Feb 2017

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

ANNUAL REPORT 2017

Hanoi, 15 February 2017

Prepared for
Central Project Management Unit
Ministry of Agriculture and Rural Development
by
Agrifood Consulting International

in association with

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Smart Policies and Practices for Shared Prosperity

Agrifood Consulting International

24 February 2017

Dr. Nguyen The Hinh,
Project Director,
Low Carbon Agricultural Support Project,
Floor 8th, Building No. 2, 16 Thuy Khue,
Tay Ho, Ha Noi, Viet Nam

Reference: LCASP/2017/02/24/01

Subject: Submission of Annual Report

Dear Sir,

Agrifood Consulting International Inc. and our associated firm, Asia Development Consultant Joint Stock Company are pleased to submit **Annual Report** for your acknowledgement of the progress have been made, challenges and recommendations for more successful project implementation.

If you need our further clarification, please let us know.

Thank you very much for your cooperation and support

Yours Sincerely,

Francesco Goletti

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Francesco Goletti
President/CEO
Agrifood Consulting International Inc.

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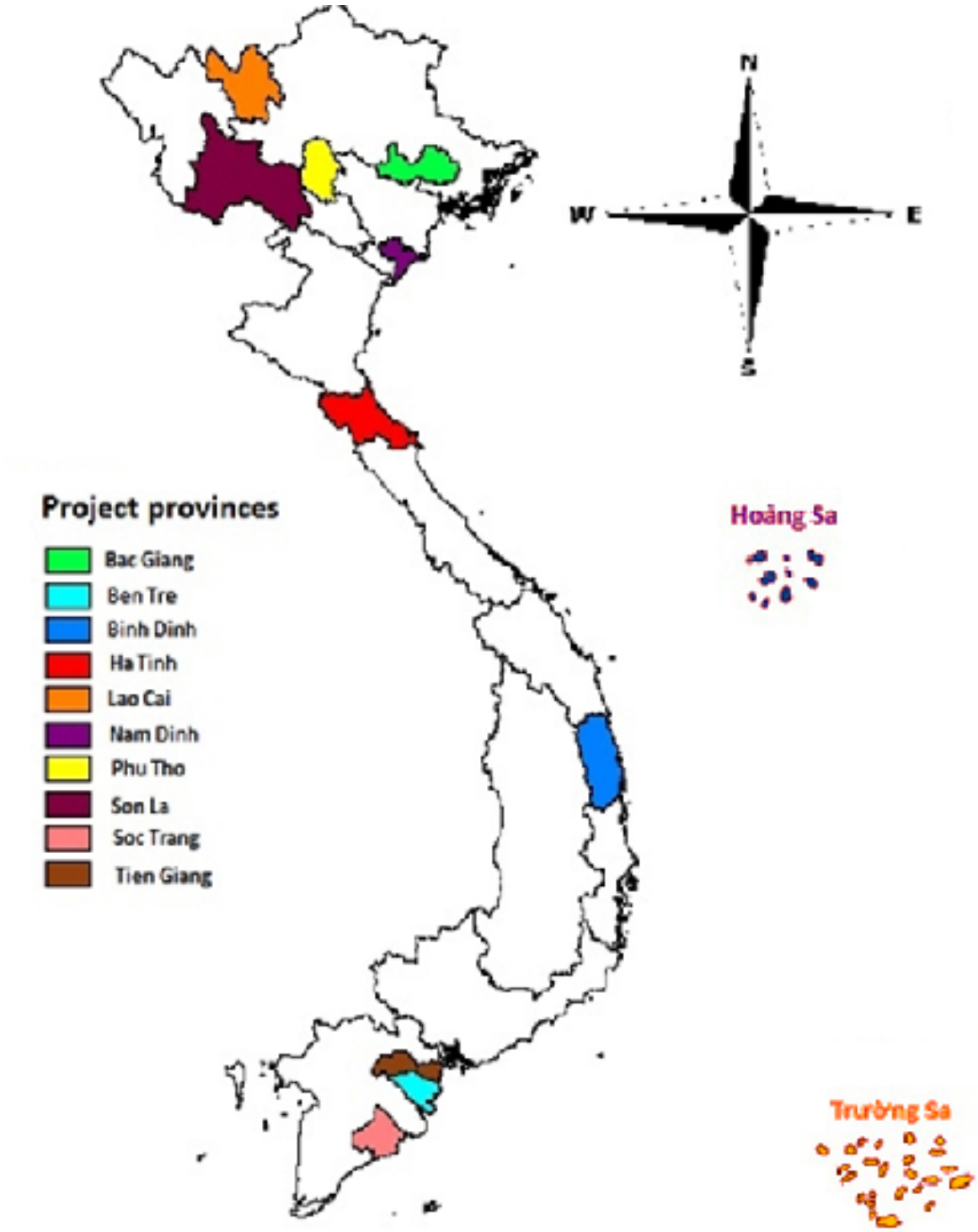
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Project provinces
Bac Giang
Ben Tre
Binh Dinh
Ha Tinh
Lao Cai
Nam Dinh
Phu Tho
Son La
Soc Trang
Tien Giang
Hoàng Sa
Trường Sa

