

The Attached Document

**THE TERMINAL JOINT EVALUATION REPORT
FOR PROJECT FOR THE SUPPORT FOR THE DISSEMINATION OF
BIOGASS TECHNOLOGIES**

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ABBREVIATIONS

BGS	Biogas System
CO ₂	carbon dioxide
C/P(s)	Counterpart(s)
CADII	Central Agency for Development, Investment and Innovation
CPREU	Centre for Problems of Renewable Energy Use
HQ	Headquarter
JCC	Joint Coordinating Committee
KOJO	Kesiptik Okutuunun Jergiliktuu Organy
MM	Man Month
M/M	Minutes of Meeting
NGO	Non-Governmental Organizations
ODA	Official Development Assistance
PDM	Project Design Matrix
PO	Plan of Operation
R/D	Record of Discussion

1. Outline of the Evaluation Study

1.1 Background of the Evaluation Study

After independence and collapse of the Soviet Union, The Kyrgyz Republic was among other post-soviet facing great economic and social difficulties. It was especially acute in agriculture.

Economic decline and reorganization left considerable part of rural population without job. Former “kolkhozes” and “sovkhozes” (collective and state farms) were destroyed, and new mechanism of doing agriculture businesses had not been created.

The structure of gross national product of the Kyrgyz Republic, agriculture occupy 25.8% (2008). Thus, the agriculture of the Kyrgyz Republic faces considerable difficulties such as; the growing prices for energy carriers and chemical fertilizer, low fertility of the land, poverty of agricultural population, and deterioration of condition of the environment.

To encounter these agricultural problems, development and wide use of biogas system (BGS) in practice is expected to improve the conditions of agricultural population.

Under the background mentioned above, a proposal for Technical Cooperation was forwarded to the Japanese Government from the Government of the Kyrgyz Republic in September 2007.

JICA as an implementation agency of Japanese Official Development Assistance approved the Project, and Ministry of Agriculture, Water Resources and Processing Industry was recognized as the main counterpart of JICA at the same time. Both sides signed a Record of Discussion in December 2007 in order to initiate the Technical Cooperation Project called “the Project for the Support for the Dissemination of Biogas Technology in the Kyrgyz Republic (hereinafter referred to as “the Project”)”.

1.2 Objectives of the Evaluation Study

The objectives of Terminal Evaluation are as follows:

- 1) to review and confirm the achievement and implementation process of the Project
- 2) to evaluate the Project in terms of the five criteria, namely relevance, effectiveness, efficiency, impact and sustainability, based on the R/D, PDM, PO
- 3) to review and evaluate changes in external conditions
- 4) to draw the conclusion on whether the Project has achieved the purpose and realized the outputs
- 5) to make recommendation for further improvement of the Project to stakeholders
- 6) to draw lessons that can be applied to other similar ongoing and future projects

1.3 Member of the Evaluation Study

Name	Job Title	Position
Mr. Satoru Hagiwara	Leader	Deputy Director General, Rural Development Department, JICA HQ
Dr. Kazutaka Umetsu	Biogas Technology	Professor, Graduate school of Obihiro University of Agriculture and Veterinary Medicine
Ms. Noriko Ishibashi	Evaluation Analysis	Consultant, IC Net Limited
Mr. Shohei Kashiwagi	Planning Management	Paddy Field Based Farming Area Division 2, Paddy Field Farming Group, Rural Development Department, JICA HQ

1.4 Schedule of the Evaluation Study

No	Date		Activity	
			Evaluation Analysis	Other members
1	7/11	Sun	Arrv. Bishkek	
2	7/12	Mon	Meeting with JICA Office Meeting with the Project Members	
3	7/13	Tue	Meeting with Fluid Company Meeting with CPREU Meeting with Kyrgyz National Agrarian University Veterinary Research Institute	
4	7/14	Wed	Visit and Interview at Pilot Plants(No1&2)	
5	7/15	Thu	(Move to Karakol from Bishkek) Interview with a Pilot farmers (No3&7)	
6	7/16	Fri	Interview with Oblast State Administration in charge of Agriculture Interview with a Pilot farmers(No5,6,8)	

7	7/17	Sat	Interview with a Pilot farmers(No4,9,10)	
8	7/18	Sun	Compilation of an interim report	Arrv. Bishkek(7/19)
9	7/19	Mon	Meeting with JICA Office Courtesy Call to C/P Organization Field observation at Kyrgyz Agrarian University Meeting with the Project Members	
10	7/20	Tue	Meeting with Ministry of Agriculture Meeting with Center of the problems of Renewable Energy Use Meeting with Public Fund ' Fluid '	
11	7/21	Wed	(Move to Karakol from Bishkek) Visit Pilot Plant(No3,7,8)	
12	7/22	Thu	Courtesy Call to Issyk-kul Oblast State Administration Visit Pilot Plant(No4&10)	
13	7/23	Fri	Team Meeting within a Mission	
14	7/24	Sat	Move to Bishkek from Cholpon-Ata	
15	7/25	Sun	Meeting within a Mission Compilation of Evaluation Report(draft)	
16	7/26	Mon	Compilation of Evaluation Report Compilation of M/M draft	
17	7/27	Tue	Preparation of Presentation Material for JCC Discussion on M/M	
18	7/28	Wed	Preparation for JCC and report of mission	
19	7/29	Thu	Hold a JCC and report the result of evaluation, Signing M/M Reporting the results to JICA Kyrgyz Office and Embassy of Japan	
20	7/30	Fri	Dept.Bishkek	

