Welcome to the biggest farmer **biogas** network!

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Get the most out of your **biodigester!**

USER MANUAL

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Understanding your biodigester

Energy = Biogas



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Note for technicians and trainers:

• On the day of installation, train the user on the contents from pages 3 to 13.

• On the day of commissioning, train the user on the entire manual.



Know the **elements** of your installation

- 1. Feeding tank
- 2. Inlet and outlet reactor piping
- 3. Reactor
- 4. Biofertilizer tank

- 5. Biogas outlet
- 6. Pressure relief valve
- 7. Isolation valve
- 8. Biogas filter

9. Water trap
 10. BioStove
 11. Counterweight

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Note: Components might differ depending on the region and the local context of the project.











Isolation valve: It allows you to close and stop the biogas flow.





8 **Biogas filter:** Reduces the smell and the sulfur content of the biogas. It increases the lifespan of all metallic biogas appliances.



NOTE: All these components require regular operation and maintenance actions as explained later in the manual!

8

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Components might differ depending on the region and the local context of the project.

9

9

Water trap: When the temperature drops, the water in the biogas condensates and is collected by the water traps.



BioStove: Appliance included in the standard kit.



*When applicable, push and turn ON/OFF



Biodigester













DO NOT change the position of the biogas components.









- STOP applying biofertilizer
 Weeks before harvesting.
- 2. **WASH** fruits and vegetables before eating.































NOTE: End of the user training for installation day.

How to use your system



Maintain your digester

FEEDING. Feed your digester EVERY DAY with 1 volume of cow dung and 2 volumes of water.















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1. Deflate the digester by using counterweights. Then, use all the burners of the BioStove to burn the remaining biogas.

3

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- 2. Agitate the digester vigorously.
- **3. Drain** the digester with a 3" slurry pump down to half the height of the trench.
- 4. Agitate vigorously.



- 6. Agitate vigorously.
- **7. Drain** the digester down to half the height of the trench.
- 8. Refill with water.
- 9. Proceed to first feeding!



5





	Digester size	SIS 6	SIS 8	SIS 12	SIS 16	SIS 20	SIS 30	SIS 40
	Daily feeding: cow manure	45 L or Kg/day	65 L or Kg/day	90 L or Kg/day	130 L or Kg/day	180 L or Kg/day	260 L or Kg/day	350 L or Kg/day
-ò.	Daily biogas production	2 m3/day	2.4 m3/day	3.3 m3/day	4.8 m3/day	6.7 m3/day	9.6 m3/day	12.9 m3/day
Warm Climate > 23 °C	Daily cooking time on 1 burner	3.4 Hr/day	4.8 Hr/day	6.6 Hr/day	9.6 Hr/day	13.4 Hr/day	19.2 Hr/day	25.8 Hr/day
	Weekly biofertilizer production	0.9 m3/week	1.4 m3/week	1.9 m3/week	2.7 m3/week	3.8 m3/week	5.5 m3/week	7.4 m3/week
	Daily feeding: cow manure	35 L or Kg/day	50 L or Kg/day	65 L or Kg/day	100 L or Kg/day	135 L or Kg/day	200 L or Kg/day	265 L or Kg/day
	Daily biogas production	1.3 m3/day	1.8 m3/day	2.3 m3/day	3.6 m3/day	4.9 m3/day	7.2 m3/day	9.6 m3/day
Temperate Climate 15 - 23 °C	Daily cooking time on 1 burner	2.6 Hr/day	3.6 Hr/day	4.6 Hr/day	7.2 Hr/day	9.8 Hr/day	14.4 Hr/day	19.2 Hr/day
	Weekly biofertilizer production	0.7 m3/week	1.1 m3/week	1.4 m3/week	2.1 m3/week	2.8 m3/week	4.2 m3/week	5.6 m3/week
	Daily feeding: cow manure	25 L or Kg/day	35 L or Kg/day	45 L or Kg/day	65 L or Kg/day	90 L or Kg/day	135 L or Kg/day	180 L or Kg/day
Cold Climate 12 - 15 °C	Daily biogas production	0.8 m3/day	1.2 m3/day	1.5 m3/day	2.2 m3/day	3 m3/day	4.5 m3/day	6 m3/day
	Daily cooking time on 1 burner	1.6 Hr/day	2.4 Hr/day	3 Hr/day	4.4 Hr/day	6 Hr/day	9 Hr/day	12 Hr/day
	Weekly biofertilizer production	0.5 m3/week	0.7 m3/week	0.9 m3/week	1.4 m3/week	1.9 m3/week	2.8 m3/week	3.8 m3/week

