ABBREVIATIONS

ACI	Agrifood Consulting International
ADB	Asian Development Bank
AD Consult	Asia Development Consultants JSC
BVC	Biogas Value Chain
CDM	Clean Development Mechanism
CPMU	Central Project Management Unit
COD	Chemical Oxygen Demand
CSAWMP	Climate Smart Agricultural Waste Management Practices
DoSTE	Department of Science, technology and Environment
DTL	Deputy Team Leader
DMF	Design and Monitoring Framework
EMR	Environmental Monitoring Report
EMP	Environmental Monitoring Plan
GHG	Greenhouse Gas
GIS	Geographical Information System
GoV	Government of Viet Nam
HDPE	High Density Polyethylene
FI	Financial Intermediaries
IEE	Initial Environmental Examination
ICT	Information and Communications Technology
IPCC	International Panel for Climate Change
LCASP	Low Carbon Agriculture Support Project
LIC	Loan Implementation Consultancy
LBP	Large Biogas Plants
MBP	Medium Biogas Plants
MARD	Ministry of Agriculture and Rural Development
M&E	Monitoring and Evaluation
MOU	Memorandum of Understanding
MTR	Mid Term Review
NOL	No Objection Letter
NBP	National Biogas Program
NCB	National Competitive Bidding
PC	Provincial Coordinators
PPMS	Project Performance Monitoring System
PPMU	Provincial Project Management Unit
ppm	Parts per million
REA	Rapid Environmental Assessment
REOI	Request for Expression of Interest
RFP	Request for Proposal
SBP	Small Biogas Plants
SNV	Netherlands Development Organization
TA	Technical Assistance
TNA	Training Needs Assessment

TOR	Terms of Reference
US$	United States $
VND	Viet Nam Dong
VAAS	Viet Nam Academy of Agricultural Sciences
VBA	Viet Nam Biogas Association

1. INTRODUCTION

This is the first annual report of LIC covering the year 2016. It also includes additional one month, December 2015, from the time LIC started to function. The report is prepared presenting a summary of progress made by LIC during the period. Detailed reporting had been covered under four quarterly reports of 2016. Other separate reports prepared during the period are Inception Report and Mid-term Report. Mid-term report had been prepared as a comprehensive report of CPMU and LIC covering the period from the beginning of the project (in case of LIC, from December 2015).

The report has been prepared based on the Specialist reports and other project reports. The main chapters of the report are features of the technical assistance, quarterly progress, technical assistance performance assessment, work plan 2017 and recommendations.

2. PROJECT BACKGROUND

LCASP is a model project addressing the environmental mitigation measures especially the reduction of GHG emissions and innovative technological application to adopt improved technologies and measures to minimize livestock waste and implement the effective climate smart agricultural waste management practices (CSAWMP). Along with the subsidized biogas program, there is credit line support to further enhance greenhouse gas (GHG) emissions mitigation measures by installing biogas plants. LCASP activities are supported with various capacity building and communication programs to be implemented at various levels.

The Project is expected to increase the uptake of climate smart agriculture waste management practices as measured by the increased use of clean biogas energy and organic bio-slurry fertilizers. The purposes include:

(i) Improve management of livestock waste, bio-slurry; 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 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 livestock waste management infrastructure,
ii) Increased access to credit lines for biogas value chains,
iii) Enhanced CSAWMP technology transfer, and
iv) Effective project management.

The project covers 10 provinces, namely, 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 June 2013 to June 2019. With the Mid-term Review (MTR) in September 2016, the project **net loan** amount is $67.92 million.

3. MAIN FEATURES OF THE TECHNICAL ASSISTANCE

LIC was mobilized in November 2015 after the contract between the CPMU and ACI/AD Consult, delayed by a year. Whereas Specialist team was mobilized (Appendix 1) from November 2016, the Team Leader (International) joined the project only in February 2016. All the team members were qualified and experienced as per the TOR.

Technical achievements supporting the CPMU and PPMUs had been achieved during the year 2016. Main features of technical assistance are described here.

3.1 Inception Report

LIC Team prepared the Inception Report at the beginning of the year. Though not all LIC team members were fully mobilized during this period, the mobilized LIC Specialists were able to produce a well appreciated report.

Agricultural waste is one of the major problems in Vietnam, having 7.9 million livestock farming households of which 4.1 million are engaged in pig farming and 8,300 livestock farms/enterprises. It is estimated that 25.6% of the farms and 37.3% of households have not

applied waste treatment solutions and discharge directly into the environment. About 46% of crop wastes are burnt in the fields.

The Inception Report pointed out that though there was a reduction in contract period from four to three years, Biogas Value Chain and CSAWMP experts input were also reduced by the same amount keeping the same original outputs. Similarly, Provincial Coordinators time had been reduced to 18 months – having only 50% input per month. Presently they are working 11 days a month in average.

In the first quarter of 2016, intensity of the workload was heavy and "the project being behind schedule has obliged the LIC Team to take adaptive and pragmatic approach to implementing the TORs"[1]. The Inception Report clearly indicated that the LIC team to pursue an output driven approach; rather than our preferred approach - process based with a view to building capacity at the provincial level. This had been a general working approach for the whole year, supporting the provinces with pragmatic approaches in the capacity building, as well as coaching, on the site training and joint team approach.

As envisaged in the Inception Report, all working modalities and supports are followed except there is a change in medium and large scale biogas plants after having GoV/ADB Mid-term MOU curtailing the large biogas plants.

There had been 31,713 SBPs (88% of DMF target) installed during the inception period (April 2016). By the end of the year, there had been 43,157 SBPs installed (CPMU, December 2016).

During the inception, detailed guidelines for the selection and implementation of demonstration pilots of LACSP had been prepared and PPMUs prepared the demonstration proposals with the support of PCs.

3.2 Expanded use of livestock waste management (Biogas) infrastructure

During the inception period, LIC specialists identified a number of operational and performance issues and advised on how to address this in a timely manner.

