

Registration of a biogas CDM project in Viet Nam with the UNFCCC CDM Executive Board (CDM-EB)

The Clean Development Mechanism (CDM) is a system which aims to reduce emission of greenhouse gases (GHGs) through the implementation of emission reduction projects in developing countries. The reduced emission is converted to credits (Certified Emission Reduction: CER) and traded in developed countries (Annex I countries in the Kyoto Protocol).

In Viet Nam, a CDM project that reduces GHG emission and contributes to rural development was established, expecting that the methodology developed from the research study would be used as basis for similar future projects. Biogas digesters (BDs) for treating farm wastes, sewage, etc. were introduced to low-income communities to produce biogas, a renewable fuel that can be used as fuel wood and LP gas substitutes for heating and cooking purposes.

In formulating a CDM project in rural areas of developing countries, the most important thing is to establish an organized system, from selecting beneficiary households in small and wide areas, to introducing GHG emission reduction technologies, monitoring, and obtaining carbon credits. In this CDM project, 34 farmer leaders (called “Key Farmer: KF”) from three districts were trained and developed to serve as promoters and provide guidance to beneficiary households in installing, operating and maintaining BDs, as well as in monitoring emission reduction.

After introducing BDs to individual households, the volume of GHG emission reduction was estimated. JIRCAS and Can Tho University (CTU) researchers conducted studies and experiments to quantify the following: 1) woody biomass stock in Can Tho City, 2) fuel demand in rural area, 3) fraction of non-renewable woody biomass, 4) reduction of nonrenewable fuel use which will be substituted by BD and 5) number of participant households. Annual GHG emission reduction by the project was 1,203 t-CO₂, with 961 households participating (Tables 1 and 2).

The above-mentioned CDM project, titled “Farm Household Biogas Project Contributing to Rural Development in Can Tho City,” was registered on 15 August 2012 with the UNFCCC CDM-EB after approval by the governments of Japan and Viet Nam (Fig. 1). This project, introducing an economical plastic type BD (Fig. 2), was the first biogas CDM project formulated by a Japanese entity to directly benefit low-income households (by contributing to livelihood improvement) as well as the environment (by emission reduction of GHG).

In order to use the BDs continuously, appropriate pig-raising techniques and maintenance of BDs should be conducted based on the technical manuals prepared by JIRCAS and CTU.

Small-scale CDM projects like this one has scale demerit (i.e., the cost of project formulation, registration, subsidy of materials, technical support, validation and verification may not be covered by its advantages). The expectation is that private companies will

participate in the project and purchase carbon credits, taking into account the expected co-benefits such as compliance to CSR (Corporate Social Responsibility), creation of BOP (Base of the pyramid) business opportunity to low income communities, and provision of additional fund to cover the shortfall.

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Table 1. Data for estimating the volume of GHG emission reduction

Item	Value	Remarks
① Woody biomass in Can Tho City		
Average biomass	18.82 tC/ha	a Baseline survey
Area of forest and orchard	14,592.82 ha	b Can Tho City
Total biomass in forest and orchard	274,637 tC	c=a*b
Annual growth rate of woody biomass	12.38 %	d IPCC
Annual incremental woody biomass	34,000 tC/yr	e=c*d
② Fuel demand in rural area		
(Fuel wood)	1.58 t/yr	f 3.8 persons / household
Rural population	563,326 人	g 2008, Can Tho City
Fuel wood use in rural area	233,799 t/yr	h=f/3.8*g
Carbon volume	116,900 tC/yr	i=h*0.5 Carbon fraction: 0.5 (IPCC)
(LPG)	17.8 kg/yr	j
③ Fraction of non-renewable woody biomass		
	70 %	k=1-e/i
④ Substitution of fuel use with renewable biogas		
	Based on monitoring activities, it is confirmed that fuel for cooking was fully substituted with biogas from BD installed at households.	
⑤ Number of participant households		
	961 hh	l

Table 2. Volume of GHG emission reduction

Present GHG emission		
Fuel wood	Fuel wood demand per household	1.58 t/yr
	Fraction of non-renewable woody biomass	70%
	non-renewable woody biomass demand per household	1.11 t/yr
	GHG emission from fuel wood use per household	1.41 tCO ₂ /yr
LPG	LPG demand per household	17.80 kg/yr
	GHG emission from LPG use per household	0.05 tCO ₂ /yr
Total	GHG emission from cooking per household	1.46 tCO ₂ /yr
	GHG emission from cooking per 961 households	1,403 tCO ₂ /yr
GHG emission reduction by CDM project		
Year 1	Unit in operation: 241	352 tCO ₂
Year 2	Unit in operation: 721	1,053 tCO ₂
Year 3	Unit in operation: 961	1,403 tCO ₂
Year 4	Unit in operation: 961	1,403 tCO ₂
Year 5	Unit in operation: 961	1,403 tCO ₂
Year 6	Unit in operation: 961	1,403 tCO ₂
Year 7	Unit in operation: 961	1,403 tCO ₂
Total		8,420 tCO ₂
Average		1,203 tCO ₂

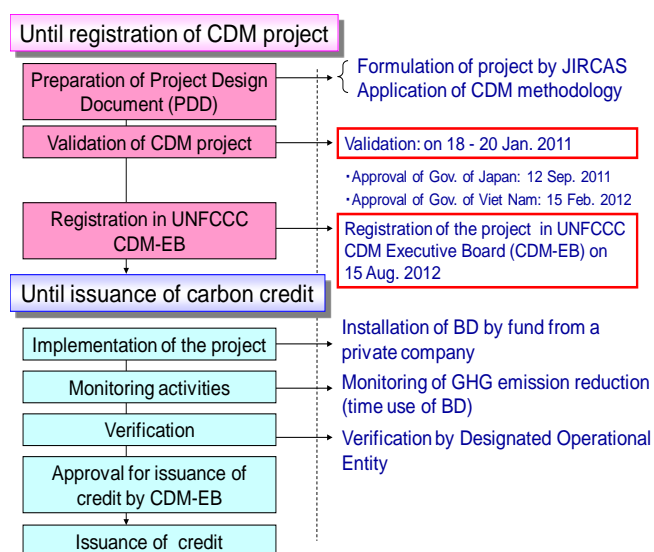


Fig. 1. CDM project implementation procedure

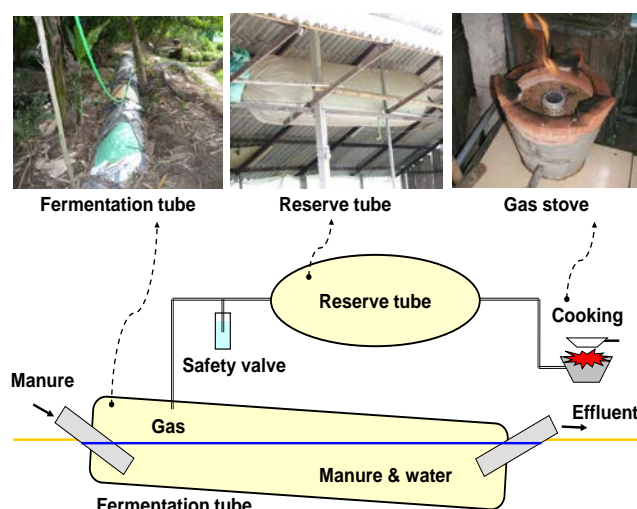


Fig. 2. Plastic type biogas digester system