



# **Small Size Household Biodigesters**

## **for organic and manure waste treatment**



# Mission of **CARDO Development Organization**

- CARDO is short for Cambodian Agriculture Research and Development Organization
- It is an NGO that promotes farming systems to increase yields and plants health with organic agricultural inputs such as:
  - Effective Micro-Organism (EMO's)
  - Bio-slurry from Biogesters



# Small Size Biogesters

- CARDO is testing several types of Biogesters
- Small size biogesters have the following advantages
  - Can be used with kitchen and organic waste
  - No need to have 10 pigs or 5 cows
  - Only limited amount of manure required.
  - More gas production per kg organic waste compared to animal manure
  - Compact and suitable for urban/peri urban and rural areas.

# Testing of Different Models



# We are now testing

- Ease of use
- Installation
- Gas production
- Pressure
- Gas Pumps
- Comparing cost



# Model 1: Plastic Bag Biogester



- Chongqing Wangliun Plastic Bag Digester
- Empty and Full

# Model 2: Concrete/Iron



- Concrete well ring
- Iron floating dome

# Model 3: Plastic Floating Dome



- Two plastic water tanks

# Model 4: Closed Water Tanks



- Two plastic water tanks
- Pressure can build up inside

# Model 5: Septictank



- Modified septic tank
- Can have pressure of gas

# Biogas Burner



- One and
- two pit biogas burners

# Gas pressure pumps and filter



- Gas pressure pumps
- Works on solar panel (10 watt)
- Puxin gas filter

# Advantages Small Size Biogester

- Suitable for peri-urban areas, small, cheap.
- No need for large numbers of animals
- Waste can be:
  - starchy or sugary feedstock (waste grain flour, spoilt grain, overripe or misshapen fruit, non-edible seeds, fruits and rhizomes, green leaves, kitchen waste, leftover food, etc).
- (5 kg and 10 liters of water) waste produces 100 gr methane (50gr LPG)
- Shorter retention time, faster digestion process

# Disadvantages

- Methane gas is hot but the calorific value is lower compared to LPG (Liquefied Petroleum Gas)
  - Natural gas calorific value is 31-38 MJ/m<sup>3</sup>
  - LPG has a calorific value of 94 MJ/m<sup>3</sup>
  - Biogas has a calorific value of 20-25 MJ/m<sup>3</sup>
- Low pressure require gas pumps

# Conclusion

- Need for biogas option for peri-urban and rural families without sufficient animals
- Small size biodigester is a good option
- Affordable, reduce cost, create fertilizer for garden
- Need for support to research and setup dissemination program

**New Cement Biogas 24 m<sup>3</sup>, can  
get 300 kg of slurry/day**



# **Shelter for 1 ton daily Natural Fertilizer Production**



# Pellet Machine



# Thank you for your attention

- (CARDO)
- Choeung Ek Village/ Comuune,  
Dangkor District, Phnom Penh
- Email: [bunrith.ngin@gmail.com](mailto:bunrith.ngin@gmail.com)
- Mobile phone: +855 78 691647