Issue 1: No effective solutions to the use of by-products i.e. bio-slurry

The issue has not yet fully been addressed. Whereas farmers with orchards and some fruit trees have used it extensively, others still discharge directly to the environment. A number of training courses had been conducted targeting efficient use of bio-slurry.

[1] Inception Report 2016

Issue 2: overloading of the SBP digester where the capacity is too low compared to the expanded livestock farming.

Many participating livestock farming households expanded their farms without assessing the SBP capacity; this caused overloading of SBP digesters. With the limited use of biogas (mainly for cooking), livestock farmers do not have enough incentive for up-scaling the capacity thus overloading of the digesters persists. So a complete solution of the biogas use is needed to attract farmers to invest more.

Issue 3: Surplus biogas is emitted without flaring (mainly from MBPs and LBPs)

This issue persists and, in addition, there are operational and maintenance issues regarding the MBPs and LBPs. Having low capacity and lack of a complete solution for LBPs, GoV/ADB Mid-term Review curtailed the LBPs. Anticipated demonstrations with the installation of MBPs will further provide technical solutions on this issue.

At the end of the project, LCASP targeted to install 40 Medium Biogas Plants in project provinces under Component 1 but PPMUs propose to increase the number of MBPs. With the anticipated demonstrations, there will be more MBPs with manure separators and biogas generators. Overall the revised targets would reach 109 MBPs in LCASP project provinces, 69 under demonstrations and 40 under DMF target.

Additional SBPs were installed after the GoV/ADB MTR in September 2016 that provided a clear understanding of the approach to eligible beneficiaries. According to CPMU, 43,157 SBP had been installed including 3,046 SBGs to ethnic minority households (GAP report). The GoV/ADB MTR also included 14,000 SBPs targeted towards ethnic minorities, women and poor which should be selected using specific criteria. LIC provided inputs to CPMU on formulating the criteria.

The LIC specialists provided support to provincial technicians in improving the knowledge and experience on selecting quality HDPE sheets for covered lagoons, control standard technical drawings of covered lagoon digester, and their maintenance.

Improvements are still needed in terms of controlling the gas leakage in the constructed and composite plants using the instruments such as U-shaped pressure gauge, dial pressure gauge, checking the ability of long-distance gas transmission for the covered HDPE lagoons and inflation of the cover can be checked for timely improvement.

Technical specialists from various institutes, Universities and international organisations had also visited the project to become familiar with the biogas technology, organic fertilizer production from livestock wastes and comprehensive management of agriculture waste for the best options within the project condition.

Demonstration Site in Ben Tre

Mr. Ung Van Hung of Thanh Hoa hamlet, Thanh An commune, Mo Cay Bac district is a progressive family who raise 2,300 pigs including 1,900 fattening pigs, and others are sows. With his personal initiation, two biogas had been installed and another additional one was from LCASP support. Capacities of biogas are 48.2 m^3 installed in 2009, 36 m^3 installed in 2015 and 26.3 m^3 installed in 2016 with a total digester capacity of 110.5 m^3. Cooking gas is provided to other 11 neighbouring households. He also invested in a biogas generator, however, did not continued due to maintenance problem and high cost. The main issue was the gas cleaning. At present, manures are separated manually and packed in the bags, and sold at VND 1.5 million per ton (total production of about 300 tons per year).

Overloading of the digester is the problem where the present capacity is 1/10th of the livestock waste. Land area of Mr. Hung is 2 ha. and bio-slurry is used in this small area and other neighbour's land of about 4 ha. Main issues are

- waste management, digesters are overloaded
- gas cleaning issue in generator

Mr. Hung is a key farmer in the anticipated LCASP demonstration model of manure separator. Two more neighbouring households are also involved with 800 pigs each. Demonstration will solve the problem partially. It is planned to pump the waste from the participating neighbour's farms. Other livestock waste will also collect by participating farmers (of their part).

Mr. Hung is a key farmer for the demonstration model providing a expected outputs. International CSAWMP Specialist recommended that the solutions to use the bio-slurry for crop production by pumping the liquid part to farmers should be considered.

At present stage, biogas installation is not implemented to ensure comprehensive solutions. The success of scaling-up to large scale biogas depends on technological diversification and innovation. Anticipated research and demonstration models will also contribute to support the scaling up in a comprehensive manner.

3.3 Demonstration Models

A guidelines procedure for demonstration models project cycle through procurement and implementation was submitted to CPMU in the first quarter of 2016. In the beginning, LIC supported the models with the feasibility studies in Nam Dinh and Binh Dinh provinces. Further technical training was provided to other provinces based on the lessons learned from Nam Dinh and Binh Dinh provinces. Demonstration topics are grouped into six categories and prepared as an in-depth technical, economic and environmental dossier. LIC team had proposed technical solutions for livestock waste treatment that were accepted by CPMU and PPMUs. These technologies are

suitable for economic and social condition of Vietnam and applied in project demonstrations. Provincial Coordinators in nine provinces closely worked with PPMUs in the preparation with the support from LIC Specialists.

An extensive review of the demonstration proposals had been conducted by the Provincial Coordinators, Biogas Technology, and the BVC Specialists. The proposals were reviewed with PPMUs on the site specifications and revised along with the economic analysis. PPMU demand for demonstration proposal preparation was very high and the Specialists had to visit Ha Tinh and Son La provinces for on-site support. The field support conducted by the Specialists further strengthened the feasibility of the demonstrations. While the total demonstration sites were 137 at the end of August 2016 (reported in Quarterly Report 3), it has now been reduced to 92 sites at the end of December 2016. The imprecise site identifications by PPMUs resulted in a waste of time during the proposal preparation and required considerable technical inputs by LIC. The highest number of site variation is on Package 36 demonstration of biogas power generation (from 60 to 24 sites) and in Lao Cai (from 54 to 21 sites). Finally, there is no demand on “utilization of cattle manure as feedstuff for red worm raising”, now keeping only five topics.

