

**Low Carbon Agricultural Support Project  
Loan No. 2968-VIE (SF)  
Contract No. 12112015/HDTV01-LCASP**

# **QUARTERLY REPORT 2018-Q1**

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**Prepared for  
Central Project Management Unit  
Ministry of Agriculture and  
Rural Development**

**By  
Agrifood Consulting International**



**in association with**

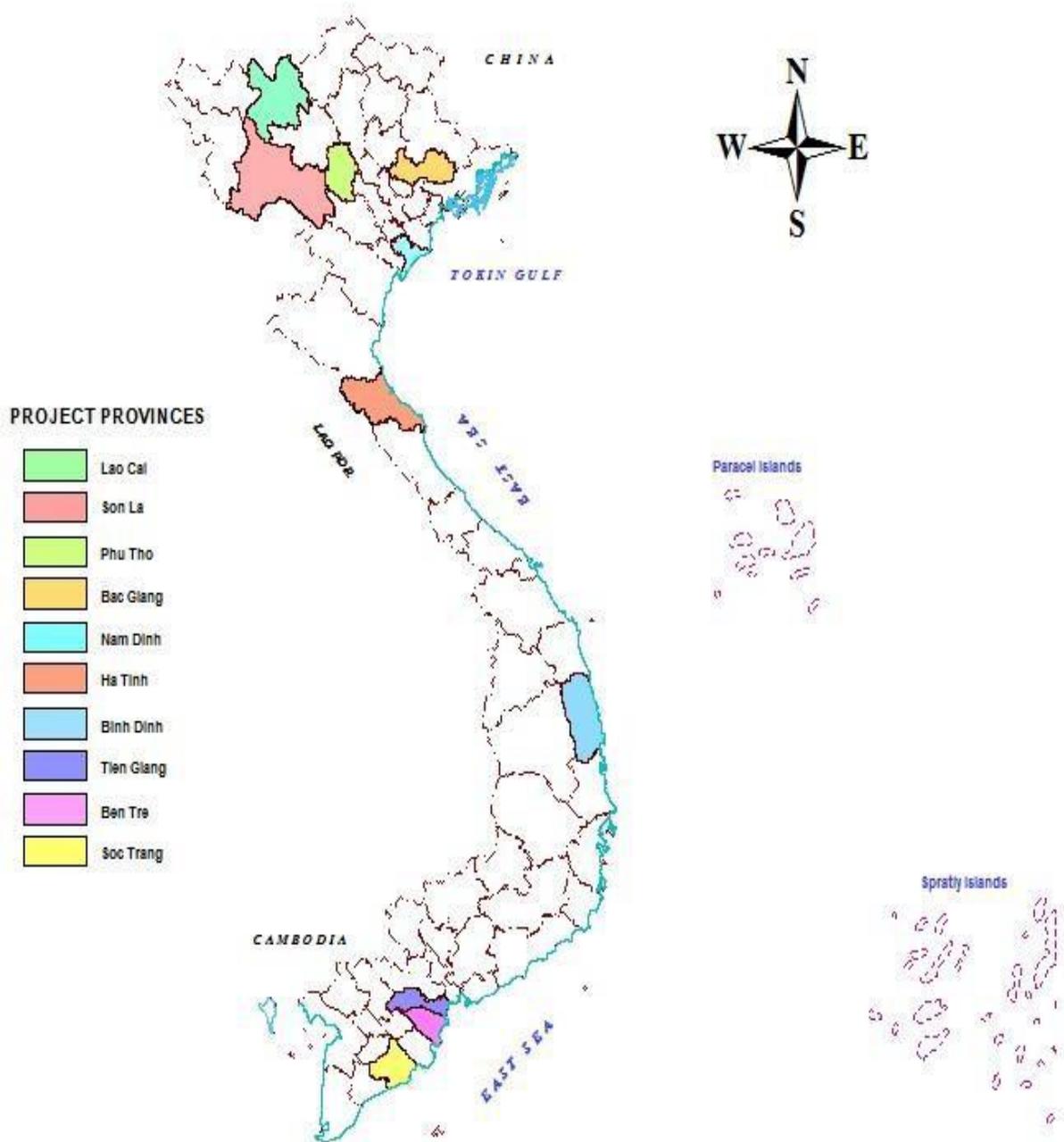
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## Map of project provinces



## LIST OF ACRONYMS

ACI	Agrifood Consulting International
ADB	Asian Development Bank
AD Consult	Asian Development Consultancy Company
APMB	Management Board of agricultural projects
BGT	Biogas technology
BP	Biogas plants
BVC	Biogas value chain
CDM	Clean Development Mechanism
CPMU	Central Project Management Board
CSAWMP	Practical management of smart agricultural waste to cope with climate change
DMF	Framework design and monitoring
EM	Ethnic minorities
EMDP	Ethnic Minority Development Plan
EMR	Environmental monitoring report
GAP	Gender Action Plan
GHG	Greenhouse gas
GOV	Vietnamese Government
HDPE	HDPE plastic
FI	Financial institutions
IEE	Preliminary Environmental Impact Assessment
LBP	Large scale biogas plants
LCASP	The project supports low carbon agriculture
LIC	Consultant for project implementation
MBP	Medium scale biogas plant
MARD	Ministry of Agriculture and Rural Development
NOL	No objection
PPMU	Provincial Project Management Board
REA	Rapid assessment of the environment
SBP	A small scale biogas plant
TOR	Terms of Reference
US\$	U.S. dollar
VND	Vietnamese Dong

## 1. INTRODUCTION

This report describes the achievements and performance of Technical Assistance for LCASP conducted by ACI Consultants and ADConsult in the first quarter of 2018 (January to March 2018) and the proposed plan for the Second Quarter of 2018.

