We are Solar CITIES.

Bringing clean, free fuel and nutrient dense fertilizer to people around the world.

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Kathy Puffer

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Solar CITIES, Inc.

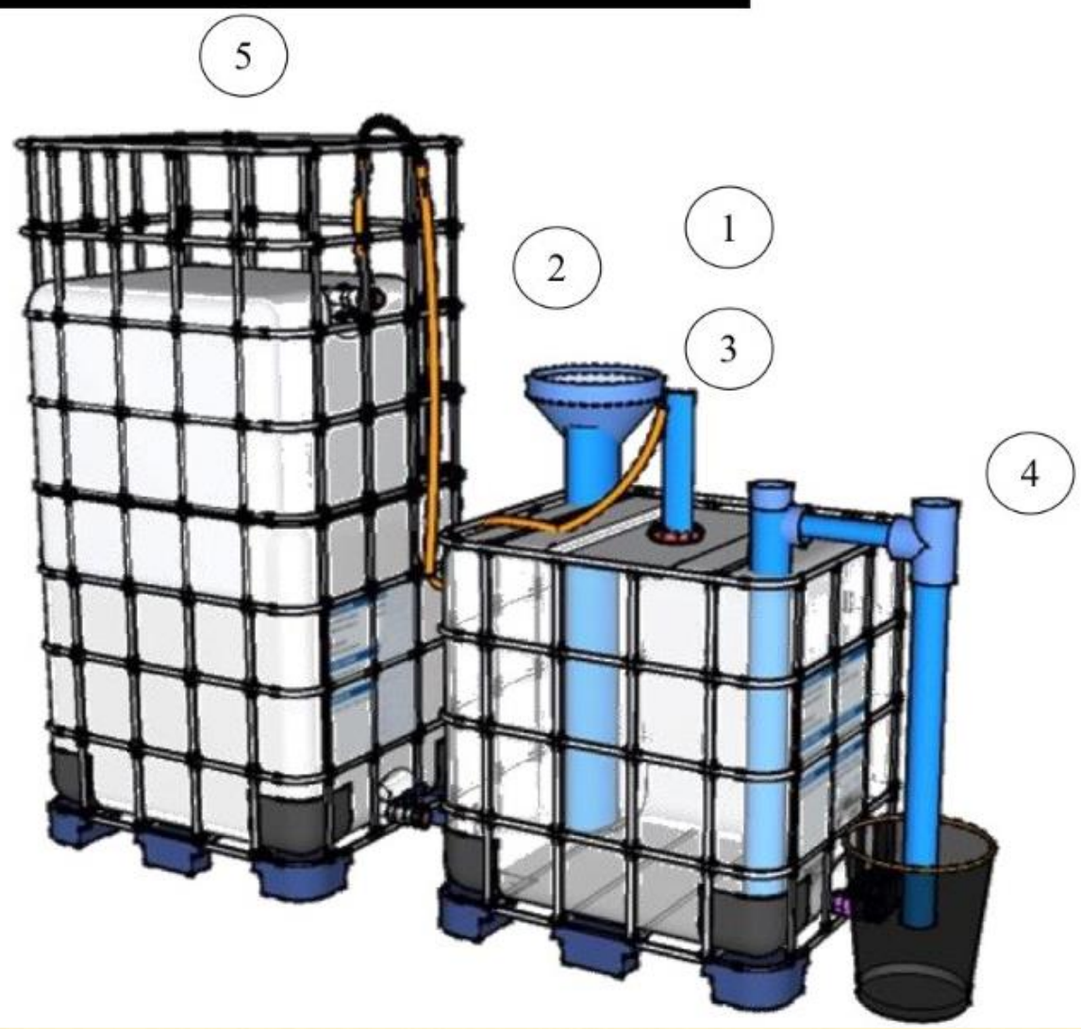
Global Biogas Education at the University of Notre Dame in Hinche, Haiti

MISSION

As a non profit, Solar CITIES works to share small scale biogas solutions where there is an existing interest. We coordinate with local partners in the US and around the world to empower people to build their own biodigester systems using our open-sourced design.

OPEN SOURCED DIGESTER & GAS STORAGE

Dimensioning of the Biodigester



Three 1 m³ IBC tanks are the base for the reliable and cost-effective Solar C³ITIES biodigester system. Both fermenter and gas storage are included and are dimensioned to cover the daily needs of gas for a small household.

