

The National Biogas Programme in Cambodia

In relation to the Clean Development Mechanism

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2006 1 17

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Introduction to the National Biodigester Programme in Cambodia

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Overall objective of the programme

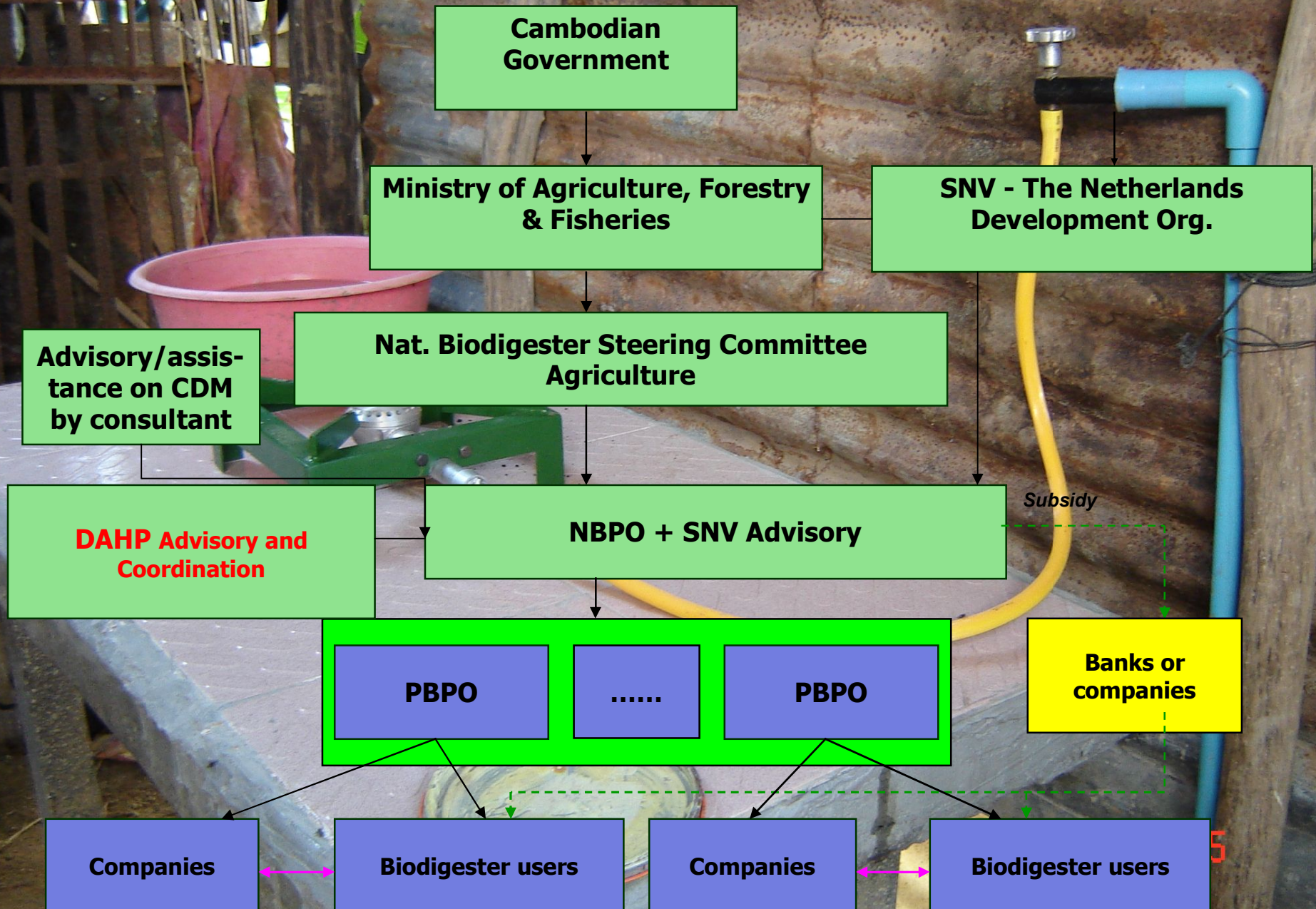
- **The overall objective of the programme is the commercial and structural deployment of domestic biogas technology, with a dissemination target of 17,500 quality biogas plants for the first phase of the implementation programme from 2006 to 2009 in six targeted provinces.**