1.5 Methodology of Evaluation

1.5.1 Evaluation Method

The Project was evaluated by Japanese Terminal Evaluation Team (hereinafter referred to as “Evaluation Team”) by using five evaluation criteria mentioned in 1.5.2.

The method for evaluation is;

- Firstly, achievement and implementation processes of the Project were verified through review of the Project reports and relevant documents, questionnaire analysis, field survey and interviews with stakeholders of the Project.

- Secondly, the overall goal, Project Purpose, Outputs, Activities, and inputs of the Project were analyzed and evaluated with the following five criteria.

- Thirdly, after compiling and analyzing the results using the five evaluation criteria, the outcomes were presented and then discussed between Evaluation Team and JCC members, and conclusion was reached. Recommendations for the Project were made and the lessons learned from the Project were documented

1.5.2 Five Evaluation Criteria

The evaluation was conducted based on the five criteria listed below:

1) Relevance

Relevance measures the extent to which the Project is consistent with the priorities and policies of the target group, recipients and donor.

2) Effectiveness

Effectiveness measures the extent to which the activities achieve its purpose, or whether this can be expected to happen on the basis of the outputs.

3) Efficiency

Efficiency measures the output – qualitative and quantitative – in relation to the inputs. This generally requires comparing alternative approaches to achieving the same outputs in order to see whether the most efficient process has been used.

4) Impact

Impact indicates whether the Project has had effects on its surroundings in terms of technical, economic and socio-cultural, institutional, and environmental factors.

5) Sustainability

Sustainability measures the extent to which the objectives of the Project will continue to be accomplished after the completion of the Project, in other words, the extent to which the groups affected by the Project intend to and/or are able to take charge by themselves to continue accomplishing its objectives.

2. Outline of the Project

The outline of the project is drawn in Project Design Matrix (PDM) (refer to Annex 1).

Its summary is as follows:

1. Overall Goal	The biogas technologies are disseminated in rural areas and the living condition of the rural people adopting these technologies is improved.
2. Project Purpose	The extension system of the improved biogas technologies is established.
3. Outputs	<ol style="list-style-type: none">1) The appropriate biogas technologies are developed.2) The capacity of personnel related to extension of the biogas technologies is strengthened.3) The existing financial institutions and regulations related to extension of the biogas technologies are reviewed.4) The coordination among the relevant organizations for extension of the biogas technologies is improved.5) The biogas technologies are widely known.

*Current PDM was authorized by 13th Dec, 2007.

3. Project Achievement

3.1 Achievement of Input

3.1.1 Japanese Side

(1) Dispatch of the Japanese Experts

Annex 5 shows the record of the dispatch of the Japanese experts to date. At the time of Terminal Evaluation, the total of 4 long-term Experts and 11 short-term Experts, the total of 37.60MM, were dispatched (as of the end of July 2010).

(2) Training of the C/P in Japan

Annex 6 shows the record of training of C/Ps in Japan to date. The total of 11 C/Ps was trained in Japan.

(3) Provision of Machinery and Equipment

Annex 7 shows the record of provision of machinery and equipment including biogas plants.

(4) Expenses for the Project (Unit: Kyrgyz Som)

JICA side's total expenses: 19,145,000 Som

1) Local cost	18,821,000
2) Machinery and Equipment	324,000

(KGS : 1KGS=1.915 ¥, as of July 2010)

3.1.2 Kyrgyz Side

(1) Assignment of C/Ps

Annex 4 shows the assignment of C/Ps for the Project.

(2) Expenses for the Project (Unit: Kyrgyz Som)

The Kyrgyz side's total expenses: 0 Som

1) Local cost	0
2) Maintenance fee of equipment	0

(3) Machinery and Equipment

Annex 7 shows the list of machinery and equipment provided by the Project.

(4) Other In-kind Inputs

The project office space for JICA Experts: one in State Department of Chemicalization and Plant Protection in Ministry of Agriculture and other is in Ak-Suu interrayon inspectorate of Chemicalization and plant protection, State Department of Chemicalization and Plant Protection in Ministry of Agriculture.

3.2 Achievement of the Project

Activities of the Project were implemented as described in the annexes listed below.