3.4 Research Packages

LIC team supported the CPMU intensively in the research strategy identification. This identification was delayed due to lack of technical support in the project before LIC joined the project. As a result, the implementation arrangements for the research component had been seriously delayed. Urgent attention has been given, addressing the lost time. The Department of Science, Technology and Environment (DoSTE) reduced the research implementation down to 23 pilots, all but one of which would be implemented by MARD Institutes. In conjunction with a first draft Research Strategy, this proposal was submitted to ADB in August 2016. However, an ADB appointed consultant raised concerns as to (i) the limited engagement with the provinces in the consultation process and (ii) the concern that MARD Institutes were ineligible to implement under ADB procurement guidelines.

Since February 2016 the LIC team was involved in providing guidelines for identification and selection of both research topics and demonstration models. Six research packages from 21 topics had been finalized with the support from LIC team and CPMU had submitted the research procurement plan to ADB.

Research TOR’s are prepared for six packages complying with the ADB requirements. Four packages had already received NOL and in the bidding process by CPMU. The remaining two packages are still pending and waiting for the approval from ADB.

The status of the two research packages is described below:

Research Package 29

The package includes:

i) research on technologies for water cleaning/purification and re-utilization and sludge sediment treatment in shrimp farming ponds;
ii) piloting of the above technologies; and
iii) policy recommendations related to the above.

Although ADB believes that extensive research on water purification and treatment of sediment in shrimp farms and technical solutions have been widely tested in the country and in the region, only little has been done until now in this area. There is an urgent need for implementing new technology and improved management for reduction of pollution with organic material (COD), nutrients, antibiotics and diseases. From a literature review of international scientific papers dealing with waste treatment in shrimp production in Vietnam very little is available and the literature available is several years old (trip report of Team Leader, international and national CSAWMP Specialists in December 2016). Thus in practice, there is still a huge need for development and optimization of technology within wastewater treatment, sludge sediment removal, re-use, and reduction. The use of sediment for biogas by co-digestion with other substrates is also a technology which could be interesting to further develop.[2]

Research Package 30

The research package includes:

i) research methods/technologies for identifying quantity and structure of GHG emissions from different sources;
ii) research on standardization of GHG emission monitoring, measuring and evaluating in rice-based farming systems and other land uses;
iii) research on technologies for reducing GHG emissions in the rice-based farming system;
iv) research on technologies for reducing GHG emissions on agricultural lands;
v) piloting of iii) and iv) above; and
vi) producing corresponding policy recommendations.

ADB commented that the research package is broad and vague. It will be difficult to compare due to a wide range of responses. Overall scope and objectives of the package are

[2] Mission Report from International CSAWMP Consultant, December 2016

not clear. International CSAWMP consultant supports the proposed research package where it contains a comprehensive monitoring and assessment of GHG in rice cultivation impact of changing cultivation. "To do this monitoring methodology need to be improved and standardized and baseline emissions need to be assessed accurately"[3]. However, it will be difficult to draw clear conclusion due to a wide range of responses.

LIC believe that scope and objectives raised in TOR are clear meeting the need of Vietnam strategy related to GHG reduction program and agricultural restructuring that indicated in the "Decision No. 1775/QD-TTg of Prime Minister dated 21/11/2012 approving the program of management of greenhouse gas emission, management of globally traded carbon credits to reduce the agricultural greenhouse gas emissions" and "Decision No. 3119/QD-BNN-KHCN of Ministry of Agriculture and Rural Development dated 16/12/2011 on approving program of greenhouse gas emissions reduction in the agriculture and rural development Sector up to 2020".

With further validation on the proposed packages, LIC is supporting to CPMU with regard to the validity of the research proposals.

3.5 CO_2 Calculation Methodology

A CO_2 emission calculation methodology had been developed for LCASP. The Excel-based model includes the actual amount of animal in each household, biogas plant size and fuel replacement. It calculates the amount of gas used for cooking and others.

SNV also developed and applied such models. Whereas in LCASP model, most of the CO_2 gain is from reduced methane release from livestock waste, in SNV model, most of the reduction is from fuel replacement. International CSAWMP consultant opines that a default value of 4.3 tons CO_2 per household by fuel replacement used by SNV is high. In addition, the proposed LCASP methodology can apply to biogas of any size, MBP and LBP.

LCASP methodology will be further discussed with NBP by CPMU for its application.

Gas quality was monitored in some of the selected households in Soc Trang and Ben Tre. Methane content was high to medium in surveyed households of Ben Tre province varied from 60% to 76%. Methane level is good in one household and medium in another household in Soc Trang. The hydrogen sulphide (H_2S) content is high to extremely high and varied from 2,000 ppm to 5,600 ppm (acceptable content of H_2S if between 200 ppm and 300 ppm). This gas will damage the generator engine if H_2S is not removed.

[3] Mission Report from International CSAWMP Consultant, December 2016

3.6 Capacity Building and Information Dissemination

Several capacity building programs in the form of training and field trips are conducted by CPMU and PPMUs. Technical assistance is important for the quality training materials and training delivery. During the year, LIC Specialists were extensively involved supporting the training contents, materials and delivery. Where necessary, the specialists delivered the training as resource persons. Most of the training was conducted by PPMUs where Provincial Coordinators played a vital role supporting the overall capacity building program. With the effective training delivery, the construction of SBP met the desired quality level, however, MBP and LBP related training still need to address several aspects especially its construction technology and use of HDPE material. Provincial Coordinators closely supervised the training and followed up on refresher training where additional technologies are to be provided.