Organisational Chart of NBP Office

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graph TD
    CG[Cambodian Government] --> MAFF[Ministry of Agriculture, Forestry & Fisheries]
    SNV[SNV - The Netherlands Development Org.] --> MAFF
    SNV -- Subsidy --> NBPO_SNV[NBPO + SNV Advisory]
    MAFF --> NBSC[Nat. Biodigester Steering Committee Agriculture]
    NBSC --> NBPO_SNV
    CA[Advisory/assistance on CDM by consultant] --> NBPO_SNV
    DAHP[DAHP Advisory and Coordination] --> NBPO_SNV
    NBPO_SNV --> PBPOs[PBPO ..... PBPO]
    PBPOs --> C1[Companies]
    PBPOs --> BU1[Biodigester users]
    PBPOs --> C2[Companies]
    PBPOs --> BU2[Biodigester users]
    C1 <--> BU1
    C2 <--> BU2
    BC[Banks or companies] -.-> BU1
    BC -.-> BU2
  
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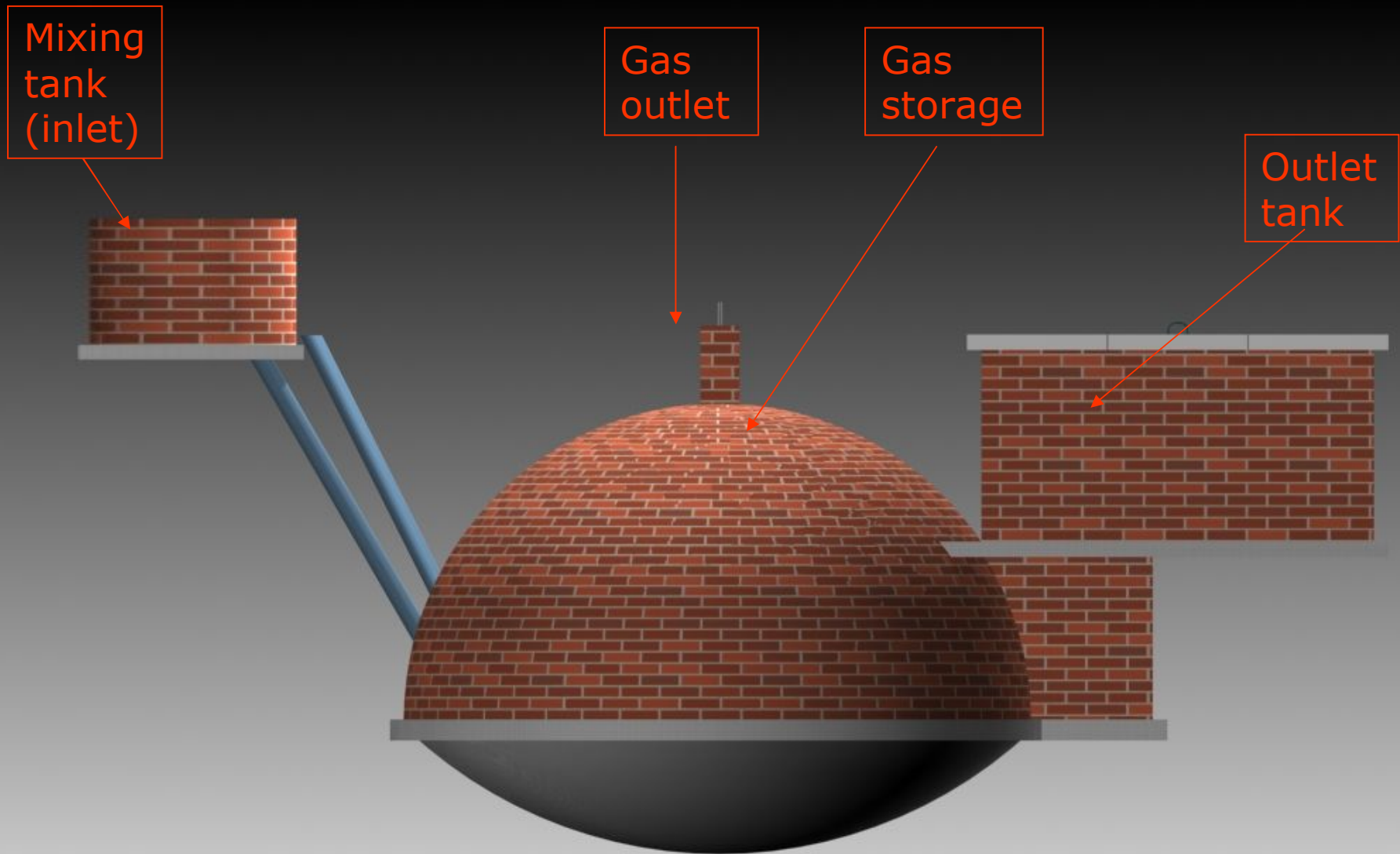
The chart illustrates the organizational structure of the NBP Office. At the top is the **Cambodian Government**, which oversees the **Ministry of Agriculture, Forestry & Fisheries**. The **Ministry** is supported by **SNV - The Netherlands Development Org.** and the **Nat. Biodigester Steering Committee Agriculture**. The **Ministry** also provides **Advisory/assistance on CDM by consultant** and oversees the **DAHP Advisory and Coordination** unit. The **Ministry** and **SNV** jointly fund the **NBPO + SNV Advisory** unit, which receives a **Subsidy** from **SNV**. The **NBPO + SNV Advisory** unit oversees the **PBPO** (Project Biodigester Operation) units, which are represented by a central box containing **PBPO**, **.....**, and **PBPO**. These **PBPO** units are responsible for managing **Companies** and **Biodigester users**. The **Companies** and **Biodigester users** are shown in a reciprocal relationship, indicated by a double-headed arrow. The **Banks or companies** unit is also shown, providing support to the **Biodigester users** and **Companies**.