- Plan of Operation (Annex 2)
- List of Kyrgyz counterpart Personnel trained in Japan (Annex 6)

3.3 Achievement of the Output

3.3.1 Overall Goal

Overall Goal:	The biogas technologies are disseminated in rural areas and the living condition of the rural people adopting these technologies is improved
Indicators	<ol style="list-style-type: none"> 1 Number of relevant projects introducing the improved biogas technologies 2 Number of households whose living conditions is improved by adopting the biogas technologies

(Indicator 1) Although the indicator is not quantitative one, the achievement level of this indicator is judged appropriate at the time of Terminal Evaluation in July 2010.

2 individuals planned the installation of their own biogas plants after their visits to the Project sites, one of which has constructed a biogas plant and started the operation.

For the 1st case described below, it is assessed that the replication of the biogas technologies started quickly enough considering the fact that the construction of the pilot plant (No.3) was completed in Feb 2009.

	Name	Visited JICA Plant	Digester Size Constructed/Planned
1	Mr. Sharipov Mansur Kant town, Chui Oblast	10 m ³ Steel type plant (No.3) Issyk-kul	10 m ³ Steel type plant Currently in operation
2	Mr. Harlanov D	25 m ³ Steel type plant (No.2) Chui	25 m ³ Steel type plant

In addition, the potential cases of replication might be found in the near future. Apart from the replicated cases listed above, there are various projects and organizations requesting technical collaboration with this Project. These projects might disseminate biogas technologies to wider population in rural areas:

	Name of Organization	Contacted	Contents of the Request
1	Instituto Oikos Onlus /Rural Development Centre-Elet	July 2010	- Technical support for the feasibility study and biogas plant model identification in

	(NGOs applying to EU grant)		Chong Kemin Valley, Issyk-Kul Oblast
2	Nalin State University	End 2009	- Lecture of biogas technologies - Collaboration on establishing biogas technology course
3	KOJO (Local Vocational Training Governance Fund) (Public foundation)	Early 2010	- Collaboration on preparing curriculum on biogas technology and liquid fertilizer for technical education course

(Indicator 2) This indicator is not achieved for it is too early to judge the livelihood improvement of livestock farmers who installed pilot biogas plant. Nonetheless, there were 145 individual guests, 71 of who were farmers from remote states, came and visited the JICA Biogas Project Office in Bishkek requesting detailed information about biogas plants. The Project provided design drawings of the plants and its operation manual with free of charge.

3.3.2 Project Purpose

Project Purpose	The extension system of the improved biogas technologies is established
Indicators	<ol style="list-style-type: none"> 1 Development of the improved biogas plants for livestock farmers 2 Review of the present financial institutions and regulations related to extension of the biogas technologies 3 Establishment of extension system of the biogas technologies through public-private collaboration for rural areas

The Project Purpose has three indicators that are not quantitative. The extension system of the improved biogas technologies is not established yet at the time of Terminal Evaluation.

The Project Purpose is not achieved yet, nonetheless, 3 new types of biogas plant design and its design drawings were produced. Also those plant designs have been improved by JICA Experts through continuous refinements. In addition, theoretical part of the problem in heating system for digester was already solved. However, the Project will be terminated without verifying the successful operations of 6 plants during severe winter season.

One of hampering factors to achieve Project Purpose is the lack of public structure of extension in agriculture sector nor in renewable energy sector, then secondly, the weakness of the public-private collaboration to establish extension system of biogas technologies in the field level. There are several public and private organizations supporting the installation of biogas facilities, however, there is few field level collaboration found and few official discussions on coordination mechanism among organizations concerned. Thus the public-private collaboration mechanism for extension of biogas technologies is yet to be established.

In addition, this Project coordinated with private sectors when organizing seminars for introducing

JICA Project's biogas facility, which is limited to such events.

Another factor is lack of loan scheme available to ordinary livestock farmers who are willing to install biogas facility. Although a review of the financial institutions and regulations has been conducted by a short-term expert in March 2010, it is hard to find any favorable condition where small scale livestock farmers can make a loan for the installation of biogas facilities.

3.3.3 Output

Output1	The appropriate biogas technologies are developed
Indicators	1-1 Improvement of biogas plants for livestock farmers 1-2 User's manual on operation and maintenance of the improved biogas plants 1-3 User's manual on utilization of biogas and liquid fertilizer produced at biogas plants

Output 1 is not yet achieved at the time of Terminal Evaluation. The prospect of achieving Output 1 until the end of the Project is moderate. For technical improvement of biogas plants, theoretical part of the problem, digester heating system, was already solved, but it needs experimental proof of successful operation during severe winter season. .

3 new types of biogas plant design and its design drawings were produced. Also those plant designs have been improved by JICA Experts through continuous refinements and a general operation and maintenance manual including the utilization of biogas is almost ready for dissemination. However, severe winter season operation is not verified for 6 pilot plants (No.4, 5, 6, 7, 8, and 9), which recently went through an essential improvement work for more effective digester heating system.