Though LCASP prepared Training Master Plan based on Training Needs Assessment during the year, there are several shortcomings especially training by yearly planning and training levels, provincial and national. LIC is supporting to finalise the comprehensive master training plan. With the comments provided by ADB, LIC is working with CPMU addressing these issues. Research and demonstration related training are also incorporated in the plan.

LCASP contributed to enhance the knowledge on biogas technology, where the functions were addressed by various information dissemination campaign. Technical assistance was provided to CPMU and PPMUs on the topic identification, design, contents and dissemination. Materials were produced in graphics, audio (commune radio) and videos (including for national and provincial TVs). Knowledge on biogas value chains contributed to public awareness to assess credit supports of LACSP other than their own investments.

3.7 Monitoring and Evaluation

In the beginning of the year, a LIC Specialist supported the CPMU and PPMUs to establish M&E system. The system also included reporting requirements with templates. Firstly, on the job training were provided to Binh Dinh, Nam Dinh and Bac Giang provinces. Additionally, national biogas database was also established with the support from ICT specialist.

PPMS database maintenance had been improved with more permanent staff in PPMUs, otherwise, the national M&E Specialist had to involve extensively with both CPMU and PPMUs. The input from international M&E Specialist in the last quarter of the year had

contributed to improving the PPMS addressing performance indicators, GHG monitoring, GAP and requirement of the software use instead of Excel-based database. Research and demonstration related monitoring system were also in place with the support of LIC.

Initially, LCASP database under PPMS was not in compliance with the NBP requirement. At the end of the year, the database is now used by NBP efficiently (CPMU Quarter Report 4, 2016).

DMF targets are to reduce the GHG emissions with 0.2 tons of CO_2 per m^3 of biogas plants. For this monitoring, LCASP will follow IPCC guidelines (IPCC, 2016). Both replacement of fossil fuels by use of biogas and reduction of emission of methane from manure management have to be considered for an impact of biogas on GHG. Whereas, the baseline survey conducted in 2016 (LCASP 2016) considered only the fuel replacement.

3.8 GOV/ADB Mid-term Review

The LIC team was involved with the GoV/ADB MTR Mission at various stages including pre-mission and post-mission meetings, stakeholder meetings and field visits to the provinces in September 2016.

Regarding the consulting management support, the mission noted that LIC is providing effective support to the CPMU and the PPMUs. The achievement of the project was 16.4% based on the weighted progress of project components. The project is currently at 57% of the loan period during the mission time.

The DMF had been revised by rationalizing the activities and updating the output level indicators and targets. Four indicators were deleted, and two indicators were merged. The recommendations had also provided a clear understanding of the reporting to be covered for each target and indicator.

The target for small biogas plants had been achieved (38,478 achievements against 36,000 DMF target). The GoV/ADB MTR mission noted its impact in terms of GHG emission reduction, odour reduction from waste, labour saving and effluent use in garden, energy use for cooking and others. Without any change to the project and within the allocated budget, the number of SBP had been increased to 65,000, with additional 29,000 units with 14,000 particularly targeting the poor, women and ethnic minorities. The Project will suspend the large biogas activities but continue the MBP to attain 40 installations.

The Mission had identified the delay in CSAWMP due to the lack of clear guidance on the procurement procedures and implementing arrangements in the project documents in addition to the delay in the LIC recruitment.

As the number of biogas plants and training had been increased for the rest of the Project period, the demand for the LIC technical support had subsequently risen.

Based on the agreed actions of the GoV/ADB MOU, LIC team prepared a six-monthly work plan (October 2016 – March 2017) to meet the technical requirements of CPMU and PPMUs (reported in Quarterly Report 3).

4. QUARTERLY TA PROGRESS BY COMPONENTS

Technical Assistance by quarterly period had been provided in detail in the Quarterly Reports.

Main progress in Quarter 1, 2016 is highlighted (Table 1).

Table 1: Technical Assistance during Quarter 1, 2016

Quarter 1	
Activities	**Remarks**
Component 1: BG Infrastructure	
• Review of MBP and LBP design manuals and O&M handbooks	
Component 2: Credit line for biogas value chain	
• Review of inception report on credit study, and business development and financial planning	
Component 3: Enhanced CSAWMP technology transfer	
• Provincial surveys for demonstration and research topics identification and selection • Co-chairing technical meeting at national level workshop to finalize demonstration and research sub-projects short list • Drafting procedural guidelines for selection and implementation of demonstration and research sub-projects • Draft technical specification for the e-library	
Component 4: Effective project management	
Capacity building • Preparation of training workshops • Contribution to training needs assessment	
M&E	

• Establishment of M&E and reporting framework based on DMF	
Baseline survey • Review of baseline survey inception report	
Reports • Submission of Inception Report • Facilitation and contribution to the preparation of detailed provincial plans • Mission report of International CSAWMP consultant • Monthly reports and work plans	

Main progress in Quarter 2, 2016 is highlighted (Table 2).

