Sales Volume	25	้ 21	16	13	23	20
Prices, costs and profits	6	19	8	6	7	9
Supply chain development	14	26	13	21	18	18
Value chain development	25	10	5	20	25	17
Business networks	8	16	7	19	11	12
Warranties	5	12	5	15	28	13
Entrepreneurial skills	5	13	8	11	13	10
Supply	15	21	15	15	25	18

Enabling Environment score card indicators

Enabling environment	ETH	KEN	TAN	UGA	BUR	Avg
Policy	24	20	18	16	24	21
Access to finance	14	23	15	8	8	13
Quality regulations, norms and	8	20	8	8	27	14
Market information	18	25	20	26	29	23
Expertise development	16	23	15	28	31	23
Enabling Environment	17	22	16	17	23	19

Source:

ABPP (2018), Africa Biogas 2019-2023. Draft Proposal. August 2018, 71p.





Annex 6. ABPP programme costs per country and year

Programme Costs				€		
	2014	2015	2016	2017	2018	Total costs
Burkina Faso	539.445	492.054	435.441	453.672	322.245	2.242.857
Ethiopia	365.220	893.104	681.488	627.973	602.470	3.170.255
Kenya	809.720	518.633	346.752	288.490	391.520	2.355.115
Tanzania	965.294	773.419	439.528	257.410	-	2.435.651
Uganda	513.656	372.562	324.128	321.440	326.320	1.858.106
Sub-total	3.193.335	3.049.772	2.227.337	1.948.985	1.642.555	12.061.984
Fund Management & TA	1.956.852	2.310.499	2.311.424	1.506.308	1.458.766	9.543.849
						-
Total costs	5.150.187	5.360.271	4.538.761	3.455.293	3.101.321	21.605.833
Red = estimate						

Costs per Digester						€
						Average costs
	2014	2015	2016	2017	2018	per digester
Burkina Faso	371	377	252	258	161	272
Ethiopia	148	395	267	242	223	252
Kenya	1.519	1.078	242	286	196	432
Tanzania	381	376	494	1.865		434
Uganda	808	560	566	589	466	596
Sub-total country programme costs per digester	419	451	310	322	222	345
Fund Management & TA costs per digester	257	341	322	249	197	273
Total costs per digester	676	792	632	572	419	617

Source: ABPP (2018), Answers to potential questions (version 2). December 2018, 4p.