Utilization method of biogas is included in the operation and maintenance manual, which is currently under translation work into Kyrgyz language. For the part of liquid fertilizer, the Project contracted out an experimental proof of fertilizer application to Kyrgyz National Agrarian University (so-called Skryabin Agrarian University), which is the only university specialized in agricultural technologies in Kyrgyz Republic. The preliminary result of the experiment would be ready by the early December 2010. The first version of manual on the utilization of liquid fertilizer is expected to be finalized by the end of the Project termination. However it is necessary to note that preparation of application standard for liquid fertilizer needs a few years of cumulated experimental data.

The contract of the experimental proof with the University includes fabrication of 2 prototypes for spreading liquid fertilizer. The test production of 2 prototypes was completed already.

Output 2	The capacity of personnel related to extension of the biogas technologies is strengthened
Indicators	2-1 Number of personnel and their degree of technical capacity for extension work of the biogas technologies 2-2 Number of technical training for personnel in charge of extension work of the biogas technologies 2-3 Development of teaching materials/textbooks for extension of the biogas technologies

Output 2 is not yet achieved and the level of achievement is low.

As written in achievement of Project Purpose, one of hampering factors to achieve Project Purpose is the lack of public structure of specific government extension system in agriculture sector nor in renewable energy sector.

The C/P personnel in-charge of extension has not been identified during the first 2 years of the Project due to the absence of technical level extension staff. The Kyrgyz side agreed and promised to allocate a contact person in charge of information dissemination in April 2010, however it was not materialized due to the recent political turmoil. As a result a permanent contact person in the ministry is yet to be allocated at the time of Terminal Evaluation. (The appointment of the person is already done.)

Apart from the government extension staff, the Project has hired and works with 5 construction technicians whose technical capability is described as below:

<Administrative level> C/Ps in charge of biogas (*Administrative only)	The following C/Ps are managerial level person in-charge of JICA Biogas Project: * Project Director and Project Manager in State Department of Chemicalization and Plant Protection, Ministry of Agriculture * Head of Agro-industrial Development and nature management division of Issyk-Kul State				
<Technical level> Personnel for technical extension of biogas technologies	- Not identified due to the absence of extension system in the Ministry of Agriculture. - Biogas extension system through the collaboration of public-private sectors was not formulated (Output 4) * The technical level officers listed in C/P are limited to information sharing only.				
<Project> Project-hired technicians who were trained in the Project	5 technicians <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Number</th> <th>Technical Level</th> </tr> </thead> <tbody> <tr> <td>2 technicians</td> <td>The following can be done in technically acceptable level in</td> </tr> </tbody> </table>	Number	Technical Level	2 technicians	The following can be done in technically acceptable level in
Number	Technical Level				
2 technicians	The following can be done in technically acceptable level in				

		Kyrgyzstan: -Construction according to design drawings -Construction management -Maintenance
	3 technicians	Assistant level with some technical specialization in welding and pipe fitting and so on
* According to the interview with Chief Advisor		
The capacity level of these technicians has been upgraded to a certain level as construction technician.		

Output 3	The existing financial institutions and regulations related to extension of the biogas technologies are reviewed
Indicators	Improved services of the existing financial institutions and regulations related to extension of the biogas technologies

The indicator can be read as ‘the number of service menu or preferential treatments given by financial institutions increase for the promotion of biogas technologies’, where by livestock farmers and other organizations can be accessible to loan scheme.

This indicator is yet to be achieved. It is assessed that fulfilling this indicator by the termination of the project would be impossible. Although a short-term expert of finance sector reviewed and analyzed the possibility of providing loans to ordinary farmers, it is limited to the information collection and analysis of financial feasibility of making loan to install biogas facility.

Apart from the above effort by the Project, the former government worked on the formulation of agriculture loan scheme under Central Agency for Development, Investment and Innovation (CADII), but it is pending since the recent political turmoil.

Output 4	The coordination among the relevant organizations for extension of the biogas technologies is improved
Indicators	4-1 Number of various joint meetings on extension of the biogas technologies 4-2 Development of guideline on linkage/networking of the organizations concerned for extension of the biogas technologies

Output 4 is not achieved, and would not be achieved by the end of Project term.

There are several public and private organizations supporting the installation of biogas facilities, however, there is few field level collaboration found and few official discussions on coordination

mechanism among organizations concerned. This Project invited those organizations working on biogas technologies when it organized seminars and opening ceremony of biogas facilities. But it is mostly limited to introduction of biogas facilities and information exchange.

For the part of the guideline, the Project promoted discussions with C/Ps for the preparation of the draft guideline in the early 2010. However, the political turmoil brought to a halt of such a plan.