Table 2: Technical Assistance during Quarter 2, 2016

Quarter 2	
Activities	**Remarks**
Component 1: BG Infrastructure	
• In-depth review, revision and editorial support preparation of three books/guidelines • TOR preparation for safety and standard audit of biogas plants • Review of potential alternative ad advanced biogas technology design	
Component 2: Credit line for biogas value chain	
• Provincial Coordinators supported Credit Specialists for survey completion • Review of credit report including the NOL proposal note to the ADB for the inclusion of Vietnam Bank for Social Policies	
Component 3: Enhanced CSAWMP technology transfer	
• Drafted procedural guidelines for demonstration models • Prepared six demonstration model forms using the economic analysis, market, and technical criteria • Prepared guidelines for the computation of the financial data to undertake financial and economic analysis • Revision of 21 pilots sub-projects from PPMUs and grouped to six research packages • CPMU submit submission 0 of package 25 to ADB	
Component 4: Effective project management	
• The resolution of the issues identified in the Inception report and Quarterly Report 1	

Capacity Building • The contribution to the preparation of the Training Master plan • Training conducted to Provincial Coordinators on demonstration proposal, gathering of monitoring data and assessment of the biogas quality • Support to finalize three training topics (more than 30 training lectures) • Support on editing training models developed by VACVINA and VNUF and in preparing a three-year training program for researchers in conjunction with VAAS	
Environmental Safeguards • Prepare and finalize the feasibility study on environmental monitoring, evaluation, and management	
Monitoring & Evaluation • Training support on data gathering and assessment of quality of biogas plants	
Procurement • Technical meeting covering the technical and procurement based requirements for the demonstration packages	
Baseline Survey • Support to refine baseline survey	
Reports • Support to guidelines for baseline survey and report preparation	

Main progress in Quarter 3, 2016 is highlighted (Table 3).

Table 3: Technical Assistance during Quarter 3, 2016

Quarter 3	
Activities	**Remarks**
Component 1: BG Infrastructure	
• Technical issues addressed on the installation of SBP and MBP	
• Biogas design and plans reviewed and revised	
• Training support on biogas technologies	
Component 2: Credit line for biogas value chain	
• Comments provided on biogas credit chain report	
Component 3: Enhanced CSAWMP technology transfer	
• Further TOR development of the six research topics based on the agreed outputs.	

• NOL received on Research Package 25	
• Total six models with 137 demonstration sites identified	
• Twenty-five general proposals developed by the PPMUs identified and finalized	
• Packages 33 to 38 progress on design proposal	
• NOL for updated Procurement Plan on demonstration models	
Component 4: Effective project management	
Capacity building • Training Needs Assessment at final stage • Revision of Training Master Plan • Review and revision of training materials conducted by CPMU and PPMUs • Supported the CPMU/PPMUs as resource persons	
Procurement • Revised REOI, cost estimates and short list criteria of six QCBS consulting services packages • Supported CPMU on draft RFP • Completed to update Procurement Plan	
Environmental safeguard • Supported PPMUs to prepare REA • Draft EMP	
Reports: • Comprehensive CPMU LIC Report • LIC Quarterly Report 2, 2016 • Rational to increase SBG targets in addition to DMF target • Report on second input from International CSAWMP consultant • Monthly reports and field reports • Report for GoV/ADB MTR Mission and for MPI/ADB "Spring Screening" Mission	

Main progress in Quarter 4, 2016 is highlighted (Table 4).

Table 4: Technical Assistance during Quarter 4, 2016

Quarter 4	
Activities	**Remarks**
Component 1: BG Infrastructure	
• Reviewed 92 detailed designs of provincial demonstration proposals • Three documents/reports prepared on biogas technology	

• Options on using excess biogas from medium biogas plants (MBPs) to avoid discharging excess biogas into the atmosphere	Continue to review
Component 2: Credit line for biogas value chain	
• Advised to add VBSP as new FI and accepted by GoV/ADB MTR Mission	
Component 3: Enhanced CSAWMP technology transfer	
• NOL on three research packages 26, 27 and 28 received • Feed back on research packages 29 and 30 provided after ADB comments • Eleven documents/reports prepared • Demonstrations and research training topics identified and incorporated in MTP	
Component 4: Effective project management	
Capacity Building: • Training Needs Assessment submitted to CPMU to forward to ADB • Training Master Plan submitted to CPMU to forward to ADB • Provided training support from LIC team as resource persons • Five documents/reports prepared	Under progress addressing ADB comments
Procurements: • Received five NOL from ADB including three for research, one each for environment and demonstration	
Environmental Safeguards: • Initial Environmental Examination document • Rapid Environmental Assessment form • Six-monthly Environmental Monitoring Report • Four documents prepared	
Gender and Ethnic Minorities Safeguards: • Gender Assessment Plan submitted to CPMU • EMDP submitted to CPMU	
Monitoring and Environment: • Excel based M&E system reviewed and streamlined • PPMS formats revised and analyzed	
Policy/Institutional: • Policy documents analysis collecting various 21 documents	
Reports: • Quarterly report 4 • Mid-term Report • Beneficiaries linkage of Component 1 to demonstrations	

(Component 3) • Specialist's monthly reports, monthly plans, and field reports • Report of international CSAWMP Specialist (third input)	

5. CONSULTANTS MOBILISATION

Immediately after the LIC on board, some key Specialists were mobilized namely biogas technology, DTL/Biogas Value Chain, CSAWMP, Extension/Training & Curriculum development, monitoring and evaluation specialists, ICT, environmental safeguard and Provincial Coordinators. Subsequently, the Team Leader joined the project from February 2016. Social, Gender and Ethnic Minority Safeguard started to work from Quarter 2 of the year. Other specialists were mobilized in quarter 3 and 4. Some of the Specialists were replaced at various periods as some of the Specialists resigned. GIS has not yet mobilized. Detail mobilization dates are provided in Appendix 1.