In this quarter, the LIC consulting team continued to support small and medium sized biogas plants (MBPs), especially prevention of the biogas plant overload, solution for making compost and organic fertilizers from exceeding waste in order to optimize the use of small-scale structures. The installation of separators has been conducted in the project provinces. LIC had consulted with the contractors to calibrate the design drawing of the settling tanks, layout and solutions to improve the settling efficiency of the separators. In addition, LIC had conducted measurement on gas quality at several structures to provide technical solutions for the efficient use of biogas by installing generators and other gas appliances. The two packages (Package 25 and Package 26) have been implemented in different stages. These two packages are in the finalization stage of the description and the technology review report. Initial Environmental Evaluation (IEE) reports of MBPs have been prepared and final report will be sent to the CPMU for approval.

## 2. BASIC INFORMATION OF THE PROJECT

Although biogas plant technology is known to Viet Nam for quite some time, the current needs for environmental mitigation measures including the reduction of GHG emission require the adoption of improved technologies and measures to minimize animal waste and effective climate smart agriculture waste management practices (CSAWMP). The new technologies and practices are important for all stakeholders in the project. Consequently, LCASP activities are supported with various capacity building and communication programs to be implemented in central, provincial, district and commune levels.

The Project is expected to increase the uptake of CSAWMP as measured by the increased use of clean biogas energy and organic bio-organic fertilizers.

The specific purposes of the project include:

- (i) Improve management of animal waste and bio-slurry while reducing environmental pollution; creating clean energy; bio-organic fertilizer; generating incomes from Clean Development Mechanism (CDM).
- (ii) Increasing the application of CSAWMPs that are effectively certified; greater use of renewable energy and bio-fertilizer from agricultural waste; replicating

models in order to reduce greenhouse gas (GHG) emissions and improving the livelihoods and quality of life of rural people.

- (iii) Capacity building of stakeholders and disseminating knowledge and skills of good CSAWMP to beneficiaries.

#### Expected Outcome

The Design and Monitoring Framework (DMF) of the Project indicated that by 2018 (from baselines in 2013) the envisaged outcomes in the project areas include:

- At least 70% bio-slurry is converted to organic fertilizers.
- At least 80% energy produced by Biogas Value Chains (BVCs) is utilized
- Daily workload of women and children is reduced by 1.8–2 hours, on average

The four components of the project are

- i) Expanded use of animal waste management infrastructure,
- ii) Credit lines for biogas value chains,
- iii) Enhanced CSAWMP technology transfer and
- iv) Effective project management.

The project covers 10 provinces of Vietnam, which are Son La, Lao Cai, Phu Tho, Bac Giang, Nam Dinh, Ha Tinh, Binh Dinh, Tien Giang, Ben Tre and Soc Trang. The project is implemented for a period of six years from 2013 to June 2019. Based on the Mid-term Review (MTR) in September 2016, the project net loan amount is 67.92 million USD.

### 3. SUMMARY OF TECHNICAL ASSISTANCE ACTIVITIES

Technical assistance in the first quarter of 2018 will focus on addressing technical issues that are still in existence since the fourth quarter of 2017, particularly the overloading of biogas tanks, support to installation of manure separators, biogas power generators, and Initial Environmental Examination (IEE) of MBPs. Main achievements are highlighted below.

#### Biogas technology

- Support and guide the provinces of Tien Giang, Son La and Ha Tinh to develop models of using liquid discharge of biogas plants as fertilizers for crops, effectively using biogas sources;
- Assess biogas quality in some biogas plants in Nam Dinh and Phu Tho provinces;
- Continue to support the pilot implementation of measures to prevent biogas plant overload, methods for utilize biogas and bio-slurry, liquid waste from medium sized biogas tanks in Phu Tho, Son La, Lao Cai, Bac Giang;

- Provide guidance and technical assistance to provinces in the process of developing registration forms, appraisal report for construction registration forms and acceptance of MBPs of households in Son La, Ha Tinh and Bac Giang;
- Provide comments on the technical reports (inception report and description of the packages) of Package 26 on improving biogas technology and enhancing the effectiveness of biogas utilization in the value chain;
- Provide technical assistance to implement the package of electricity generators in small farm households in Lao Cai;
- Support Phu Tho, Son La, Lao Cai, Bac Giang on the use of biogas and bio-slurry, liquid waste from MBPs
- Continue to support the operation and maintenance of small sized biogas plants;

#### Climate Smart Agriculture Waste Management Practice

- Survey current status and provide technical assistance on selection of households to install the manure separators, the system of settling tanks for animal waste, the use of biogas discharge for irrigation of crops, and survey the use of biogas in Tien Giang, Nam Dinh and Phu Tho;
- Survey current status and provide recommendations for the sites where the separators were installed; Survey on the use of biogas and gas quality in Nam Dinh, Phu Tho , support the CPMUs to award research packages;
- Additional design 2 packages, Package 42: Pilot of technology for organic mineral fertilizer production for key crops from animal wastes and biogas slurries in Vietnam and Package 43: Development of Production and supply system of Micro-organism products for organic substance conversion in order to facilitate the treatment of animal waste, biogas slurry and crop residue in Vietnam to produce organic fertilizers.

#### Training and communication

- Supplement and finalize the media script of Package 40 and prepare the contents of the talk show on television, reading, translating and translating English subtitles for the first and third bulletins of the communication package;
- Support to develop 3 curriculums for primary vocational training;
- Report on training results of the project;
- Prepare impact assessment of training courses on gender and ethnic minorities, training technicians, and separator models.

#### Environment Safeguard Policy

- Revise and finalize IEE reports for MBPs in Son La, Bac Giang, Phu Tho, Lao Cai, Soc Trang, Tien Giang and Nam Dinh;
- Environmental monitoring of MBPs

- Review, provide comments and revise provincial internal environment monitoring reports for the last 6 months of 2017 of the provinces;
- Finalize the six month environmental monitoring report of the project.

#### Gender and Ethnic Minorities Safeguard Policy

- Continue support for GAP and EMDP updates

## 4. TECHNICAL ASSISTANCE PROGRESS BY COMPONENT

### 4.1 Component 1: Expanded Use of Livestock Waste Management

According to the project design, component 1 consists of five main activities:

- (i) Standardization and dissemination of design package for biogas value chain management;
- (ii) Strengthening the monitoring capacity of relevant agencies to handover and monitor the constructed biogas plants;
- (iii) Financial support for biogas plants;
- (iv) Capacity building in designing, constructing, operating and monitoring biogas plants;
- (v) Strengthening capacity and providing equipment for relevant agencies to manage the national biogas database.