Output 5	5	The biogas technologies are widely known
Indicators	5-1	Number of seminar on the biogas technologies for users
	5-2	Development of pamphlet/leaflet for introducing the biogas technologies (including videos)
	5-3	Number of press tours/ study tours to the pilot project sites

Indicators of Output 5 are mostly achieved at the time of Terminal Evaluation, and all of them are expected to be achieved by the end of the Project. One more opening ceremony and open forum to a pilot plant that has been pending due to the recent turmoil would be conducted before the Project termination.

The public relations have been one of most successful outputs of this Project partly due to strong public interests toward biogas technologies.

By the time of Terminal Evaluation, 6 seminars were organized inviting users and villagers in target areas, and were attended by the total of 191 participants. 2 kinds of leaflet and 1 video introducing the biogas technologies were produced. For study tours to the pilot project site, one more opening ceremony of a biogas facility will be organized inviting press and other concerned organizations before the termination of the Project.

Apart from planned activities in PO, the Project proactively involved in public relations: reaching the media such as newspapers and TV interviews, responding to enquiries and accepting visits by general public and so on. (Refer to the public relations activities in the table below). As a result the Project Office in the Capital received more than 145 visitors (as of the end of July 2010) requesting information, 71 of whom were farmers. (For more details, please refer to 3.3.1 Overall Goal.) A positive background of rather quick response is that biogas has been relatively known since the era of Soviet Union for the former Kyrgyz government installed numerous biogas plants, most of which are left unoperated at this time. The Project made its way into the media, thus more people came to know this Project and were interested in biogas facilities.

Furthermore, the pilot biogas plants attracted many visitors, some of them were from state administrations and some were farmers and private companies, from all over the country day to day basis. According to the interview with the plant owners, each of 10 biogas facilities received roughly 5 to 10 visitors every week. (Unfortunately there is no concrete number of visitors recorded.)

It is assessed that the Project's proactive exposure to media, acceptance of visitors to the Project's

biogas facilities, and general public interests in biogas technologies mutually effected each other and thus contributed to the widespread of biogas technologies and higher presence of JICA Biogas Project (The Project for the Support for the Dissemination of Biogas Technology).

Public Relations Activities Conducted

Type of Activities	No.	Outputs	Date	No. of Visitors /Participants
Seminars				
		Venue of Seminar		
	1	No. 3 biogas plant	2009.3	15
	2	Kyrgyz National Agrarian University	2009.4	14
	3	Osh Oblast State Administration	2009.8	30
	4	Dzhalal-Abad Oblast State Administration	2009.8	12
	5	Talas Oblast State Administration	2009.9	47
	6	Chon-Kyzyl-Suu No.4 biogas facility with public bath house	2010.4	63
Pamphlets/leaflets				
	1	Pamphlets: 2 kinds 1) 500 pieces, Eng/Russian 2) 500 pieces, Russian/Kyrgyz	2008 2009	-
	2	Video	2010.5	-
Press Tour				
	1	1 Press tour organized by JICA Kyrgyz Office (2009.7) * Funded by JICA Kyrgyz office		
Study Tours				
	1	Each Pilot Biogas Plant	2009.9	15
	2	Each Pilot Biogas Plant	2009.10	11
Newspaper Article				
	7	Agro-Vesti: 7 times *Funded by JICA Kyrgyz Office	2009.7-12	
	1	Time of Central Asia:1 time	2010.4	
Visitors to Project Office				
		Bishkek office	2009.1-	145 visitors
		Karakol office	2009.3	Many but not recorded
Visitors to pilot biogas facilities				
		Mostly everyday for each of 10 plants		Roughly 5 - 10 visitors/plant per week

3-4 Implementation Process of the Project

In general, the project activities under Output 1, 3 and 5 were mostly implemented according to the PO until the early 2010. Initial stage of the Project made several adjustments in the construction schedule of biogas plants due to the minor complications causing delay: difficulties in procurement of materials for biogas facility, inexperience of construction technicians and so on. Also the activities other than construction saw delays in the first stage of the Project. Then the recent turmoil in Kyrgyzstan caused delays in several activities other than construction and maintenance of biogas plants. However, all the activities under Output 1, 3 and 5 would be completed by the end of project termination.

Progress of activities under Output 2 and 4 suffered because the Project was unable to find field level C/Ps to whom the Project takes technical transfer: only administrative level officers were allocated to the Project as C/Ps but technical level one, and there is no leading organization to establish the forum of dialogue to set up public-private collaboration in extension. The turmoil in Kyrgyzstan toward the end of the Project caused the delay in the allocation of a permanent contact person in the Ministry which was agreed by the former government. Therefore the Project saw difficulties in implementation of activities under Output 2 and 4.

(1) Monitoring and communication

Regarding the monitoring activities of the Project, State Department of Chemicalization and Plant Protection monitors the activities through the regular and frequent reports by JICA Experts. CPREU's involvement of this Project has been an advisory one in a whole period of the Project. Although Kyrgyz C/Ps took appropriate actions in trouble shooting, few initiatives were taken by C/Ps in monitoring.