Regarding the international specialists, CSAWMP was mobilised from the beginning of the year to assess project status in the field of climate smart agriculture waste management practices and rest of the two specialists, namely international Policy and Institutional Specialist and international M&E Specialist, were mobilized in the beginning of the quarter 4 of the year. The work of the international Specialists has been in progress in line with their respective TORs.

The mobilization of the specialists progressed with the demand of the technical assistance of the project and their inputs were timely as required by CPMU and PPMUs. However, turnover of some of the specialists created some TA gaps. There was a turnover of Team Leader, Extension/Training & Curriculum Development Specialist, ICT, Environment and Social, Gender and Ethnic Minority Specialist. Social, Gender and Ethnic Minority Specialist and two Provincial Coordinators are not yet filled.

The technical assistance period had been reduced from four years to three years, however, DTL/BVC and CSAWMP Specialists TOR kept the same duration. Similarly, Provincial Coordinators inputs had also been reduced with the original TOR. Inception report recommended the distribution of each Provincial Coordinator inputs in years 2016, 2017 and 2018 as 9, 5 and 4 person-months respectively. However, the Provincial Coordinators inputs were provided on demand basis for technical assistance. Overall the monthly average person-month of the LIC team was 10.60 person-months in 2016.

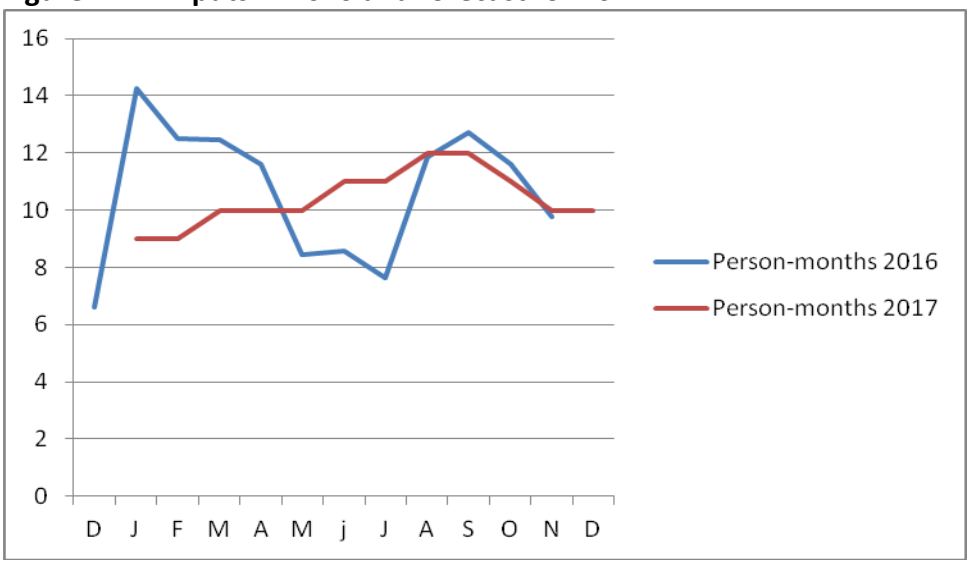
Total person-months allocated for the project period and inputs till the end of December 2016 are provided in Table 5.

Table 5: Total allocated person-months and inputs to December 2016

International Experts			
No	**Experts**	**Total Person-months**	**Balance Person-months**
1	Team Leader/Management/Agricultural Waste Specialist	30	20.68
2	CSAWMP Specialist (LCA Crop Waste)	8	6.50
3	Monitoring and Evaluation Specialist	2	0.48
4	Policy and Institutional Specialist on CSAWMP	4	3.60
	Total	44	31.26
National Experts			
No	**Experts**	**Total Person-months**	**Balance Person-months**
1	Deputy Team Leader/BVC Development Specialist	36	23.27
2	CSAWMP Specialist (LCA Crop Waste)	36	26.00
3	Biogas Technology Specialist	36	23.41
4	Extension/Training & Curriculum development Specialist	36	28.30
5	Monitoring an Evaluation Specialist	8	0.50
6	Social, Gender and Ethnic Minority Specialist	6	5.64
7	Environment Safeguard Specialist	12	8.00
8	Geographic Information System (GIS) Specialist	6	6.00
9	ICT specialist	12	6.91
10	Policy and Institutions Specialist for CSAWMP	6	4.66
11	Provincial Coordinators, Lao Cai	18	11.73
12	Provincial Coordinators, Son La	18	14.73
13	Provincial Coordinators, Phu Tho	18	12.32
14	Provincial Coordinators, Bac Giang	18	9.96
15	Provincial Coordinators, Nam Dinh	18	11.41
16	Provincial Coordinators, Ha Tinh	18	13.82
17	Provincial Coordinators, Binh Dinh	18	9.00
18	Provincial Coordinators, Tien Giang	18	10.91
19	Provincial Coordinators, Ben Tre	18	10.73
20	Provincial Coordinators, Soc Trang	18	10.91
	Total	374	248.21
	Grand Total	**418**	**279.47**

Figure 1 provides the overall TA inputs in the year 2016 by month and forecasted TA inputs for the year 2017.

Figure 1: TA inputs in 2016 and forecast for 2017



6. OVERALL TA PERFORMANCE ASSESSMENT

Construction of biogas infrastructure was conducted according to technical requirements and on a demand-driven approach in the provinces. Technical assistance was provided as required both during the construction and training masons and technicians. LIC Specialists supervised and followed up as required. SBGs are installed meeting more than the DMF target, however, there are issues regarding the MBP and LBP especially on the use of HDPE. Low-quality HDPE material was used and not moistened to capture the gas at the desired level.