In the above five activities, in the first quarter of 2018, LIC focused on two main activities, namely (i) and (ii).

#### 4.1.1 *Standardization and dissemination of design package for biogas value chain management*

The consultants continue to support Phu Tho and Son La in developing model to overcome the overload of small-scale biogas plants (SBPs) in farm households. The design solution to prevent overload adjust the amount of waste water discharged and filtered to obtain solid waste from biogas slurry; the solution for optimizing the use of SBPs by making compost from excess manure for organic fertilizers and propose solution for efficient model operation. **Appendix 1**

Supporting and guiding Tien Giang, Son La and Ha Tinh provinces to develop model of using liquid discharge from Biogas plants as fertilizer for crops, effectively using biogas for cooking and lighting.

In order to encourage the households to optimize the use of excess biogas, LIC has reviewed and studied the biogas generator documentation to assess the applicability in Vietnam and finalized the report entitled "Overview on the use of generators in the world, problems and solutions". The report consists of 2 main contents: (i) content related to technical issues such as engine types, fuel consumption and performance/efficiency, etc. and (ii) content related to economy and supporting policy. The report is posted on the project website as a reference and for dissemination of knowledge to the project participants.

To evaluate the current operational status of biogas plants, LIC has conducted the assessment of gas quality in some biogas plants in Nam Dinh and Phu Tho. Gas quality measurement showed that 16.7% of the plants did not have enough gas to use, 83.3% of the plants were overloaded of input materials. However, high methane content indicated that the quality of construction and installation of the plants was quite good, so the anaerobic environment was ensured for methanogenic bacteria to grow. A list of households that had been measured and results of gas quality measurement had been developed to assist PPMUs in advising users on their options and solutions for effectively using gas as shown in Table 1.

**Table 1: Results of gas quality measurement**

No.	Place	Type of tank	Volume (m <sup>3</sup> )	Quality of biogas	
				CH <sub>4</sub> (%)	H <sub>2</sub> S (ppm)
1	Yen Dung, Bac Giang	HDPE	2000	69	8196
2	Bao Thang, Lao Cai	Composite	9	68.5	6030
3	Bao Thang, Lao Cai	KT1	10	68.4	6109
4	Bao Thang, Lao Cai	Composite	9	66.4	5238
5	Muong Khuong, Lao Cai	KT1	48.7	70	2900
6	Muong Khuong, Lao Cai	KT1	14.1	70	445
7	Muong Khuong, Lao Cai	Composite	9	64	2770
8	Thanh Ba district, Phu Tho province	KT1	30	65.7	6613
9	Phu Tho town	KT1	350	82	5400
10	Thanh Ba, Phu Tho	KT1	7.5	71.4	323
11	Mo Cay Bac, Ben Tre	KT2	49.2	67	4800
12	Mo Cay Nam, Ben Tre	KT2	48.5	67	3600
	<b>The average value</b>			<b>70</b>	<b>4369</b>

The consultants surveyed the current situation, recommended on the places installed with manure separators, settling system for animal waste treatment and use of biogas liquid discharge as fertilizer for crops in Nam Dinh and Phu Tho. Calculation of the settling tank volume was made for the farms installed with manure separators in the two provinces of Nam Dinh and Ha Tinh, as the calculation results from both companies supplying separators in these two provinces were unsuitable with the actual situation at the farm; the capacity of the settling tank was too small compared to the number of pigs in the farm. At the same time, LIC investigated and evaluated the settling capacity and manure separation efficiency of the separators installed in the project. (Appendix 1).

Technical consultancy had been provided for households that will install biogas generator in Lao Cai on the installation, maintenance and use of biogas generators (installation and use of large biogas bags (10 - 15 m<sup>3</sup>), use and replacement of H<sub>2</sub>S filter in the filter, water trap, safety equipment, etc.).

The provincial coordinators supported the PPMUs to develop proposals for models to use waste and residues from biogas tanks as organic fertilizer for crops and environmental protection, specifically 03 models in Ben Tre, 03 models in Nam Dinh, 02 models in Ha Tinh ....

#### *4.1.2 Strengthening the monitoring capacity of relevant agencies to handover and monitor the constructed biogas plants*

The provincial coordinators often work closely with provincial technicians to inspect and supervise the biogas plants constructed in the project. Some typical examples are:

- The coordinator of Nam Dinh province together with provincial PPMU conducted acceptance for 84 biogas plants in 10 districts and cities, of which 42 plants received subsidies of 3 million VND/plant and 42 plants received 5 million VND/plant.
- The coordinator of Ben Tre province together with Ben Tre PPMU conducted acceptance for 43 plants, of which 36 plants received 3 million VND/plant and 7 plants received 5 million VND/plant.

The consultants together with CPMU developed acceptance forms for MBPs and the criteria for evaluating the plants after the construction and equipment installation is completed. The forms had been approved by the CPMU for use in the project.

The consultants together with CPMU carried out the inspection and acceptance for 6 MBPs with the capacity of 51 - 75 m<sup>3</sup> in Bac Giang and Lao Cai; these plants had been built to meet the technical requirements of the project. During the inspection, LIC had consulted on measures to thoroughly use biogas; encouraged technical measures in the thorough use of biogas liquid discharge for fruit trees, tea, grass, vegetables, upland crops and fish ponds, and recommended technical measures for the operation and maintenance of the MBPs.

LIC also provided technical support to Bac Giang and Ha Tinh provinces for the selection of households to build additional MBPs. With the consultation of LIC, Ha Tinh has selected 6 more potential households and Bac Giang selected 7 potential households that want to build MBPs.

LIC also reviewed, provided comments and edited the internal environment monitoring reports for Son La, Phu Tho, Lao Cai, Bac Giang, Soc Trang, Tien Giang and Nam Dinh provinces.