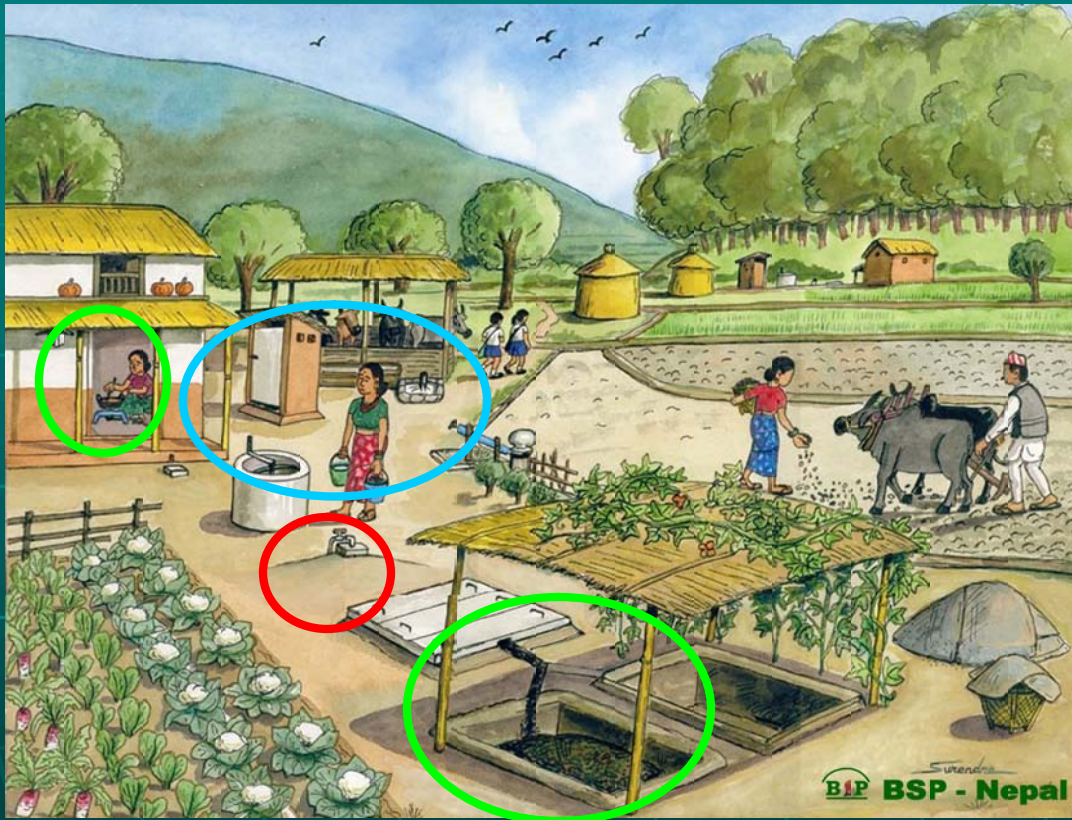
How does a biogas digester operate?