One IBC tank functions as **fermenter (1)**. The ground up and liquefied biomass is inserted into the fermenter through the **feeding pipe (2)**. Inside the tank anaerobic digestion takes place in the absence of air and light. The arising biogas, mainly consisting of methane (~60%) and carbon dioxide (~40%), leaves the fermenter through a **gas outlet pipe (3)** and flows via a simple garden hose into the gas storage (5). Another pipe **(4)** serves as outlet for the **liquefied fertilizer** (fermented biomass) that is leaving the filled fermenter with every feeding event.

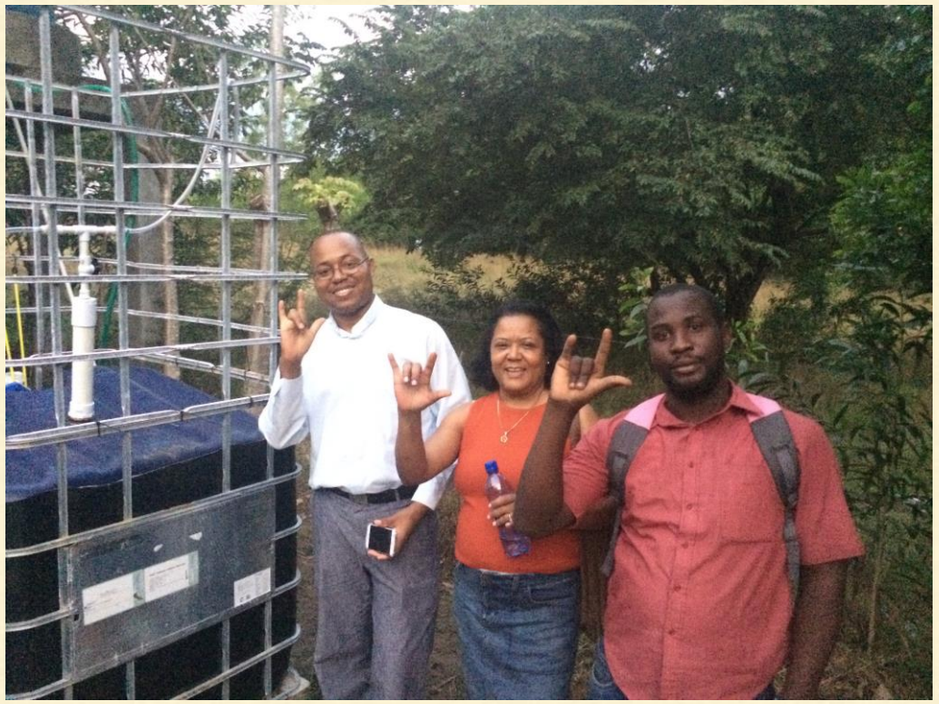
The **gas storage (5)** consists of two IBC tanks and works according the floating drum principle: The upper tank, rotated by 90°, is inserted into the lower tank whose lid has been cut off and which is filled with water. The inserted IBC tank has a hole on one of its side's sidewalls close to the bottom through which it is filled with water. The gas that flows via the hose in to the top of the tank through the rotated drain valve presses out the water and causes the rise of the floating tank. It generally pressurizes the gas sufficiently for cooking by gravity, but can be assisted by the placement of a pallete, a wooden board or bricks or sandbags.

BIOGAS TEACHER CLASS

- Caregivers as our teachers
- Hands-on learning
- Discovering our resources

  What have we tried, what worked, what didn’t
- Animal husbandry for comparison/contraction
- Self-care as starting point for understanding digester care
- Teacher and student assessment