The Ethnic Minority Development Plan (EMDP) and the Gender Action Plan (GAP) are regularly updated to support the CPMU.

## **4.2 Component 2: Credit Lines for Biogas Value**

*Financial Institutions (FIs) to provide credit lines to Eligible Beneficiaries to finance Biogas Value Chain Infrastructure and other climate-smart agriculture waste management investments which satisfy the Subproject Eligibility Criteria by June 2019.*

No activity was reported this quarter.

## **4.3 Component 3: Enhanced CSAWMP technology transfer**

*4.3.1 Utilizing farmer-based research including using biochar and other agricultural wastes as organic fertilizers; applying other efficient low greenhouse gas emission agricultural practices which generate bio-energy, managing waste treatments in aquaculture and other CSAWMP.*

Research packages signed by the end of 2017 had been started. The consultants provided technical support to research contractors as required by the CPMU. The consultants participated by giving comments to the Inception Report and detailed descriptions of the research packages as follows:

- For Research Package 25: (i) Improve organic composting technology from animal waste to make the most use of agricultural byproducts such as straw, old corn stem, husk ... in order to increase the economic benefit of the composting process; (ii) Research on simple methods to dry slurry (similar to sludge) to be input material for making organic fertilizer; (iii) Study methods for using biogas discharge as a source of liquid organic fertilizer, or as an input material for making organic fertilizer.

- For the Research package No. 26: (i) For small scale biogas technology, it is necessary to improve the collector of slurry from the digestion tank, to facilitate the removal of slurry on a monthly basis. The stirrer also need to be improved to increase fermentation efficiency; (ii) For medium and large size biogas plants, it is necessary to improve the scum disintegration part and slurry collector of the digestion tank; (iii) For the use of biogas in the value chain, it is necessary to improve the generator system (biogas bag, generator cooling system, power supply system, etc.) to improve the efficiency of biogas use and generators.

- For the Research package No. 27: (i) It is necessary to evaluate the actual amount of water used for cleaning livestock cages and livestock bathing in the three regions of Vietnam (Northern, Central and Southern) by installing water meters; (ii) Research on the use of high-pressure pumps to "wash" the cages to reduce the amount of wastewater. (iii) Research on the appropriate styles of cages for waste collection without water.

Pursuant to the agreement between ADB and MARD, LIC had designed two additional packages, Package No. 42: Pilot of technology for organic mineral fertilizer production specialized for key crops from animal waste and biogas by-products in Vietnam and Package No. 43: Development of Production and supply system of Micro-organism products for organic substance conversion in order to facilitate the treatment of animal waste, biogas slurry and crop residue in Vietnam to produce organic fertilizers. These two packages have been submitted to ADB and APMB for approval.

#### *4.3.2 Developing livestock waste management models for agricultural production and greenhouse gas emission reduction*

The consultants had re-evaluated the technical specifications and the actual situation of the locations will be installed with biogas generators under Packages No. 34 and No. 36. The consultants coordinated with the technical staff of the contractors to calculate and adjust all the technical specifications of the models in the two packages before submitting them to the CPMU for approval. At the same time, the consultants also supported the contractor's technical staff to calculate and determine the capacity of the generators in accordance with the actual condition of the farms, and calculate the economic efficiency and effectiveness of use to make recommendation to the PPMUs

for reselecting the locations if the efficiency is low. Some recommendations of the consultant when selecting the sites for installation of biogas generators as follows:

- The installation location should be convenient for the use and operation of the machine;
- The installation location should be close to the place where biogas bags are installed (should be between 5-8 m);
- The installation location should be far away to avoid noise for humans and livestock.

The consultants made comments to complete the designs of the settling tanks in accordance with the installation of the manure separators in the models of Package No. 32, specifically comments on the layout and design of the settling tank of the 4 companies that awarded with Package No. 32 to install fixed separators for farm scale in Phu Tho, Bac Giang, Binh Dinh and Ben Tre.

#### *4.3.3 Capacity building of researchers, extension staff and farmers including vocational training program, training packages and study tours on CSAWMP*

The PPMUs had organized a number of training courses during this period. Together with the technical consultants, the provincial consultants had actively supported the development of materials and support for training activities.

LIC together with the CPMU supported the selected agencies to accelerate the preparation of 3 primary vocational training curriculums to submit to the Ministry for approval.

The consultants provided comments on the media scripts for Package No. 40, videoconferencing and prepared contents for 5 topics related to LCASP project on VTV1, VTV2 and VTC 16. The contents of these topics had also been posted on the project website.

The consultants drafted 2 training materials for Tien Giang province: (1) Measures to utilize excess gas of SBPs and MBPs, (2) Measures to prevent overloading of SBPs.

#### *4.3.4 Establishing an information system (e-library, map sets on agro-ecological zones and distance learning system) to disseminate awareness and knowledge CSAWMP.*

No activity was reported this quarter.

## 4.4 Component 4: Effective Project Management

4.1 Establish CPMU and PPMUs to be operational by 2013

4.2 Conduct a gender awareness raising workshop for PMUs by 2016.

4.3 Engage consultants for start-up and auditing, and to develop the PPMS, with sex- and-ethnicity-disaggregated data and including gender action plan monitoring by 2015.

This section also includes environmental and gender safeguards.

### Environment

In the first quarter of 2018, 14 IEE reports were prepared and submitted to the CPMU. As a result, from the end of 2017 to the first quarter of 2018, a total of 17 biogas plants were built. However, only 14 completed reports have been completed, the remaining IEE ones have not been finalized (Table 2 as below).