Maximize the biodigester's benefits





1. ONE day before feeding: moisten 1 volume of dry dung in a bucket, then top up with water to create the consistency of wet cow dung.

2. During feeding,
do normal water dilution
(1 volume of cow dung with 1 volume of water).















IRON WOOL replacement: every 2 weeks to once a month approx. To be purchased locally.	
TRANSPARENT FLEXIBLE PIPE replacement: every 2 to 3 years approx. Contact Sistema.bio if you need replacement.	
BUTYL TAPE for temporary membrane repair when external damage happens.	

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Biodigester specifications



COMPONENT	MATERIAL	SPECIFICATIONS		
Feeding tank	HDPE	Refer to corresponding digester model		
Reactor	LLDPE	Refer to corresponding digester model		
Biofertilizer tank	HDPE	Refer to corresponding digester model		
Pressure relief valve	HDPE and UPVC	6" diameter, 20 mbar back pressure		
Isolation ball valve	UPVC	1" diameter		
Biogas filter	PVC	2" diameter		
Transparent / flexible gas line	UPVC	1" diameter		
Gas line	HDPE	1" diameter		
Water trap	ABS and UPVC	1" diameter		
Single burner (when applicable)	Cast aluminum	7 x 45 x 10 cm (h x l x w)		
BioStove	Structure: stainless steel or coated mild steel Burner: Cast aluminum	Cookstove: 12 x 68.5 x 38 cm (h x l x w) BioStove 2: 19 x 58 x 36 cm (h x l x w)		

Digester size	Approximate total kit weight	Feeding tank volume	Slurry volume in the digester	Gas storage in the digester	Biofertilizer tank volume	Area requirement lenght * width (excluding biofertilizer tank)
	kg	Liters	m3	m3	m3	m * m
Sistema 6	67	110 L	4	2	1	5 * 3.6
Sistema 8	93	110 L	5.5	3	2	6 * 3.6
Sistema 12	109	160 L	8	4	2	7 * 3.6
Sistema 16	137	160 L	11	6	4	9 * 3.6
Sistema 20	163	160 L	15	8	4	11 * 3.6
Sistema 30	219	160 L	22.5	12	8	15 * 3.6
Sistema 40	257	160 L	30	15	8	19 * 3.6





- I do not have sufficient biogas to cook
- I do not have biogas in my BioStove, and my digester is flat!





- Is there enough water in the inlet and outlet pipes? Make sure they are filled so that biogas cannot escape. Refer to section "Biodigester startup" "Fill the reactor with water until water reaches the inlet and outlet elbows." on page 10. Videos: I3, I5.
- Have you completed your first feeding? Refer to section **"Biodigester startup"**, "First feeding" on page 11. Video: OM7.
- Has enough time passed since the first feeding? Refer to section "Biodigester startup", "WAIT FOR THE REACTOR TO INFLATE" on page 13.
- Are you following the feeding instructions? Refer to section "How to use your system", "Maintain your digester" on page 14 and "Maximize the biodigester's benefits", "FEEDING REGULARITY" on page 22. Videos: OM7, OM8.
- Is your pressure relief valve filled with water? Refer to section "How to use your system", "PRESSURE RELIEF VALVE" on page 19. Videos: OM2, O&M1.