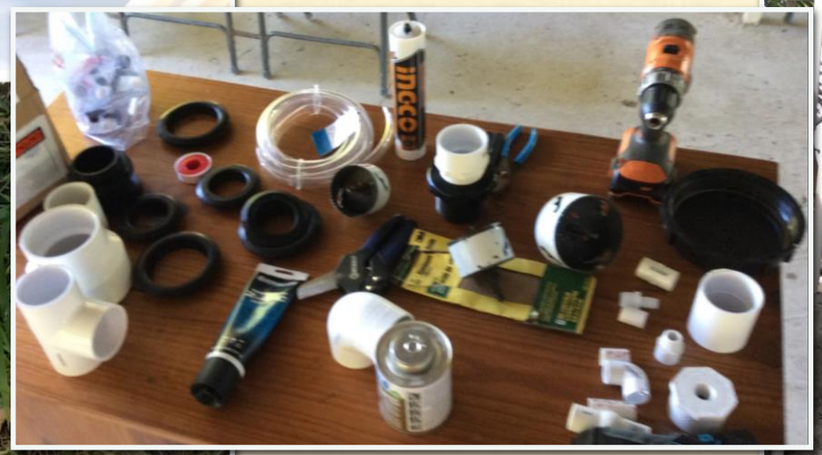
HANDS-ON LEARNING

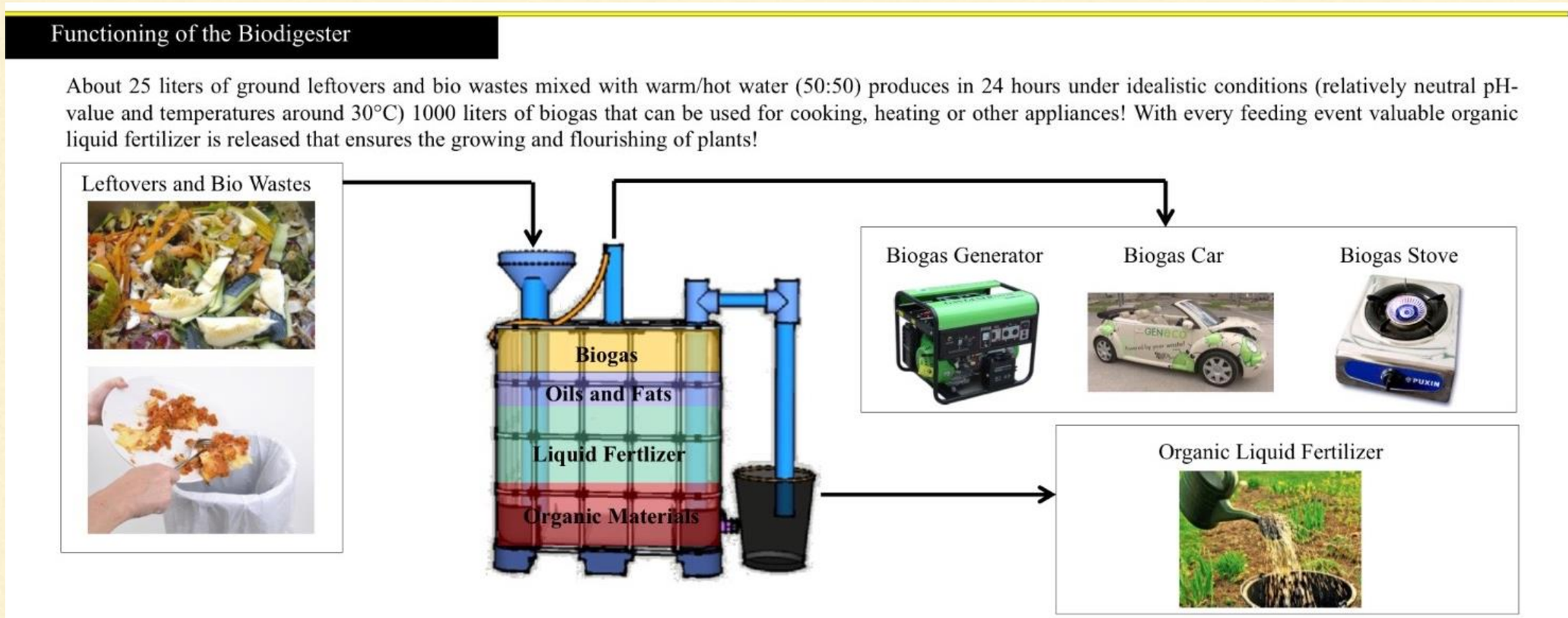


- Safety
- Space for women to learn new skills
- Written directions in native language
- Opportunities for each student to participate in the build
- Translation of verbal directions
- Close training of local experts
- Video tapping of step by step process in native language