**Table 2: Status on the IEE report preparation**

No.	Province	No. of MBPs	IEE status in the 1 <sup>st</sup> quarter of 2018	
			Preparation stage	Finalized and provided to CPMU
1	Son La	8	0	0
2	Lao Cai	5	1	1
3	Bac Giang	3	9	9
4	Nam Dinh	10	0	0
5	Ha Tinh	10	0	0
6	Binh Dinh	5	4	4
7	Tien Giang	3	0	0
8	Ben Tre	3	0	0
9	Soc Trang	2	0	0
	Total	49	14	14

The project's 6 month environmental monitoring report is developed by the CPMU with the regular support from the environmental safeguard specialist based on the internal environmental monitoring reports of the provinces. Currently, the project's periodic environmental report has been developed and is being sought for approval from ADB. Some issues in the report show that sedimentation tank from most of the construction works have not been designed properly in line with the standards to treat sludge after biogas, the waste water from these sedimentation tanks has not met the Vietnamese standards No. 62-MT: 2016/BTNMT. Although LIC's experts and sludge disposal experts have come up with several designs to fiamr the amount of suspended solids in wastewater after biogas, those design have not been reached and many households are

not willing to apply due to: lack of construction sites, lack of funding and efficiency of these sedimentation tanks have not been tested.

### *Gender and Ethnic Minorities*

LIC updated the gender monitoring action plan for the fourth quarter of 2017, and the internal monitoring report on the EMDP in the last 6 months of 2017 for the ADB mission. Based on a memorandum of understanding signed by the ADB mission in May 2017, LIC reviewed and updated gender activities in the project activities and updated the GAP monitoring report by the end of February 2018.

LIC collaborated with CPMUs, PPMUs and contractors to integrate gender indicators into the specific activities of the studies and activities and at the same time guided the provinces where EM communes are available develop EM indicators.

#### *4.4 Undertake baseline surveys in all project provinces with collection and analysis of sex-and-ethnicity-disaggregated data by 2016.*

Completed in early 2016

#### *4.5 Prepare progress reports and submit to ADB on a regular basis by 2018.*

Various reports including technical and quarterly progress reports have been provided to CPMU. In addition, LIC have also sent weekly reports to CPMU on technical progress.

## **5 SPECIALISTS MOBILIZATION**

None of new specialists was mobilized in this quarter.

## **6 LIC MANAGEMENT**

LIC team members provided their inputs as requested by CPMU and PPMUs. All Provincial Coordinators supported PPMUs on various activities, coordinating with the subject matter Specialists.

### *The 2017 summation and 2018 plan conference*

LIC held the 2017 summation and 2018 plan conference in Moc Chau, Son La province on January 15, 2018. At this conference, the central and provincial consultants mentioned about relevant technical issues including: i) Solutions to overcome the phenomenon of bio-gas plants abundance; ii) issues related to gender and ethnic

minorities including the integration issue of gender and ethnic minorities in some provinces; iii) evaluation on the effectiveness of bid package implementation to be basis for the elaboration of mechanisms and policies; and iv) updates on progress as well as existing issues related to the implementation of the bids package on installation of waste separators and construction of medium scale biogas plants in 4 provinces: Ben Tre, Bac Giang, Binh Dinh, Phu Tho, Lao Cai.

*Report on the 2017 summation and 2018 plan conference* is presented in the Appendix 2.

*Participation in the ADB mission*

In March 2018, ADB conducted a project evaluation and the LIC consultant team fully supported the ADB mission at fields and at report preparation. The consultant also shared comments on the mission report.

**Table 3: Summary on workshops/conferences as organized and participated by LIC**

No.	Name of workshops/conferences	Organization al Agency	Participants	Period
1	The 2017 LCASP summation workshop	CPMU	LIC, CPMU, PPMU	29/1/2018
2	The LIC’s 2017 sumation and 2018 plan conference	LIC	LIC, CPMU, PPMU Son La	14-15/1/2018

*Coordination*

LIC has worked effectively with the stakeholders to implement the project. In addition to the CPMU and the PPMUs, LIC has worked with companies providing separators and generators to assist them in completing work related to the installation of these devices as well as reviews and suggestions for these contractors to complete the training materials.

*Report prepation and submission*

In addition to the technical reports, the Q4 2017 report were also be submitted to the CPMU.

*Specialists and Provincial Coordinators Input Period*

Specialists and Provincial Coordinators inputs by desk office and field are tabulated in Table 3 for the period of January to March 2018. A total persons-months was 29.27, in monthly average, of which the person-months at the desk office and field were 11.45 and 17.82 in turn.

**Table 4: Specialists Inputs by Desk Office and Field (Jan – Mar 2018)**

Full name	Person-months by desk office	Person-months by field
Manohar Shrestha	0.00	0.73
Bùi Bá Bổng	0.00	0.00
Henrik B. Moller	0.00	0.45
Nguyễn Văn Bộ	2.09	0.91
Hồ Thị Lan Hương	2.14	0.32
Bùi Văn Chính	2.39	0.64
Phạm Thị Vượng	2.50	0.64
Phạm Văn Bình	0.00	0.00
Tạ Hòa Bình	1.68	0.18
Lê Thị Mộng Phượng	0.77	0.45
Nguyễn Ngọc Long	0.00	0.00
Lê Thị Thoa	0.00	0.00
Bùi Thế Hùng		1.50
Bùi Thị Phương Loan		1.50
Lê Ngọc Hùng		0.45
Đặng Thị Phương Lan		1.59
Tống Khiêm		1.73
Nguyễn Đình Vinh		1.45
Đào Văn Thông		1.55
Bùi Thị Lan Hương		1.55
Trần Việt Cường		0.55
Dư Văn Châu		1.95
<b>Total</b>	<b>11.45</b>	<b>17.82</b>

## 7 TA PERFORMANCE ASSESSMENT

It was very common now that the size of the current biogas plants were not suitable with the amount of manure to be treated. Therefore, LIC continued to support the design of overloading solution for SBP and MBP in a number of project provinces by (i) construct a two-compartment sedimentation tank before the BP and separate solid waste from animal wastewater by natural sedimentation for organic composting and (ii) separate

solids in tanks after BP and uses solids collected as organic fertilizer. The initial assessment showed that the overloading solution in BP in Phu Tho has brought effectiveness.

