



Biodigesters for better life

Since 1992, SNV has supported the design and implementation of market-based biodigester programmes. Our strong local presence coupled with three decades of experience has brought us an in-depth understanding of sector needs in local contexts. By 2020, our programmes supported the installation of over 900,000 household biodigesters in 24 countries. These digesters have reduced greenhouse gas emissions by an estimated 22.5 million tonnes CO₂ equivalent.

The challenge

Worldwide, close to three billion people lack access to clean cooking. They cook on polluting open fires or simple stoves fuelled by biomass (wood, charcoal, animal dung, and crop waste) or kerosene. The World Health Organisation (WHO) estimates that annually close to 4 million people die prematurely from illness attributable to household air pollution from inefficient cooking practices. Biomass resources are rapidly dwindling, and further depletion of forests is causing ecological degradation and emission of greenhouse gasses (GHG). Gathering biomass is usually done by women and children, denying



What is a biodigester?

Biodigesters convert organic matter like animal manure, human excreta and food waste into combustible gas, known as biogas. Smallholder farmer households with at least two cows or seven pigs can generate sufficient gas to meet their basic energy needs: clean cooking and basic lighting. The resulting bioslurry, either direct or in the form of biocompost, is used as organic fertiliser for the production of crops and fodder. Digesters are thus part of a regenerative and resilient farming system.



Biodigesters produce organic fertilizer which increase agricultural yields.

them time that could otherwise be spent on leisure, productive activities, or education. Soil fertility is crucial for sustainable food production, yet the Food and Agriculture Organization (FAO) estimate that 33% of the world’s soil is moderately to highly degraded. In Sub-Saharan Africa, major threats are soil erosion due to forest degradation, soil organic matter and nutrient depletion, and loss of soil biodiversity.

Market barriers

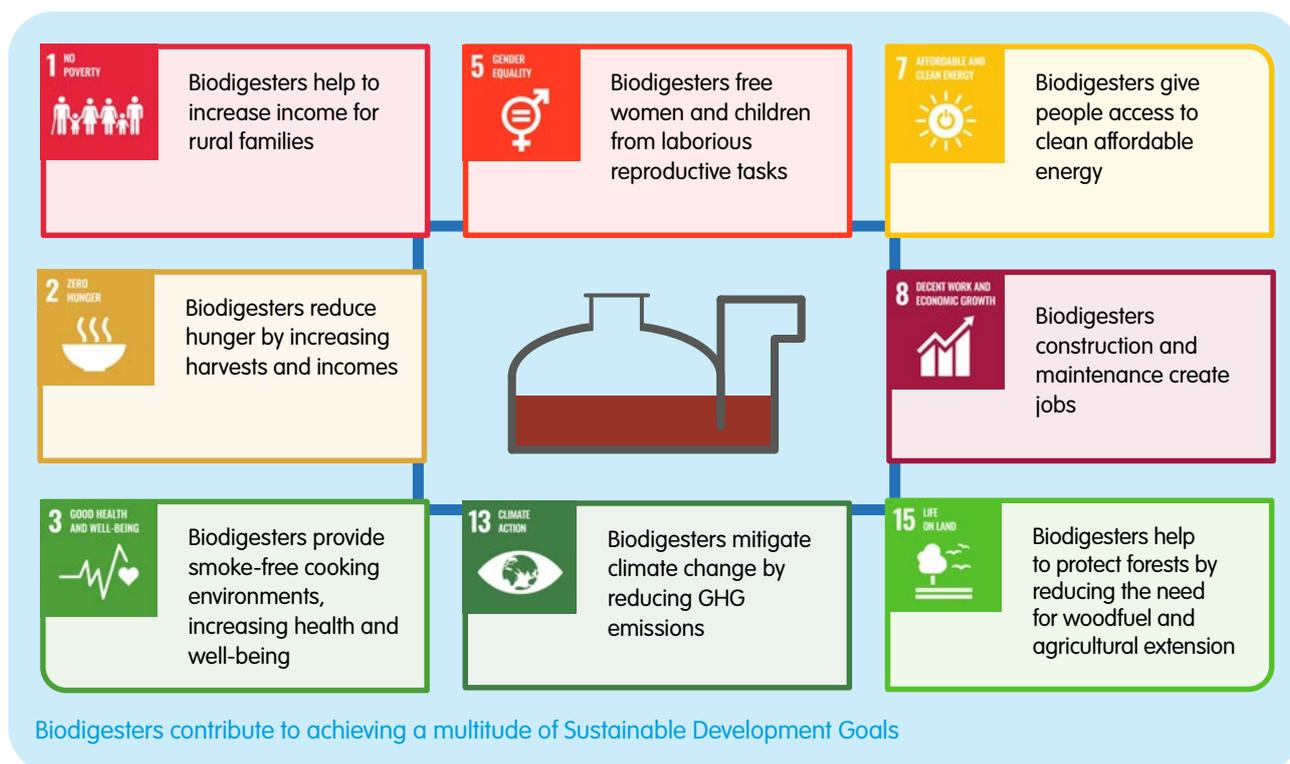
While biodigesters provide multiple benefits to households and society at large, there are ample barriers that need to be addressed to develop vital and sustainable markets. On the demand side, there is often a lack of awareness about the benefits and costs of the technology. The required upfront investment ranges from USD 500 to 800, depending on size and location. Even if this investment can be earned back within 2-3 years, most smallholders lack the money for upfront payments due to low income and competing priorities. When financial institutions offer credit, the households are often faced with high-interest rates and short repayment periods. On the supply side, biodigester companies may lack the capacity to operate their

