



## Household biodigesters installed in Asia, Africa and Latin America in 2018



This brief provides data and information on the status of household biodigesters in Asia, Africa and Latin America for countries in which SNV Netherlands Development Organisation ever provided implementation support. In many of these countries, support by SNV has been terminated while partners (private sector, government, donors) have continued the development of the sector. In this respect, the data presented below combine digesters installed with direct SNV support as well as with support of related follow-on projects. Due to absence of reliable data, most biodigesters being sold in the free market or by NGOs or local governments through small projects could not be included. SNV likes to express its gratitude to all partners having provided data and information to this brief.



### Installation rate in 2018:

In 2018, over 38,000 household biodigesters have been installed in 17 countries in Asia, Africa and Latin America, see Table 1. Almost all these digesters are fed by animal manure and provide two precious outputs: biogas, mainly used for clean cooking, and bio-slurry, a potent organic fertiliser to enhance agricultural production. Asia delivered most digesters (over 27,000 units), in particular in Nepal, Vietnam, Bangladesh and Indonesia. Africa surpassed 10,000 digesters, with most of the units installed in Ethiopia, Kenya, Zambia and Burkina Faso. Numbers in Latin America are low. Up to 2018, over 868,000 households in 24 countries have invested in a biodigester since the start of SNV's interventions in Nepal in the early nineties. Out of this number, about 315,000 units (36%) have been established without SNV support, most of them in Nepal (over 154,000 units) and Vietnam (over 107,000 units).

**Table 1: Number of household biodigesters installed in 2018 and cumulatively by the end of 2018 in countries in Africa, Asia and Latin America where SNV ever provided support**

Asia:			Africa:			Latin America:		
Country	2018	Up to 2018	Country	2018	Up to 2018	Country	2018	Up to 2018
Bangladesh	2.105	50.374	Benin	25	132	Bolivia	-	50
Bhutan	240	5.239	Burkina Faso	1.699	11.986	Honduras	36	40
Cambodia	903	27.757	Cameroon	-	355	Nicaragua	317	1.466
Indonesia	1.370	23.817	Ethiopia	4.148	22.574	Peru	-	26
Lao PDR	-	2.888	Ghana	13	17	<b>Total</b>	<b>353</b>	<b>1.582</b>
Nepal	9.574	385.490	Kenya	2.139	20.699			
Pakistan	45	6.121	Rwanda	?	10.009			
Vietnam	13.354	279.049	Senegal	-	2.287			
<b>Total</b>	<b>27.591</b>	<b>780.735</b>	Tanzania	28	6.570			
			Uganda	663	8.235			
			Zambia	1.738	3.394			
			Zimbabwe	-	97			
			<b>Total</b>	<b>10.453</b>	<b>86.355</b>			

All regions:		
	2018	Up to 2018
<b>Total</b>	<b>38.397</b>	<b>868.672</b>

## Investment costs

Among others, the investment costs of biodigesters depend on the size of the unit which in turn is determined by a number of factors including the amount of animal manure which will be available for feeding. Table 2 provides an overview of the most popular size of digesters in 14 countries, the investment cost of the most popular size (in local currency and USD) and the investment subsidy provided by the government and/or programme, if any. The most popular size in almost all countries is 4 or 6 m<sup>3</sup>, being the total volume of the digester and gas storage.

Pakistan is an exception with 15 m<sup>3</sup> as the most popular size, as farmers keep larger number of cattle and buffalos. Niche markets for medium (up to 100 m<sup>3</sup>) and large size digesters (mostly up to 1,000 m<sup>3</sup>) are emerging in a number of countries like Ethiopia, Rwanda, Bangladesh, Nepal and Vietnam, though numbers are still quite low. Most of the digesters are still constructed in-situ, using traditional construction materials like sand, gravel and cement. Increasingly, companies bring pre-manufactured digesters to the market, e.g. in Kenya, Vietnam and Nicaragua.