The manure separators continued to be installed in the provinces and several technical issues were supported by the LIC team, such as suggestions for completing the design of the sedimentation tank for separators and utilization of waste collection systems and sedimentation tanks for separating machines which were considered highly effective. These comments/suggestions were welcomed by the CPMU and the contractors and the contractor has modified the design of the sedimentation tank basing on these comments

Since the prices of pigs have fallen so low, the number of pigs raised in farms have declined significantly compared to previous time. This has affected the implementation of power generation model in some provinces due to insufficient gas to run the generator. LIC has supported the PPMU and the contractors to evaluate the locations where the generators will be installed and their capacities in Lao Cai, Bac Giang and Ben Tre. Some initial selected locations have been replaced by new locations that receive high agreement from all parties.

LIC consultants have supported several workshops and trainings by providing presentations, sharing experiences and results. In particular, LIC has supported the CPMU to complete the information dissemination plots and prepare the contents of the discussion, implementing communication conferences for the project. In addition, LIC also assisted the stakeholders in finalizing three primary training materials and training materials on the use of manure separators.

The completion of IEE reports for MBP were slow. Until the end of the Quarter 1, 17 MBPs have been built but only 14 had IEE report and LIC continued supporting the PPMU to finalize the IEE report.

An internal monitoring report on the EMDP for the last 6 months of 2017 and a GAP monitoring report by the end of February 2018 have been finalized and sent to ADB.

## 8 WORKING PLAN FOR THE NEXT QUATER

See Table 5 for detail plan for the next quarter.

**Table 5: Plan in Quarter II 2018**

No	Activities	2 <sup>nd</sup> quarterly 2018			Note
		4	5	6	
<b>1</b>	<b>Component 1: Expanded use of livestock waste management infrastructures</b>				
1.1	Review solutions to prevent overload for smal scale bio-gas plant	■			
1.2	Technical support for implementation of medium and small scale model preventing overload for Son la, Ha Tinh and Phu Tho province.		■		
1.3	Support to PPMUs on MBP design, construction and monitoring				
1.4	Support PPMUs on monitoring the quality of MBP construction	■			
1.5	Support to PPMUs on post-treatment system after biogas digester	■			
1.6	Support to PPMUs on biogas excess gas use of MBP				
1.7	Update the implementation status and review on manure separators		■		
1.8	Technical inputs to PPMU on manure separators		■		
1.9	Support contractors on manure separators		■		
1.10	Support on sedimentation tank design		■		
1.11	Support for evaluation of efficiency of manure separators		■		
1.12	Support for pilot test of optimal sedimentation/separation		■		
1.13	Support O&M of manure separator system		■		
1.14	Support PPMUs and contractors to install Power Generators			■	
1.15	Support contractors with power generators			■	
1.16	Support for optimal utilization bio-slurry as organic fertilizer for crops (Bio-slurry utilization P37)			■	
<b>2</b>	<b>Component 3: công nghệ CSAWMP Component 3: Climate Smart Agriculture Waste Management Practices</b>	■			
2.2	Support development of optimal technology for use of bio-slurry as fertilizer	■			

2.3	Support development of optimal technology for use of crop residue as organic fertilizer		
2.4	Support to complete the report reviewing bio-gas technique		
2.5	Support to complete the report reviewing power generating using bio-gas technique		
2.6	Support to complete the report reviewing bio-gas filter technique		
2.7	Support development of optimal technology for water saving piggery production		
2.8	Support development of optimal technology for treatment of sludge sediment in shrimp farming		
<b>3</b>	<b>Training and Communications</b>		
3.1	Review curriculum and support PPMU and contractors to implement training activities		
3.2	Training assessments		
3.3	Identify and design communication materials		
3.4	Follow up on communication materials		
<b>4</b>	<b>Environmental Safeguards</b>		
4.1	IEE preparation for MBPs		
4.2	Review and finalize IEE Report		
4.3	Support to prepare 6-month Environmental Monitoring Reports		
4.4	Regular environmental monitoring support to CPMU and PPMUs		
4.5	Field survey on IEE		
<b>5</b>	<b>Other Activities</b>		
5.2	Review of mission reports and others reports		
5.3	Facilitation and participation in CPMU Workshops		
5.4	Facilitation and participation in PPMU Workshops		
5.5	Technical articles preparation and upload in LCASP website		
<b>6</b>	<b>Report</b>		
6.1	Quarterly report		

## 9 CONCLUSIONS AND RECOMMENDATIONS

### *Conclusion*

The progress of construction of SBPs has been slowed down due to the occasion of Lunar New Year. The number of MBPs constructed during this period were not high either. The appraisal and approval of MBPs construction registration were updated regularly to timely support the CPMU as well as the PPMUs for timely implementation and effective management of the works. In addition, provincial coordinators often work closely with provincial technicians to inspect and supervise the biogas plants built within the project.

For the installation package, this is the time for installation of manure separators and bio-gas power generators. However, the installation process has been behind schedule due to several reasons in which there may be one reason that the design of sedimentation tank has not met the demand of each farm. Therefore, LIC still cooperates and supports the contractor to complete the design, choosing households to join the model and evaluating the installed manure separators.

The implementation of research packages is too slowly, which may affect the results as well as the committed progress.

The consultant will continue to assist the PPMUs and the contractors in compiling training materials and conducting training. However, PPMUs as well as contractors will need to complete the training evaluation in accordance with the overall Training Plan.

The preparation of IEE reports by PPMUs is still slow. The submitted IEE reports should be approved soon by the CPMU.

Provincial consultants have been mobilized in all provinces. In general, the technical assistance of the LIC team is effective at all stages.

### *Recommendation:*

- The goods packages have been and are being implemented, but due to the reduced livestock situation in the model farms, the manure separators as well as generators installed on some farms have not actually been proven to be effective. Therefore, there should be close cooperation among the relevant parties, such as CPMU, PPMU, LIC and contractors to find the optimal solution

for the use of manure separators and generators which have been and will be installed together with other synchronous solutions.