The JCC was conducted 3 times so far, in which 2 times were held in 2010. Therefore JCC meeting organized only once in the first 2 years.

Apart from monitoring activities, the communication between the counterpart staff and the JICA Experts are favorably and frequent as a whole.

(2) Ownership

It is found that the sense of ownership of the C/Ps toward this Project is limited although there are frequent consultations between JICA Experts and the C/Ps. There is no leading organization to promote biogas technology in the field level among the concerned organization in the Project implementation.

(3) Recognition toward the Project

The C/P organizations' recognition toward the Project is very high. It is well understood that

the biogas technologies will bring various positive benefits to environment and the living conditions of rural population. A lot of expectations were expressed, both in central and State level, toward the Project for further development of biogas technologies during the evaluation study.

4. Result of the Evaluation with Five Criteria

4.1 Relevance

For the following reasons, the Project is judged to be of high relevance.

(1) Consistency with national strategy and legislation

This Project is consistent with National Energy Programme Of the Kyrgyz Republic 2008-2010 and Fuel energy complex development until 2025, which was in approval process of the former government. It is also along with the Law on renewable Energy Sources which was signed by the former President Kurmanbek Bakiyev in January 2010. The objective of this legislation is to promote investment in renewable energy sources as well as to promote the development of rural areas through increased access to electricity, hot water, heating and fertilizers.

This project is also consistent with the needs of farmers whose primary means of making living is livestock. Biogas technology promotes the use of animal manure and produce environmentally clean energy.

(2) Consistency with Japan's Official Development Assistance (ODA): Rolling Plan for the Kyrgyz Republic 2009-2013

Under Rolling Plan for the Kyrgyz Republic 2009-2013, the assistance to this project is referred in the Rural Development Program under Agriculture Development/Local Development issue, which is one of 6 development issues of cooperation.

(3) Technical advantage of Japan in biogas technologies

Japan has an advantage in biogas technology. As a country giving particular focus upon the production of renewable energy sources, Japan has rich human resources of researchers and private sectors.

4.2 Effectiveness

Effectiveness of the Project is judged to be moderate:

(1) Prospect of achieving the Project Purpose

The prospect of achieving the Project Purpose is low. 2 out of 3 indicators were achieved or likely to be achieved by the end of the project, but the last indicator regarding the establishment of extension system for biogas technologies would not be materialized by December 2010.

For the development of biogas facilities, 3 new types of biogas plant designs of 10 to 25 cubic meters were ready. At the time of Terminal Evaluation, all of biogas facilities produce biogas and the owners of those pilot plants benefit from biogas. With the support of 11

short-term experts dispatched by the end of July 2010, those plant designs were refined little by little. Only necessary technical verification is winter-season operations of 6 biogas plants.

(2) Facilitating / obstructing factors to achieve the Project Purpose

Due to the absence of public extension system neither in Ministry of Agriculture nor in Ministry of Energy, as well as the weakness of the public-private collaboration to establish extension system for biogas technologies, the Project was suffered by the absence of C/Ps for technical transfer at the field level. Most of activities for development of public/private coordination mechanism (Output 4) and capacity building of extension personnel (Output 2) were unfulfilled therefore the concerned indicators were not satisfied. It is due to the fact that biogas technologies fell in the work of several different government organizations which made the footing of the Project implementation unstable. For instance, policy and legislation on renewable energy comes under Ministry of Energy, research and advisory on renewable energy sources under Centre for Problems of Renewable Energy Use (CPREU), and liquid fertilizer comes under State Department of Chemicalization and Plant Protection, Ministry of Agriculture. Then there are a handful of private companies installing biogas plants. However, extension of biogas plant itself is beyond the mandate of all the parties above.

Another obstructing factor to achieve Project Purpose is the political turmoil occurred in April 2010. Toward the end of Project term, the Project was unable to contact the C/P personnel, some of who were displaced. It slowed down the implementation and thus adversely affected the progress of activities.

4.3 Efficiency

This efficiency of this Project is mixed: some of the Outputs (Output 1 and 5) are to be successfully achieved by the time of Project Termination; meanwhile the some of the Outputs have little possibility to be achieved. Efficiency of this Project was suffered by the lack of technical C/Ps in extension of biogas technologies. It made the establishment of extension mechanism and the capacity development of government C/Ps for extension impossible. Yet, the biogas plants for livestock farmers are ready for dissemination and attracted high level of attention from the Government of Kyrgyz Republic and also from general public (Output 5).

(1) Inputs of JICA side

Total of 11 short-term Experts (as of the end of July 2010) greatly contributed to the improvement of biogas plant designs and construction as well as the quality control and

maintenance of biogas plants. Also the provisions of materials and equipment went smooth except for Mr. Kimura's equipment, maximized the efficiency in improving the biogas technology.

Also the Training in Japan was useful showing the new technological development and sophisticated management of biogas as energy source.