- Were the BioStove valves, the water trap or the biogas filter left open? Close them! Refer to section "How to use your system", "FIRST BIOGAS FLAME" on page 18, "WATER TRAP CHECK" on page 19 and "FILTER REPLACEMENT" on page 20. Videos: OM6, TS12, OM5.
- Is there a leak? Refer to section "How to use your system", "GAS LINE LEAK INSPECTION" on page 20.
- Cold weather, rainy season? You can recirculate your biofertilizer to improve biodigester productivity during cold seasons. Refer to section "Maximize the biodigester's benefits", "TEMPERATURE & BIODIGESTER PRODUCTIVITY" on page 23.
- Are the burner and the BioStove installed in different rooms? Check if somebody else is using the biogas!

If your biogas production is still low: CONTACT YOUR TECHNICIAN!





• I do not have biogas in my BioStove or it does not light, and my digester is inflated!





- Have you placed a counterweight on your digester? Refer to section "How to use your system", "IMPROVE YOUR FLAME USING COUNTERWEIGHTS" on page 18. Video: TS5.
- Were the gas valves left closed? Open them! Refer to section "How to use your system" "Use the energy you produce and maintain your biogas line!" on page 18. Videos: OM3, OM3bis, OM4.
- Are you regularly draining your water traps? Refer to section "How to use your system", "WATER TRAP CHECK" on page 19. Video: TS3.
- Is your biogas line sagging? In biogas line low points, water can accumulate and block the biogas from flowing! Elevate the gas line to direct the accumulated water towards the water trap or the PRV.
 Refer to section "How to use your system", "WATER ACCUMULATION IN THE GAS LINE" on page 19. Videos: TS1, TS6.
- Is the iron wool in the biogas filter blocking the biogas flow?

Open the filter and pull out the steel wool. Use a stick to make sure there is no old steel wool inside. Try to burn the gas on your BioStove! Refer to section **"How to use your system"**, "FILTER REPLACEMENT" on page 20. Video: OM5.

- Is the gas line folded at any point? Inspect your gas line and make sure there is no blocking point.
- If only 1 of the 2 BioStove burners does not have a flame, the burner valve might be blocked. Call your technician!
- Are you overfeeding your digester? Refer to section "Maximize the biodigester's benefits", "FEEDING REGULARITY" on page 22. Measure the pH of the biofertilizer from your outlet pipe using a calibrated pH meter (please follow pH meter calibration instructions). If the pH level of the biofertilizer is low and you continue to feed your digester, it could keep the bacteria from producing biogas: too much carbon dioxide and not enough methane.

If your biogas production is still low: CONTACT YOUR TECHNICIAN!





Slight acidification:
 pH 6 to 6.5





- Stop feeding the reactor & empty the digester of biogas through the pressure relief valve.
- **2. Agitate** the digester thoroughly. Video: OM13.
- 3. Let it rest for 3 days or until it inflates.
- 4. Try lighting the biogas stove.
- 5. If the gas does not burn, repeat from step 1.

If your biogas still does not light: CONTACT YOUR TECHNICIAN!



- **1. Stop feeding** the reactor & **drain** all the biogas.
- **2. Agitate** the digester thoroughly. Video: OM13.
- **3. Empty** at least half of the digester.
- 4. Refill the digester with:
 A) water mixed with as much biofertilizer from a working digester as possible
 B) water mixed with 5-10kg of limestone powder for a Sistema 6 (increasing proportionally to the digester size).

- **5. Let it rest** for 1-3 weeks or until it inflates.
- 6. Try lighting the BioStove.
- 7. If the gas does not burn, **empty the digester of biogas** through the pressure relief valve and let it rest for 1-3 weeks or until it inflates and produces a flammable gas.

If your biogas still does not burn: CONTACT YOUR TECHNICIAN!



• The flame in my BioStove is intermittent/dancing





There might be water accumulated somewhere in the gas line.

 Is your biogas line sagging? In biogas line low points, water can accumulate and block the biogas from flowing! Elevate the gas line to direct the accumulated water towards the water trap or to the PRV.

Refer to section "**How to use your system**", "WATER ACCUMULATION IN THE GAS LINE" on page 19. Videos: TS1, TS6. • Are you regularly draining your water traps?

Refer to section "**How to use your system**", "WATER TRAP CHECK" on page 19. Videos: TS3, OM6.

If your flame is still dancing: CONTACT YOUR TECHNICIAN!