- Installation of manure separators and power generators should continue to be tested to address technical issues.
- The construction of MBPs should be speeded up, as at the end of the first quarter of 2018, only 20 MBPs were built (reaching 40.8% of the target).
- The research packages should be combined with relevant model packages at some locations to make it easier to compare new technology and equipment.
- In the coming time, the project should focus on successfully building new models, monitoring and evaluating the efficiency of the application models of manure separators producing organic fertilizer, prevention of overloading for biogas plants and using wastewater after biogas plants to irrigate crops. This model has been developed for the later on replication in the project.
- There should be a plan for utilizing the package 14: environmental protection and should consult the research packages to use these equipment to perform the sample collection and analysis.
- The project should actively propose contents related to the management of animal and plant waste, including liquid waste in the Law on Livestock and Law on Cultivation, which are being prepared by the Ministry of Agriculture and Rural Development for submission to the National Assembly in 2018.
- The revised TOR for LIC consultants should be quickly approved.

## APPENDIX

### Appendix 1: Analyze efficiency of the manure separator

The demonstration packages 32/33 aims at utilization of manure separators to improve manure management and reduce overloading of biogas digesters. Manure separators are a well-known technology to separate part of the dry-matter and nutrient from liquid animal manure slurry. There are different systems for separating slurry into a nutrient and dry-matter rich fraction and a liquid fraction; for instance, mechanical screen separators, screw presses, sedimentation, centrifugation and reverse osmosis. In the LCASP project mechanical screw press separators from the Austrian Company Bauer and from Italian company Cri-man have been selected. Screen separators are in general very reliable and cost-efficient equipment but the efficiency is only high when treating slurry with a dry-matter at 6% or above, usually up to 35% of the initial dry-matter of slurry can be separated to a solid fraction with a dry-matter content about 30%. In this chapter an initial description and proposal of methodology for evaluation of separation efficiency is developed and observations from the visited provinces are evaluated and recommendations are included.

The used separators are Bauer or Cri-man screw press used on liquid manure after an initial sedimentation. The reason implementing an initial sedimentation step is to increase the dry-matter concentration in the liquid manure to a suitable level where the separator works optimal. The dry-matter concentration in liquid manure in Vietnamese pig production is very low, often less than 1% due to high use of water for washing and cooling the pigs. This very dilute manure will not give an optimal separation with a screw press where more than 6% is desirable. For this reason an initial sedimentation tank is installed. By natural sedimentation, the fact that the particles and liquid in the liquid slurry have different densities is exploited and require low throughput. Low throughput sedimentation tanks collect the precipitate, which has consistency as a viscous slurry.

In Bac Giang province data has been collected from two farms where the amounts of solid fractions have been registered. The data and the calculations for the farms are listed in table 1.

Table 1		Calculation of theoretical and actually observed amount of produced solids in two farms.			
Parameter	Unit	Farm 1 (Nguyen The Thuyet)	Farm 2 (Pham Van Dung)		
Animal category		Fattening pigs	Fattening pigs	Total	
<b>Amount of pigs</b>		<b>600</b>	500	500	<b>1000</b>
<b>Average weight</b>	kg	<b>85</b>	90	120	<b>105</b>
<b>Fattening pigs equivalent</b>		<b>600</b>	724	795	<b>1519,</b>
<b>Manure</b>	kg ab animal/day	<b>3,5</b>	3,5	35	<b>3,5</b>
<b>Manure</b>	DM (%) ab animal	<b>10</b>	10	10	<b>10</b>
<b>Drymatter</b>	kg DM/day	<b>210</b>	254	278	<b>531</b>
<b>Washing water</b>	kg/day	<b>24000</b>	20000	20000	<b>40000</b>
<b>Total slurry</b>	kg/day	<b>26100</b>	21750	21750	<b>43500</b>
<b>Drymatter in slurry</b>	%	<b>0,80</b>	1,2	1,3	<b>1,81</b>
<b>Solid fraction</b>					
<b>Calculated based on theoretical assumptions</b>	kg/day	<b>208</b>			<b>527</b>
<b>Produced</b>	kg/day	<b>214 (average 7 days)</b>			<b>992 (average 9 days)</b>

*The assumption are 80% sedimentation efficiency, 35% separation efficiency and 30% drymatter concentration in solid fraction.*

In the table it can be seen that the actual amount of solid fraction produced during first test period is higher than the theoretical calculated with the assumptions used. In farm 2 almost double amount is produced compared to the expected while for the first farm the calculated and measured amount is almost the same. However the data survey need to take place over longer time and with precise data collection to have a clear picture of the long term efficiency.

In the LCSAP project a large number of separators have been installed and more will be installed in the coming period. This offers unique possibilities to collect data from a large number of installations with many varying parameters like number and type of animals, amount of washing water, size and proportion of sedimentation tank, detention in sedimentation tank etc. To be able to make statistics and evaluate which parameters determines the efficiency of separators data, it is recommended to collect data for all separators and a survey and test report should be developed for all installations. The test should be done for a period of at least one month and the separator should run 2 times per

week. Each time the separator is running the sedimentation tanks need to be emptied for sediment as well as possible, i.e. until the pump can not pump any more material.

In general, it seems that the dimensions of the sedimentation tanks are too big and they don't have the ideal proportions between length and width. If possible some of the sedimentation tanks that have not yet been installed should be constructed in the recommended size and proportions and in general the sedimentation tanks should be designed so that they fit the actual animal population on the farm instead of using standard design.

In cases where sedimentation tanks are too big in relation to the amount of animals on the farm, addition of organic bulk material could be an option to increase the amount of solid fraction produced and making a suitable dry-matter concentration for separation in the sedimentation tanks (>6%) by adding bulk material so that separation can be done with frequent intervals (2 times or more per week). The bulk material could be fibrous material in the form of straw, ricehusk, sawdust, residues from coconuts or similar which could be added to the tank some hours before separation.

For all farms there should be initiatives to reduce the water consumption to maximum 30 liter per pig per day to reach the ideal dry-matter concentrations for separation.

## Appendix 2: Minutes of the 2017 summation meeting and the plan for 2018

### I. General

1. Purpose of the meeting: Summing up the consultancy work in the year of 2017 and the work plan for 2018
2. Chaired by: Asia Development Consultancy Joint Stock Company (ADC) (ADC)
3. Guest: Low Carbon Agriculture Project Management Board (CPMU / LCASP), Son La LCASP Project Management Board.
4. Participants: LIC and provincial consultants.