**Table 2: Investments costs in 2018 for the most popular size of household digesters in countries in Africa, Asia and Latin America**

					Costs		
Region/country	Digesters installed (number)	Most popular size (m3)	Specification	Local currency (LCU)	Average investment cost for most popular size (LCU)	Exchange rate (LCU:USD)	Average investment cost (USD)
Africa:							
- Benin	25	4	in-situ	CFA	305.700	553,09	553
- Burkina Faso	1.699	4	in-situ	CFA	310.000	553,09	560
- Ethiopia	4.148	6	in-situ	ETB	15.661	27,43	571
- Kenya	2.139	6	pre-manufactured	KES	67.073	101,28	662
- Uganda	663	6	in-situ	UGX	1.876.040	3.744,01	501
- Zambia	1.738	6	in-situ	ZMW	9.000	11,16	806
Asia:							
- Bangladesh	2.105	6	in-situ	BDT	49.500	83,57	592
- Bhutan	240	6	in-situ	BTN	52.000	67,15	774
- Cambodia	903	4	in-situ	USD	550	1,00	550
- Indonesia	1.370	4	in-situ	IDR	10.749.000	14.500,35	741
- Nepal	9.574	6	in-situ	NPR	109.000	104,37	1.044
- Pakistan	45	15	in-situ	PKR	160.000	110,04	1.454
- Vietnam	13.354	6,5	pre-manufactured	VND	14.000.000	22.942,02	610
Latin America:							
- Nicaragua	317	6	pre-manufactured	NIO	37.646	31,55	1.193

Notes:

1) Exchange rates 2018 by IMF

2) Digester sizing in Bangladesh is based on gas production (2,4 m<sup>3</sup>/day)



Investment costs of the most popular sized biogas digester in Asia and Africa range from USD 500 to 800. Exceptions are Nepal, Pakistan and Nicaragua. In Pakistan, the higher investment cost is caused by the higher size. The higher cost of the (pre-manufactured) most popular digester in Nicaragua may be caused by the small market (low economies of scale). Table 3 compares the investment

costs of household digesters in 2010 and 2018 for 11 countries in Africa and Asia. It appears that companies in Nepal have increased margins to make their operations sustainable. This may be true to a lesser extent for other countries in Asia as well. In contrast, the average investment of household digesters in Africa was reduced by about 35%.

**Table 3: Investments costs in 2010 and 2018 for the most popular size of household digesters in countries in Africa, Asia and Latin America**

Region/ country	2010			2018			2018 versus 2010		
	Most popular size (m3)	Specification	Average investment cost (USD)	Most popular size (m3)	Specification	Average investment cost (USD)	Cost difference (USD)	(%)	Remarks
Africa:									
- Benin	6	in-situ	1211	4	in-situ	553	-658	-54%	size reduction
- Burkina Faso	6	in-situ	808	4	in-situ	560	-248	-31%	size reduction
- Ethiopia	6	in-situ	800	6	in-situ	571	-229	-29%	same size
- Kenya	6	in-situ	947	6	pre-manufactured	662	-285	-30%	pre-manufactured
- Uganda	6	in-situ	741	6	in-situ	501	-240	-32%	same size
Asia:									
- Bangladesh	5	in-situ	488	6	in-situ	592	104	21%	size increase
- Cambodia	4	in-situ	430	4	in-situ	550	120	28%	same size
- Indonesia	6	in-situ	660	4	in-situ	741	81	12%	size reduction
- Nepal	6	in-situ	663	6	in-situ	1044	381	58%	same size
- Pakistan	10	in-situ	505	15	in-situ	1454	949	188%	size increase
- Vietnam	12	in-situ	621	6,5	pre-manufactured	610	-11	-2%	size reduction and pre-manufactured

Note:

1) Digester sizing in Bangladesh is based on gas production (2,0 m3/day in 2010 and 2,4 m3/day in 2018)

## Financing

An investment of USD 500 to 800 for a rural household is a major barrier, even if the technical lifetime of the digester surpasses 20 years. Part of it may be covered by the household through collection of traditional construction materials like sand and gravel and/or through the provision of unskilled labour. Some governments and/or programmes like in Burkina Faso, Ethiopia, Nepal and Indonesia provide investment subsidies, lowering the net investment for the farmers, see Table 4 for data on the most popular size.