(2) Inputs of Kyrgyz side

The inputs from the Kyrgyz side is mostly limited to in kind such as C/P personnel and office space. No local cost was borne by the Kyrgyz side, and few efforts were made to supply local cost for the implementation of the Project.

(Unit: Kyrgyz Som)

	Kyrgyz Side	JICA side
	Local Cost 0	Local cost 18,821,000
		Equipment 324,000
Total	0	19,145,000

(KGS : 1KGS=1.915 ¥, as of July 2010)

4.4 Impact

The impact of this Project is relatively high. The positive impact is produced in a relatively short period of time. Given the fact that biogas technologies have attracted attentions of general public in recent years, particularly in rural areas, it is understood that the expansion of biogas technologies to wider public has started already. It is speculated that the number of replicated cases might increase. However it is too early to judge the livelihood improvement of livestock farmers who installed pilot biogas plants.

(1) Prospects of achieving Overall Goal

The indicators of Overall Goal have no quantitative indicator, which make the judgment of achievement level difficult. There are 2 cases of replication by 2 organizations as was described earlier. The Terminal Evaluation Team has understood that the achievement level of Overall Goal is relatively high for a 3-year project. But it is too early to see any improvement of living conditions of farm household even in the target States.

(2) Positive impact observed beside the Overall Goal

- Effect on Climate Change

Biogas can reduce the emission of Greenhouse Gases, that has positive impact on Climate Change. This Project also contributed to Climate Change although marginal. According to

Professor Umetsu's provisional calculation, an estimated annual reduction of carbon dioxide (CO₂) emission from the 10 pilot plants is 105.5t-CO₂, in case all of those plants would have operated in full capacity.

- Possible increase in agricultural production by using liquid fertilizer

Although any scientific proof is yet to be provided, 9 out of 10 owners of biogas plants saw good signs of increased production by utilization of liquid fertilizer. For those who applied liquid fertilizer to potatoes (but only 1 of them harvested once but others never harvested), 8 out of 9 owners saw that the growth is quicker than usual, more leafy, and leaf colors are greener than usual.

- Installation of biogas cooking stove, toilet and shower facilities in house

According to the interview, all the owners who installed biogas cooking stove, toilet and shower facilities replied that it is more convenient than before.

4.5 Sustainability

The Team concluded that sustainability of the institutional, financial and technical aspect is low:

<Policy>

Promotion of biogas was in 'National Energy Programme Of the Kyrgyz Republic 2008-2010 and Fuel energy complex development until 2025' under Ministry of Energy, which was under approval process of the former government of Kyrgyz Republic. Currently the new government is to formulate new policies under each Ministry. Biogas is expected to be listed even under the new government policies including the one in Ministry of Agriculture.

<Institutional and technical aspect>

Institutional sustainability in carrying out the Project activities is weak. At the administrative level, Ministry of Agriculture promised to allocate a permanent staff as a contact person after the Project termination. However there is no technical level C/P who is the target of technical transfer of JICA Experts.

In fact, the field level implementation structure of the Project is not permanent. The 5 Project-hired technicians and JICA Experts worked on the installation and maintenance of biogas plants so that there is no permanent technical staff identified to take over the technical support provided by the Project. Likewise, technical sustainability is assessed to be low at the time of Terminal Evaluation. After the termination of the Project, all the maintenance of the biogas plant should be done by the owners themselves since there is no systematic service provision.

<Financial aspect>

There has been no counterpart funding provided by the C/P organization neither in central nor in State level. Expansion of biogas plants construction by Kyrgyz side's own budget has few possibilities. The maintenance of biogas plant is in-charge of the owners themselves.

5. Conclusion

Evaluation team finalize the following conclusion through a series of interviews with C/Ps, private biogas company, other donor, Japanese experts, and the field survey of the pilot plant sites.

The Project Purpose has not yet been achieved at a satisfactory level in specific areas. Nonetheless, positive impact in relation to Overall Goal has been observed: 2 cases of replication of the biogas plant models by the visitors of pilot plants. The replication has already started during the Project period without going through an extension system that the Project originally intended to formulate.

Major achievements are: 1) 3 new small-sized biogas plant models of 10 to 25 cubic meters that are operational even in cold regions are close to a completion, and 2) successful public relations on biogas facilities that attracted the attention of several projects and more than two hundred visitors.

Meanwhile, the Terminal Evaluation team concludes that some actions should be taken to ensure the achievement and the sustainability of the outcome of the Project.

Major achievements are as follows:

(1) Development of the improved biogas plants

Project has introduced 3 new types of biogas system, the capacity of which are 10 to 25 cubic meters which utilized locally available materials except for some equipment such as compressor. It is considered that the technological improvements necessary to develop small-sized plants for livestock farmers reached mostly satisfactory level by the time of Termination Evaluation.

*Operation of 6 plants, No.4,5,6,7,8 and 9, have not verified in severe winter season and it still remains functional uncertainty whether plants may function without anomaly during severe winter.