Biodigester plant

How does a Biodigester work

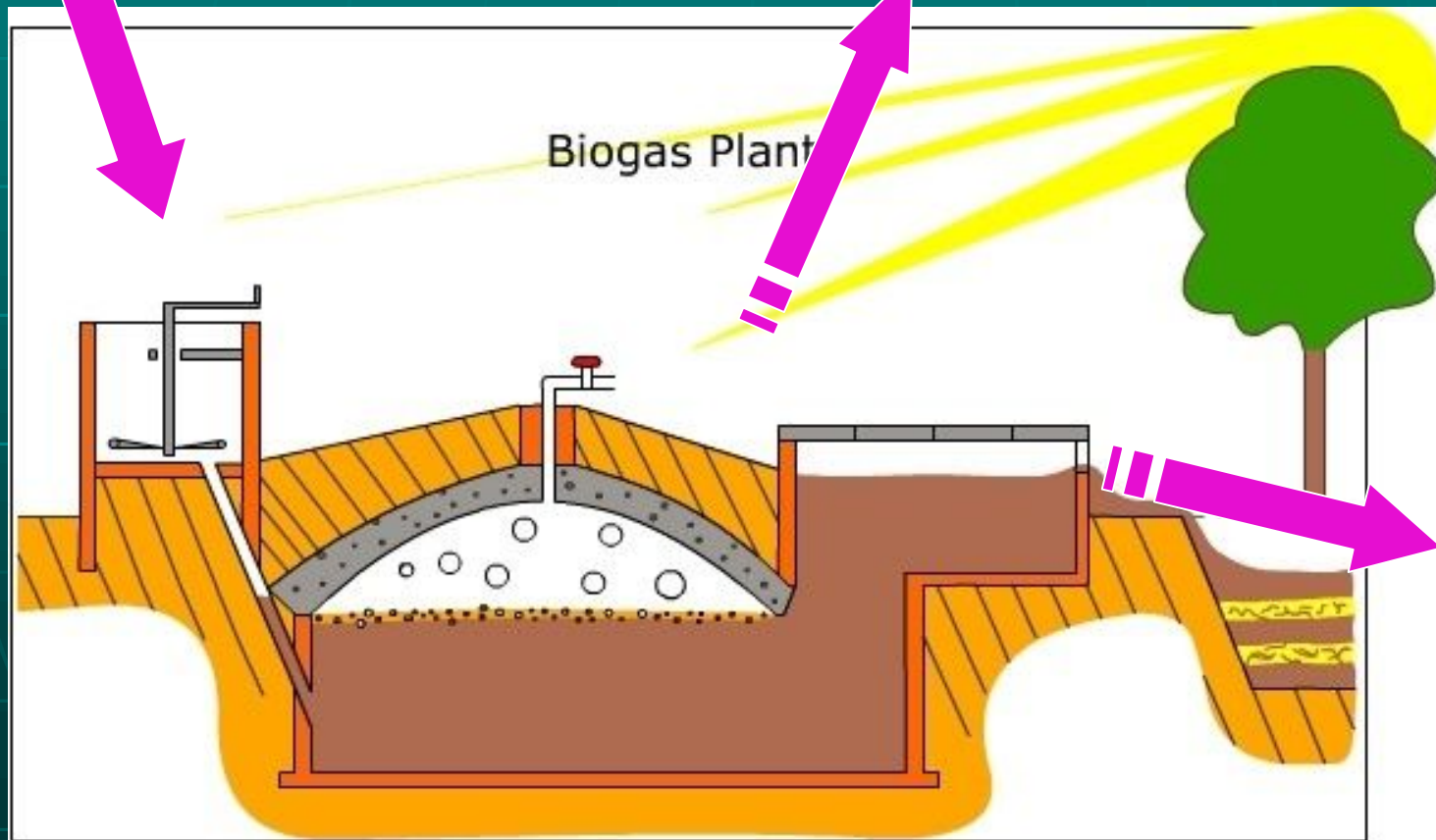


- Input:
Organic material
(animal dung & Toilet)
- Process:
Anaerobic fermentation
- Output:
Biogas + Slurry

A biogas plant: inputs and outputs

**Input:
Animal dung**

**Output: Biogas (used
for cooking and
lighting)**



**Output: bio-
slurry
(fertilizer)**

Why should we have a biodigester programme in Cambodia?