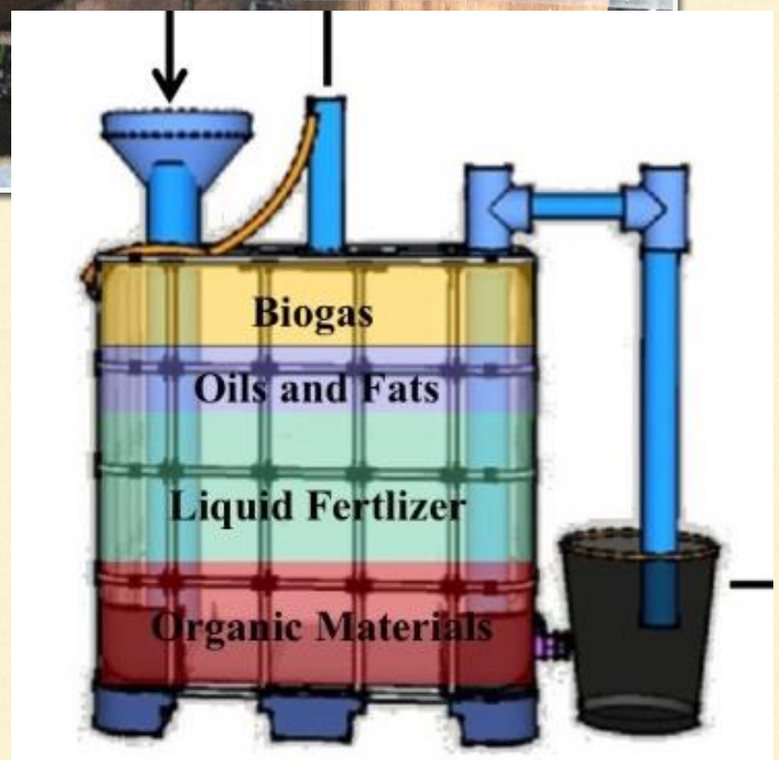
RESOURCES

- Water
- Feed stock
- Manure
- Tools
- Tanks
- Patterns of use
- People power





UNDERSTANDING BIODIGESTERS AS “BIO-PIGS”



- It’s alive and needs to be cared for.
- A new biodigester is like a baby pig, it needs special care.

  It doesn’t have teeth, we need to chop the food and mix it with water.
- It has similar bodily functions.
- We need to feed the mature digester the right food every day --
  - The right amount of food
  - Food scraps of a balanced variety

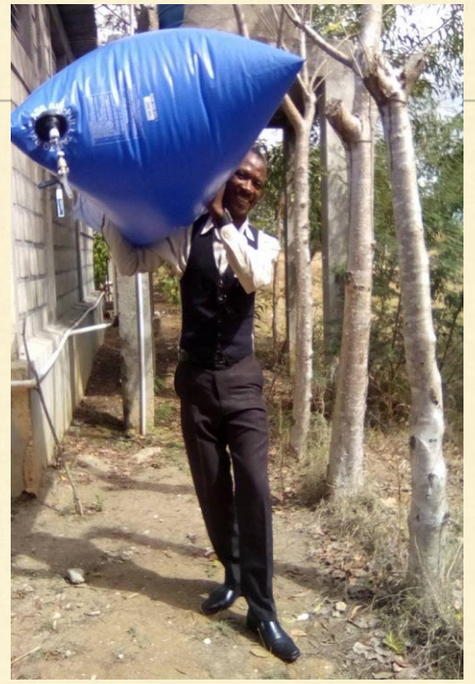
SELF CARE AS BIODIGESTER CARE

- Self-discovery process of what we do to help ourselves when we have a stomach bug --
  - Stop eating
  - Drink tea
  - Rest
  - If very sick, take a probiotic
  - When feeling better start eating a little bit at a time slowly.

RETROFITTING THE KITCHEN

- Converted Coleman stove into a biogas stove by removing propane valve
- Coffee can stove
- Garden hose functions as gas line to the kitchen
- Will convert commercial kitchen propane burner once they build more capacity

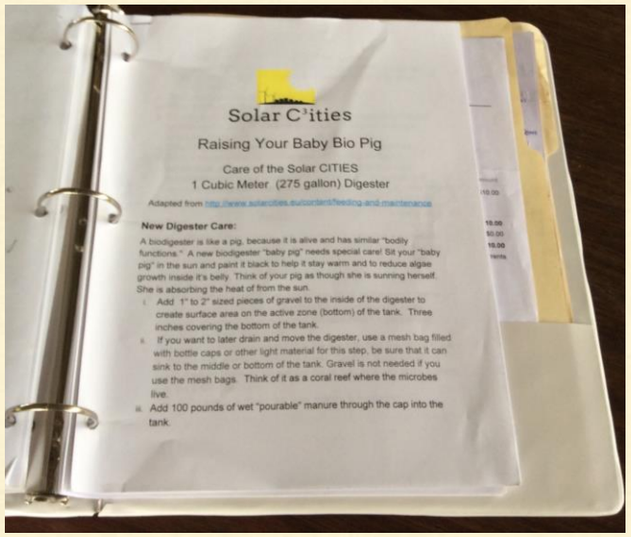
EFFICIENT GAS USE &STORAGE



- Floating gas storage system upcycled from two 275 gallon IBC totes
- Self-pressurized for a stove with weights
- Gas storage bag for portable use.
- Using a both and method for biogas and solar cooking to maximize gas.

ASSESSMENT & FEEDBACK

- Written test Practical test
- Teacher assessment
- What worked What didn't work
- What would make the course better



ON-GOING SUPPORT

- FaceBook and What’sApp groups
- YouTube step-by-step video in Haitian Creole- PPAF, HEART in Haiti, & Solar CITIES
- On-site training in the USA at our biogas training hub in Florida

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