(2) Increase the awareness of people about biogas technology and successful public relations on biogas facilities

On a favorable background of biogas technologies where people have general knowledge on biogas technologies, JICA project's biogas plants has become widely known among the public since 4 pilot plants have been operational during the cold season. The news of the new and

small sized biogas plants were publicized through various public relations activities by the Project: seminars, public relations to the mass media, distribution of project introduction brochures, and acceptance of visitors to those pilot plants. Therefore, the project has greatly contributed to increase the awareness of people about biogas technology.

It is understood that those major achievements contributed to the appearance of a positive impact.

(3) Indication of scaling up of newly developed biogas plants

2 cases of replication of the biogas plant models by visitors of pilot plants were identified. The replication has already started during the Project period without going through an extension system that the Project originally intended to formulate.

6. Recommendations and Lessons Learned

6.1 Recommendations

1) Completion of activities planned in PDM before termination of the Project

The following activities were not achieved yet in terms of the Indicators of PDM. By the end of the Project, project should continue and complete following activities excluding activity 3-3 (To conduct necessary revisions of the existing financial institutions and regulations) and 4-7 (To develop guideline on linkage/networking of the organizations concerned based on the review of the pilot projects) which are impossible to conduct under the present condition of Kyrgyz side.

- i. To hold open forum for the public relations on the pilot project.
- ii. To completion of 'User's manual' comprehensively covering 'operation and maintenance of biogas plant', 'utilization of biogas and liquid fertilizer produced by biogas plant', 'extension materials'.
- iii. To conduct terminal survey in order to assess its terminal effect of 10 pilot plants.
- iv. To conduct 'press tour / study tour' to the pilot project.

2) Identification of an exclusive body to promote biogas program by the initiative of Ministry of Agriculture

Launching an inter-agency task group across agencies concerned or an internal task group to promote biogas program would be necessary in order to promote replication of biogas facilities in the field level. In order to secure the sustainability of the Project outcome, and scaling up the individual cases of replication, it is recommended to organize an exclusive body such as inter-agency biogas promotion task group among concerned Departments, Agencies, Universities and NGOs, or internal task group by initiative of Ministry of Agriculture.

It is also recommended to identify a department in-charge and formulate an exclusive body to promote biogas program in Ministry of Agriculture.

3) Recognition of biogas program as a part of the Ministry's policies and strategies

Biogas program should be officially recognized as a part of the Ministry of Agriculture's policy, and biogas program needs to aligned with the new Ministry's mandate also in order to clarify the department and/or the organization fully responsible to promote biogas technologies; from compliance to the regulation regarding construction, registration of biogas facilities to the department concerned, to its operation, and to the promotion of liquid fertilizer use. For the further expansion of biogas program, necessary budget should be secured under a department in-charge.

- i. Utilization of pilot plants of the Project

After termination of the Project, every 10 plant constructed by the Project will be handed over the ownership to the farmers and farmer's group of the plants.

Ministry of Agriculture should continuously utilize those biogas pilot plants as model one with cooperation of the plant owner-farmers for dissemination of biogas technology. This would be an optimum venue for facilitating the individual cases of replication as well as for maximizing the showcasing effect of already-build biogas plants.

ii. Registration of biogas plant as agricultural facility under the Ministry

Since the fact that biogas technologies fell in the work of several different government organizations, Ministry of Agriculture should officially authorize the Biogas Plant as agricultural facility. This made the organization and/or the department to be responsible for its management and utilization of biogas facilities.

iii. Promotion of the research on liquid fertilizer and spreaders of liquid fertilizer

Since the Project is unable to follow up the use of spreader, Ministry of Agriculture and Kyrgyz National Agrarian University should continuously cooperate to conduct the research to verify the effectiveness of liquid fertilizer and spreaders of liquid fertilizer.

iv. Identification of potential loan scheme for ordinary farmers to install biogas facilities

Ordinary livestock farmers cannot have easy access to any loan scheme for installing biogas facility at this moment. Therefore, public-financing system with preferential low interests and long-term loan scheme should be identified under the guidance of Ministry of Agriculture. The earliest provision would be appreciated for farmers and/or farmers' group who intend to construct biogas system.

4) Extension of the Project period to the end of the next winter season

Technical development through pilot plant activities will be completed as expected. However, verification of developed pilot plants during the winter (freezing season) cannot be conducted due to the termination of the Project on December 2010.

Therefore, in order to monitor and confirm the stable generation of gas from the plants during the freezing winter season, it is recommended to extend the Project period covering next winter season.

6.2 Lessons Learned

Evaluation Team identified the following lessons learned from the Project:

Identification of possible organizations being responsible for taking technical transfer, and measures to diffuse such technologies

It is essential to clarify the target group to a certain level: who takes technical transfer from JICA Experts and who is responsible for extending the technology to other groups and