- More than 90% of the rural household energy need is for cooking
- Traditional energy sources such as firewood and charcoal are becoming scarce and expensive.
- Collection of these resources devours time, in particular women and children, which could have spent otherwise at school or in productive activities.
- collection traditional fuels and production of charcoal do exhaust natural resources and damage the environment on which the people heavily rely



Why should we have Biodigester in Cambodia? (continues)

- Domestic biodigesters are a proven technology commonly used in Asian countries (China, India, Nepal, Vietnam and others)
- There are more than 230,000 households in the six provinces selected for the pilot phase, who have enough animal dung for a biodigester.



Sustainability/Benefits of a Biodigester

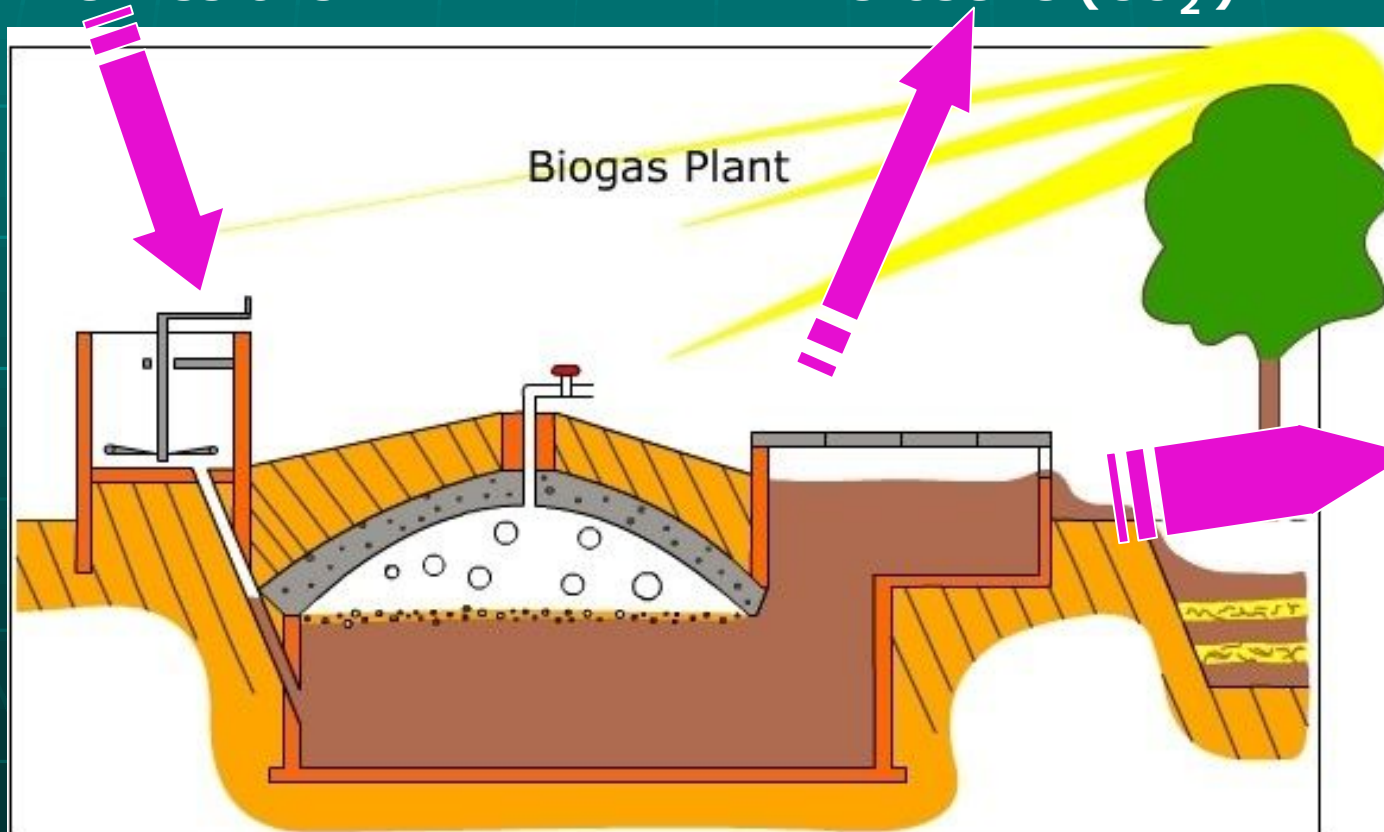
Benefits	Quantity
Reduction of workload	Average 2.5 hours per household per day
Saving of firewood	2,500 kg per year when 40 kg dung/day is fed into the biodigester
Saving in money	With an conservative price estimate of 200 Riel/kg; 500,000 Riel per year
Saving kerosene	50 liters per year when a gas lamp is used
Improvement of health	No indoor air pollution, less flies. When a toilet is attached, pathogens are killed. Reduced eye and reparatory diseases
Increase of agricultural production	Up to 40% increase in yields for most crops, no further need for chemicals