business professionally, in particular on after-sales services. Often, their business cases are marginal. Access to finance (debt and equity) is limited, especially for local companies offering brick-dome digesters. In many countries, a favourable enabling environment is yet to be developed. Regulation including quality standards for biodigesters is lacking, while governments do not provide technical or financial support to the development of the sector. Also sector coordination is often lacking.

Highlights



- The technical market potential for household biodigesters worldwide is estimated to be 150 million systems. In Africa alone, this potential amounts to 33 million units.
- By the end of 2020, SNV has supported the installation of more than 900,000 household digesters in 24 countries in Asia, Africa, and Latin America.
- In Vietnam, a Gold Standard project was registered in 2012. By 2020, this project has reduced about 3 million tonnes of CO₂-eq and generated about US\$8 million in revenues.



Our approach

In terms of the biodigester market development, SNV applies a two fold approach:

- To create direct impact by providing access to biodigesters for households. Women express great satisfaction about the use of biogas for cooking. Not only are time and labour for the collection of traditional cooking fuels and cleaning of cooking pots greatly reduced, biogas is also much cleaner, quicker and more convenient. Bioslurry reduces the use of chemical fertiliser and/or enhance agricultural productivity. Better hygienic conditions are also achieved through improved manure management at the farm and sanitation if toilets are attached to the digesters.
- To develop the capacity of all relevant actors in the countries including (local) businesses, associations, (financial) institutions and governments. We pursue systems change by kick-starting markets, leveraging finance, convincing the government and others to adopt market-based approaches, and making biodigesters the norm.

Biodigesters and climate change

Household biodigesters mitigate climate change by reducing GHG emissions with 3 to 6 tonnes of CO₂-eq per unit each year. The benefits of the technology also allows households to adapt to the effects of climate change, imparting resilience and improving livelihoods, in particular on clean cooking and sustainable agricultural production. Larger programmes can generate carbon revenues as a sustainable source of finance.

Emerging niche markets for medium-scale digesters

In several countries, niche markets for medium-scale biodigesters are emerging. These digesters installed by businesses, institutions, communities and large farmers, process larger quantities of organic matter including agricultural process residues, animal manure, human excreta, slaughter waste, sewage and garbage. SNV has been engaged in piloting of medium-scale digesters in over 15 countries including Vietnam, Nepal, Indonesia, Ethiopia, Kenya, Nicaragua, and Honduras.



Productive use of biogas from a medium-scale biodigester for sprinkler irrigation in Nicaragua.

Profound, participatory, and context-specific preparation is key for each intervention. The sector provides great opportunities for women, children, disadvantaged groups, and youth. Once the household has installed a digester, women and children reap the benefits on the demand side. The supply-side provides opportunities for (rural) employment and income generation for women, disadvantaged groups, and youth along the value chain. As markets, by themselves, do not ensure inclusion, SNV has developed approaches to promote equity in all its interventions.