In addition to these subsidies, facilities for customer finance are key to market development. Credit facilities have made progress in few countries like Ethiopia, Bangladesh and Bhutan, but not in other countries, often despite considerable efforts. In these countries, households are obliged to finance the (net) investment in some way or another through cash and informal loans. A new arrangement has been recently pushed by a limited number of companies in Kenya, being 'Lease-to-Own' (LtO). Not less than 45% of the 2,139 households in Kenya having installed a digester in 2018 financed their unit through such an LtO arrangement. In Indonesia, 46% of the

biogas digester households in 2018 received full subsidy from central or local government to provide better access to energy; this, however, may jeopardise the ownership and functionality of the digester.



Table 4: Financing of household digesters in 2018 for the most popular size of household digesters in countries in Africa, Asia and Latin America

Region/ country	Most popular size (m3)	Specification	Local currency (LCU)	Exchange rate (LCU:USD)	Costs		Financing				
					Average investment cost for most popular size		Subsidy amount		Net investment by household (USD)	Share of households financing	
					(LCU)	(USD)	(LCU)	(USD)		in cash (%)	through loan (%)
Africa:											
- Benin	4	in-situ	CFA	553,09	305.700	553	257.700	466	87	100%	0%
- Burkina Faso	4	in-situ	CFA	553,09	310.000	560	160.000	289	271	98%	2%
- Ethiopia	6	in-situ	ETB	27,43	15.661	571	7.000	255	316	79%	21%
- Kenya	6	pre-manufactured	KES	101,28	67.073	662	0	0	662	54%	1%
- Uganda	6	in-situ	UGX	3.744,01	1.876.040	501	0	0	501	86%	14%
- Zambia	6	in-situ	ZMW	11,16	9.000	806	1.500	134	672	99%	1%
Asia:											
- Bangladesh	6	in-situ	BDT	83,57	49.500	592	13.500	162	431	62%	38%
- Bhutan	6	in-situ	BTN	67,15	52.000	774	11.700	174	600	59%	41%
- Cambodia	4	in-situ	USD	1,00	550	550	150	150	400	93%	7%
- Indonesia	4	in-situ	IDR	14.500,35	10.749.000	741	9.229.000	636	105	43%	11%
- Nepal	6	in-situ	NPR	104,37	109.000	1.044	24.400	234	811	90%	10%
- Pakistan	15	in-situ	PKR	110,04	160.000	1.454	0	0	1.454	100%	0%
- Vietnam	6,5	pre-manufactured	VND	22.942,02	14.000.000	610	0	0	610	100%	0%
Latin America:											
Nicaragua	6	pre-manufactured	NIO	31,55	37.646	1.193	15.788	500	693	98%	2%

Notes:

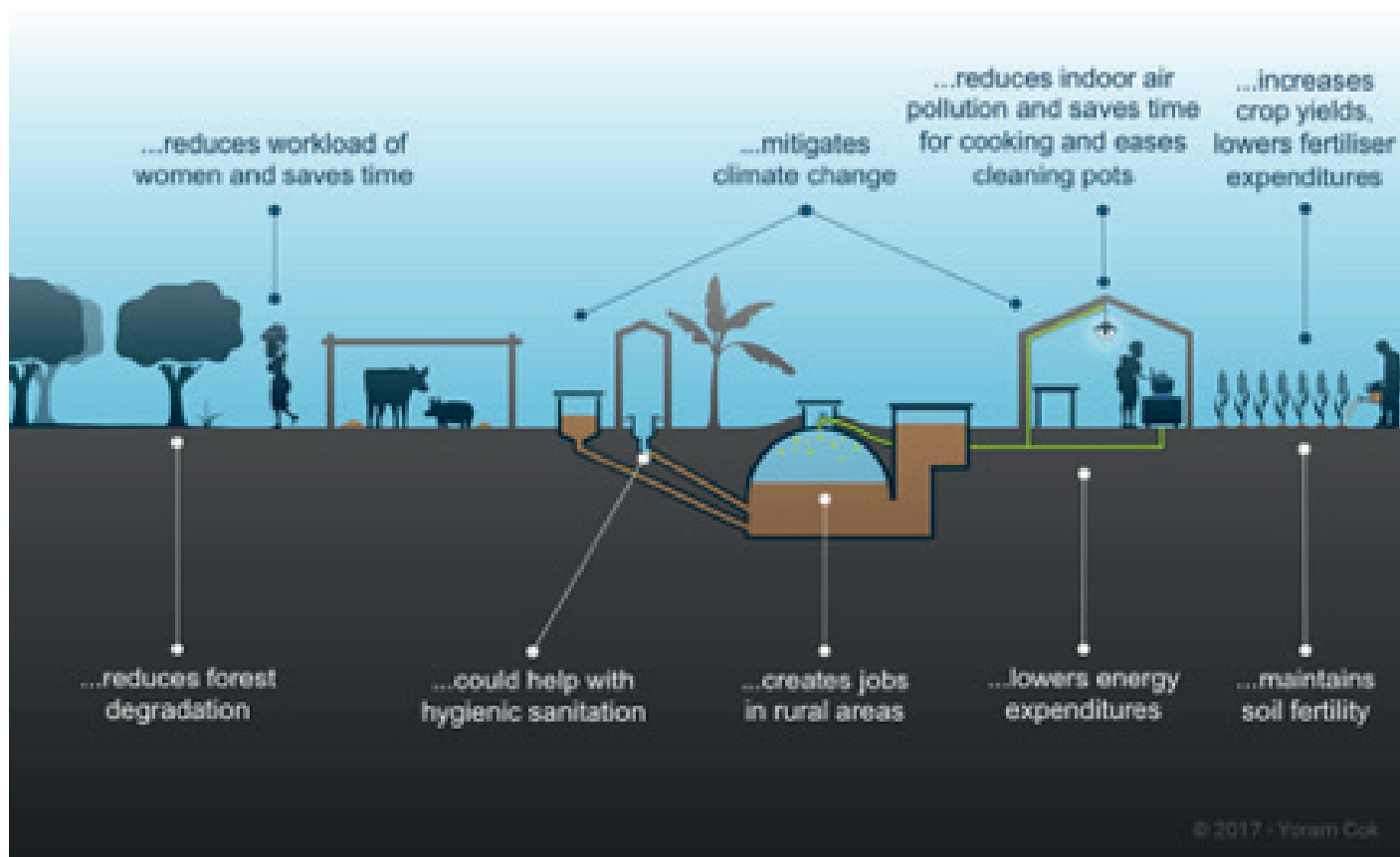
1) Exchange rates 2018 by IMF

2) Digester sizing in Bangladesh is based on gas production (2,4 m<sup>3</sup>/day)

## Multiple benefits

Biodigesters in operation provide multiple benefits, as shown in Figure 1, by creating more income, increased well-being, reduced vulnerability, improved food security, and more sustainable use of the natural resource base for smallholder farmers. They potentially contribute to nine of the seventeen Sustainable Development Goals (SDGs). Based on current UNFCCC methodologies, household digesters reduce GHGs by 3 to 4 tonnes of CO<sub>2</sub>-eq each year.

**Figure 1: Multiple benefits of household biodigesters, contributing to multiple SDGs**



## Final remark:

Countries are hugely different, and even within countries there are also high variations, in all aspects, which makes it hard to compare data and information on household digesters. However, further analysis and sharing of results, challenges and opportunities is definitely contributing to useful learning at global level, and is therefore strongly recommended.

## For more information

Please contact SNV Netherlands Development Organisation at [wvannes@snv.org](mailto:wvannes@snv.org) for any question and/or comment.



## SNV

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 aim for premium quality and focus on only three sectors: agriculture, energy and water, sanitation and hygiene (WASH). With a long-term, local presence in over 25 countries in Asia, Africa and Latin America, we know how governments work and how relationships are built. Implementing our mission exclusively through project financing requires us to work efficiently and invest in operational excellence every day. Our team of more than 1,300 staff is the backbone of SNV.

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## FOR MORE INFORMATION

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