The greenhouse gas emission reductions of a biodigester & the CDM

Potential greenhouse gas emission reductions of a biodigester

Biogas plants transform traditional manure management; reducing CH_4 emissions

Biogas substitutes conventional domestic energy sources, reducing reliance on firewood and kerosene (CO_2)



Bio-slurry can substitute chemical fertilizer, reducing N_2O emissions

Fuel substitutions by a biodigester

One digester replaces per year
(estimation):

- **2,500 kg of (non-renewable)
firewood**
- **50 liters of kerosene**
- **Burning single burner stove for
5.5 to 6 hours**
- **Burning biogas lamp for 12-15
hours**



How to make a CDM project of the national biodigester programme?

- To qualify for CDM a project should:
 - Reduce greenhouse gas emissions
 - Contributes to the sustainable development of Cambodia
- ⇒ Both requirements are perfectly fulfilled by national biodigester programme of Cambodia!
- But challenge is to meet all specific technical CDM requirements

Small scale baseline methodologies

■ Fuel switch

- New small scale methodology proposed by Meth Panel for switch from non-renewable biomass (firewood) to renewable energy sources (biogas)
- Small scale methodology for switch from fossil fuel (kerosene) to renewable energy sources (biogas) available

■ Change in manure management

- No approved (small scale) methodology yet, but small scale methodology is being developed for biodigester programme in Vietnam

■ Change use of fertilizer

- No approved methodology, very difficult to make

Quantification of potential emission reductions (1)

- **Fuel switch non-renewable (firewood) to renewable (biogas) (new methodology)**
 - 1 t CO₂-eq per plant per year
- **Fuel switch fossil fuel (kerosene) to renewable (biogas)**
 - 0.15 t CO₂-eq per plant per year
- **Manure Management Change**
 - Estimation made in Vietnam 2.1 t CO₂-eq per plant per year (but not yet an approved methodology)
- **Change fertilizer use**
 - No estimation available

Quantification of potential emission reductions (2)

- Total emission reductions could maximally be around 3.1 t CO₂-eq per plant per year
- In total for programme (17,500 biodigesters) around 54,250 CO₂-eq per year
- But depending on development and approval of new (small scale) methodologies

Status of the project and the CDM component

Activities Carried out

- **A National Biodigester Programme Office has been established as well as training centre**
- **A biodigester fixed dome model suitable for mass dissemination in Cambodia has been selected and further adapted to the local conditions.**
- **Nine demonstration/pilot biodigesters have been installed. All these nine plants have been operational with highly satisfactory results.**
- **Detailed construction manual, operation manual and repair and maintenance manual for Farmer's Friend Biodigester have been prepared**
- **Quality standards on construction and O&M of biodigesters have been formulated**

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Future Target

No. of Biodigesters to be installed

2005	2006	2007	2008	2009	
Preparation	Implementation				
0	I	II	III	IV	Total
Province I	400	800	1500	2000	4700
Province II	300	650	1500	2000	4450
Province III	300	650	1000	1500	3450
Province IV		300	500	500	1300
Province V		300	500	1000	1800
Province VI		300	500	1000	1800
Total	1000	3000	5500	8000	17500

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Present status of CDM component

- PIN submitted to DNA
- DNA issued letter of no-objection
- Baseline study finalized August 2006 (in cooperation with consultant)
- Based on results of baseline study and availability of methodologies go/no-go decision on CDM
 - If go decision: development of PDD (in cooperation with consultant), finalized before end of 2006