Stimulating demand

- Promotional activities to make potential biodigester households and other stakeholders aware of the benefits and costs of the technology, either constructed in-situ using traditional building materials or prefabricated.
- Improvement of the business case for biodigesters through the valorisation of biogas and bioslurry, considering both domestic and productive use.
- Facilitation of access to finance for households to cope with the high up-front investment of quality digesters.

Facilitating supply

- Assessment of market entry barriers and opportunities for both local and international manufacturers, suppliers, and retailers.
- Provision of business development services including training, coaching, mentoring and advice, based on needs assessments.
- Design and implementation of Results Based Finance (RBF), carbon projects and matchmaking with other providers of private and public finance to businesses (debt, equity).

Improving the enabling environment

- Support to governments using evidence-based advocacy to develop conducive frameworks including policies, targets, regulations, and support programmes.
- Engaging with government institutes and business associations on certification, quality standards and testing.
- Structured interaction and knowledge exchange between relevant stakeholders in the sector.

Selection of our experience

The Biogas Dissemination Scale-Up Programme (NBPE+) in Ethiopia | 2017-2022 | €22.85 million | European Union and the Government of Ethiopia

NBPE+ is a public-private partnership hosted by the Ministry of Water, Irrigation & Energy (MoWIE). SNV is the overall programme manager, also providing technical assistance. The objective of the project is to improve the living standards of smallholder farmers in nine regions in Ethiopia through the sustainable development of a biodigester sector, reducing over-exploitation of biomass cover and GHG emissions. By the end of 2020, a total of 10,807 household - and seven medium-scale digesters have been installed.



Towards a Market-Driven Biogas Sector in Vietnam | 2013-2020 | €7.5 million | EnDev and the Government of Vietnam

Following earlier work on biodigester sector development in Vietnam, SNV has supported the Ministry of Agriculture and Rural Development to implement an innovative results-based financing (RBF) facility to further commercialise the sector. The receiving companies refined their market approaches and increased their sales. By the end of the project, over 55,000 digesters were installed under this facility. Companies offering pre-manufactured, composite systems benefitted most, taking over 80% market share in the two last years.



Africa Biogas Partnership Programme in Burkina Faso, Ethiopia, Kenya, Tanzania and Uganda | 2009-2020 | €45 million | DGIS, EnDev and the Governments of Burkina Faso and Ethiopia

The Africa Biogas Partnership Programme (ABPP) was designed as a Public-Private Partnership, funded by DGIS, managed by Hivos and advised by SNV. Covering five countries and implemented in two phases, the Programme aimed to lay the foundations for the emergence and development of market-oriented biodigester sectors. By the end of 2019, a total of 72,823 household units were installed. Awareness about the technology among potential customers increased, while emerging companies were capacitated and facilitated.



Energy for Agriculture in Zambia | 2015-2019 | €6.5 million | Sida

The Energy for Agriculture (E4A) project took off in a country basically without any biodigester development. Step by step, essential building blocks were put in place including the development of suitable digester designs and standards, training of individual masons, support to the formation of companies and brokering partnerships between local actors. By the end of the project, a total of 4,877 digesters were installed by about 45 companies in cooperation with more than 70 farmer cooperatives.



Selection of our experience

Biogas Market Development Programme in Nicaragua | 2012-2018 |
€6.2 million | IADB, NDF, Hivos and SNV

This program in Nicaragua aimed to kick-start a market-based biodigester market utilising manure produced by cattle mainly kept in extensive husbandry systems. In addition to small-scale units, the project also piloted numerous larger-scale digesters, both made of bricks and prefabs. The gas from the larger units was also used to power different appliances like water heaters, milking systems, milk chillers and water pumps. The project supported the installation of over 1,400 digesters.



"Nowadays I can cook in the main house on the gas stove and I don't have to inhale the thick, damaging smoke as often. Also, I can cook breakfast quickly for my school-going child, saving time in the morning." Aman family, beneficiary of the National Biogas Programme of Ethiopia

SNV is a not-for-profit international development organisation that makes a lasting difference in the lives of people living in poverty by helping them raise incomes and access basic services. We focus on three sectors - energy, agriculture and WASH - and have a long-term, local presence in over 25 countries in Asia, Africa and Latin America. Our team of more than 1,300 staff is the backbone of SNV.

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