### II. Result of the meeting:

1. Mr. Nguyen Ngoc Thang, the representative of Asia Development Consultancy Company has given the opening speech; Mr. Lo Thanh Bang, representative of PPMU LCASP Son La presented his welcome
2. Mr. Nguyen Van Bo, DTL of the consultant team, reported on the results of the consultancy activities in 2017 and the implementation plan for 2018 as well as the consultative relationship with the CPMU's counterpart with the provincial consultant. He also raised the Consultant's solutions related to the implementation of the project activities and proposed recommendations to implement the project more conveniently.
3. Mr. Hoang Thai Ninh, Deputy Director of LCASP, commented on the contents related to the project management as well as the project implementation status and stated key issues in 2018 that the consultant Particular attention should be paid to implementation, especially the monitoring of the implementation of local bidding packages.
3. The provincial consultants and consultants have stated the following technical issues: i) Mr. Bui Van Chinh, reported on overcoming overloading biogas plants, in which 2 designs to limit overloading of biogas plants (small and medium scale) have been approved by CPMU and implemented by Phu Tho PPMU; ii) Ms. Le Mong Phuong, reported issues related to gender and ethnic minorities. In particular, gender mainstreaming and ethnic minorities have achieved some results, but they are not the same across provinces. Statistics on gender and ethnic minorities are still low in training reports. This content has been even neglected in the planning stage. Therefore, the consultant suggested the provincial coordinator to work closely with the PPMU to carry out gender-related monitoring, with particular attention to mainstreaming gender and ethnicity into local plans, bidding package as well as propose the CPMU's facilitator on loan consider that the loan agreements which signed by both husband and wife should be counted as loans in the name of both husband and wife; iii) Ms. Le Thi Thoa, consultant on institutional and policy, recommended that the effectiveness of implementation of bidding packages should be evaluated as a basis for the development of mechanisms and policies.

4. The consultants of Ben Tre, Bac Giang, Binh Dinh, Phu Tho and Lao Cai updated the progress as well as the issues related to the implementation of the package 32 – manure separators and construction of MBPs.

From the initial evaluation, the quality of the separators installed was of good quality, however the separation efficiency was very different. The consultants claimed that there are three main reasons for the performance of the separators, namely the percentage of raw material in the manure (too loose in many places due to the use of 30-50 liters of water per pig per day), or the low number of pigs <1000 and separation time as well as separation distance. It is recommended to use a separator for farms with over 1000 pigs and at least twice a week.

Some provinces such as Phu Tho, Bac Giang and Binh Dinh, the households with manure separators also had the initiative to install extra tanks and trash collection nets (trash and cover may be unintentionally mixed); adding solid waste restriction valves from sedimentation tanks or microbial mulch into post-separation waste, bagging and incubation in bags which is good in the process of incubation and delivery to the purchase of fertilizer. In Phu Tho, the consultant also asked the contractor for the machine to run without load then with the maximum load to check the efficiency of the machine, or arrange the water pump separator in the middle of the scum and the sedimentation of the tank to reduce the amount of water before separation helps to improve separation efficiency. At present, the product consumption of the separator is very good, the amount of separation to be consumed there. Binh Dinh PPMU also signed a contract with Binh Dinh Fertilizer Company to buy all the separated fertilizer.

However, some contractors consider package 32 as a goods package not model package, so they are irresponsible in designing and supervision of the construction of ancillary facilities, sedimentation tanks or stirring machine installation (so manure firing to manure separator when operatin...). It is difficult for households and provincial consultants to contact contractors. To ensure the quality of the packages, the CPMU is requested to remind responsible contractors to implement the contract and to cooperate closely with the provincial coordinator when implementing.

Tien Giang and Phu Tho may have to adjust/alternate households with manure separators, due to the relevant criteria, especially the number of pigs. For Ha Tinh, the selection of some slaughter households for the installation of medium scale biogas plants needs to be adjusted because it is difficult to meet the criteria for use of biogas by plants, as well as to ensure the sustainability of the model.

About the MBP with a volume of 50-75 cubic meters, the amount of gas generated is used up for tea drying, alcohol making and bran cooking and these households have signed commitments to fulfill the requirements of the project. Son La is also in the process of adjusting household using manure separator.

5. Mr. Nguyen The Hinh, the Project Director, was very pleased with the outcome of the

meeting, thanks to the frank and constructive speeches of the participants. He was looking forward to receiving further cooperation and support from LIC in the coming time, especially focusing on the following topics: (i) livestock waste treatment technology, (ii) mechanisms and policies support the implementation of low-carbon agriculture solutions; and (iii) promote communication and dissemination activities to introduce the results of the project to a wider audience and, in particular, Supervision and monitoring of project implementation activities in the provinces.

6. Mr. Nguyen Van also noted that the consultant is concerned about the implementing the following issues in 2018:

(i) 2018 is the final year of the project, so each consultant should concentrate on his or her responsibilities to develop an appropriate plan, including the prioritization of workdays for the beginning and end of the year, even saving certain days for the year of 2019.

(ii) All packages are implemented in 2018; each consultant, especially the provincial consultants, needs to monitor progress, actively participate in monitoring and evaluation to timely consult to CPMU and PPMU.

(iii) In 2018, a conference on policy on comprehensive treatment of animal waste will be held. The institutional and policy team is requested to develop a detailed plan for submission to the CPMU for implementation.

(iv) The provincial and national consultants should cooperate together and cooperate with the CPMU as well as with the PPMU to work more smoothly, assist each other more effectively. At the request of the Project Director, LIC needs to spend more time on field work.

On behalf of the consultants, Mr. Nguyen Van Bo sincerely thanked the Leaders of the Agricultural Projects Management Board and the LCASP Project Management Board for their prompt and effective attention and guidance to the consultancy activities and expected that the cooperation will continue in the coming time and thanked the participation of Son La PPMU. He also thanked the ACI/ADConsult partnership for creating good working conditions.