- If your biofertilizer only comes out when the digester is inflated, there is no problem!
- Unclog your inlet or outlet pipes from dry or solid material that may be blocking the flow. Use a thin, flexible stick (like bamboo) to unblock the pipe through the Y fitting. Video: TS11.
- Is the the inlet pipe lower than the outlet pipe?

Elevate the feeding tank slightly by placing stones or soil under it.

If your slurry is still not flowing: CONTACT YOUR TECHNICIAN!





• My pressure relief valve bubbles too often!





- Are you filling your pressure relief valve valve regularly? Refer to section "How to use your system", "PRESSURE RELIEF VALVE" on page 19. Videos: OM2, O&M1.
- You might be producing too much biogas! Please burn your excess gas or use it to warm water in a pan! If it still bubbles regularly,

progressively reduce feeding. Refer to section "Maximize the biodigester's benefits", "DO NOT LET YOUR BIOGAS ESCAPE" on page 23. Video: TS10.

If your digester still produces too much biogas: CONTACT YOUR TECHNICIAN!



- Does it smell while you light your cookstove? Do not wait long before presenting the match to the burner to limit the release of unburned biogas. Refer to section "How to use your system", "IMPROVE YOUR FLAME USING COUNTERWEIGHTS" on page 18. Videos: OM11, OM12.
- Are you frequently changing the iron wool in your filter? Refer to section "How to use your system", "FILTER REPLACEMENT" on page 20. Video: OM5.
- Were the cookstove valves, water trap or biogas filter left open or not properly closed? Close them! Refer to section "How to use your system", "FIRST BIOGAS FLAME" on page 18, "WATER TRAP CHECK" on page 19 and "FILTER REPLACEMENT" on page 20. Videos: OM6, TS12, OM5.
- Is there a leak? Refer to sections "How to use your system", "GAS LINE LEAK INSPECTION" on page 20 and "Safety", "Biogas" on page 8.

If you still detect a biogas smell in your kitchen: CONTACT YOUR TECHNICIAN!





ISSUE: • There is a gas/rotten eggs smell near the digester





- Can you see water in the inlet and outlet pipes? Make sure they are filled so that biogas can't escape. Refer to section "Biodigester startup" "Fill the reactor with water until water reaches the inlet and outlet elbows." on page 10. Videos: I3, I5.
- Is your pressure relief valve filled with water? Refer to section "How to use your system", "PRESSURE RELIEF VALVE" on page 19. Videos: O&M1, OM2.
- Is there a leak? Refer to section "How to use your system", "GAS LINE LEAK INSPECTION" on page 20.
- Is your biogas filter properly tightened and with the filter gasket? Refer to section "How to use your system", "FILTER REPLACEMENT" on page 20. Video: OM5.
- Is the transparent pipe between the digester and the filter cracked? Call your technician!



• Are you overfeeding your digester? Refer to section "Maximize the biodigester's benefits", "FEEDING REGULARITY" on page 22. Measure the pH of the biofertilizer from your outlet pipe using a calibrated pH meter (please follow pH meter calibration instructions). If the pH level of the biofertilizer is low and you continue to feed your digester, it could keep the bacteria from producing biogas: too much carbon dioxide and not enough methane.

• Are you feeding your digester with organic waste other than animal dung? Some wastes are too rich to be properly digested and require specific control of the feeding quantities! Contact your technician.





- The packaging of your biodigester kit is recyclable. We recommend you to take it to the nearest recycling center or equivalent.
- Used iron wool can be disposed of in the bin or added to compost to enrich it with iron and sulphur -shred first!
- Once the **20 year lifetime** of your **digester is over** and it is no longer in use, **take its components** to a **local recycling center**.
- If you **need information on recycling centers**, feel free to call us.



Technician's name:

Installation date:

Type of waste:

Daily feeding volume:

Dilution:

Serial number:













CONTACT OF LOCAL SISTEMA.BIO CUSTOMER CARE:

Name:

Telephone:

Email adress:

https://sistema.bio/contact-us/

Date and client signature acknowledging they have **RECEIVED** THE TRAINING:

FOR MORE INFORMATION, VISIT: www.sistema.bio

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