A CO_2 calculation methodology had been developed by LIC following IPCC procedure. This methodology complies with all biogas plants of any size. Methodology developed by SNV complies only with small biogas plants. Being the low carbon project with project impact by about 0.2 tons of CO_2 equivalent annually per cubic meter capacity of biogas plants, LCASP must apply this methodology in early 2017 so that CO_2 monitoring can be in place.

Major time was consumed during the year on the research proposals and demonstration models. Several research topics and demonstration models feasibility and assessment took a longer time than expected, in addition to several revisions for the approval process understanding on the selected topics and models from ADB. Out of six research topics, four research topics had received NOL and one NOL received for demonstration models.

With the experience and TA support gained during the period, there was ample opportunity to support credit line supported biogas program, however, due to a slow process of financial intermediaries, no such technical assistance had been provided.

Under the capacity building program, several training activities have been conducted by CPMU and PPMUs from the beginning of the project. Since the LIC involved, the training curriculum and materials were reviewed and improved. Provincial Coordinators played a crucial role at PPMU level. Still, there were several areas to improve. For example the same topic training course was not the same in terms of the contents in all provinces (with some variations by local conditions), selection of resource persons, timing of the training and training evaluation. Training plan was another issue to improve that resulted in repeated work on training needs assessment and training master plan.

Though M&E system had been established with heavy inputs from LIC to operate PPMS, there were still discrepancies on the data and data collection approach. Improvement had been made in the Excel-based PPMS, however, the system will be well functional once new software is installed, and that is under process to purchase by CPMU.

With the finalization of e-library TOR, CPMU was in the bidding process at this stage.

There were delays in the implementation of the procurement activities due to delayed LIC recruitment including national Procurement Specialist. In addition, CPMU is not familiar with ADB procurement procedures for both procurements of goods and selection of consulting services. Some times ADB also delayed to reviewing the documents submitted by CPMU. Consequently, most of the project procurement documents received NOL in the months of November and December 2016.

Regarding the safeguards, though gender and ethnic minority related technical supports were provided as necessary, however, lack of Specialist after the resignation by the existing Specialist hampered in a number tasks to be completed. GoV/ADB MTR MOU provided several agreed actions to be completed in this regard. On environmental safeguards, regular environmental monitoring of biogas was followed completing REA, preparation of IEE and EMR were still under progress.

Policy and institutional studies were started in last quarter of the year and under progress to the desired level.

All LIC team followed with a regular work plan and reporting in a timely manner and met the technical support to CPMU and PPMUs.

The Inception Report noted that “the initial work of the team tended to be of an ad hoc nature as directed by the CPMU and influenced by the ADB. Communication channels were, at times, inadequately synchronized resulting in mixed messages between the LICs, CPMU

and ADB respectively". LIC closely worked with CPMU and PPMUs efficiently by direct communications, coordination and team building.

Overall the LIC performance is satisfactory during the period with timely feedbacks from CPMU and ADB. GoV/ADB MTR also expressed on the satisfactory technical assistance to the project.

7. WORK PLANNING

The first quarter of the year 2017 continues to follow the activities related to GoV/ADB MOU agreed actions. Detail activities for 2017 are as follows:

i. GoV/ADB MTR MOU related agreed actions with technical assistance to CPMU and PPMUs.
ii. LIC Specialists will focus on the following key technical issues to resolve.
    a. Overloading of SBPs;
    b. Using excessive gas by flaring; and
    c. Treating livestock wastes from large scale farms.
iii. Support CPMU and PPMU on a timely manner providing comments on the quality of activities and performance to accomplish.
iv. Continue to support technically to install SBPs including additional SBPs. Technical assessment of MBP installations along with the demonstration related MBPs.
v. Technical assistance to complete Research Package 29 and 30 for ADB approval. Follow up on the implementation of the other approved research packages.
vi. Technical assistance for the demonstration models design and support during the bidding process and follow up support for implementation. PPMUs will be supported by Provincial Coordinators with sharing meetings of the results at various stages of the demonstration.
vii. Technical support to initiate CO_2 calculation to monitor the GHG reduction in the project and support to CPMU to comply with NBP.
viii. Finalization of Training Master Plan with the training needs assessment complying with the ADB comments and follow up.
ix. Provincial Coordinators support to PPMU on training, information dissemination, monitoring and others as required by PPMUs.
x. Support to purchase M&E software and develop database compatible to NBP national database.
xi. Environmental monitoring related equipment purchase is already in process. More closely work with PPMU on environmental monitoring. IEE and EMR will be prepared as required.

xii. Support to update GAP and EMDP as required and follow-up at PPMU level.

xiii. Revise Submission 1-4 of research packages no. 25 to 28. Discuss with ADB on TOR for packages 29 and 30, including RFP, consultant selection reports, contract negotiation and contract signing; contract negotiation and contract signing for NCB good package no. 32, package no. 14 and support CPMU implementing demonstration sub-projects.

8. RECOMMENDATIONS AND CONCLUSIONS

Main recommendations are as follows, addressing technical and management aspects.

Technical

1. H_2S adsorptive materials often are made with ferrous oxide (Fe_2O_3) which is expensive and not available in Vietnam. It was advised to PPMUs of Binh Dinh, Ha Tinh, Nam Dinh and Lao Cai provinces to use activated biochar or charcoal as H_2S adsorptive materials for H_2S filters. These materials are effective on adsorption of H_2S. They are very cheap and available in Vietnam.
2. CO_2 calculation methodology has been derived by LCASP that can cover various digester capacities. This methodology is more appropriate than the methodology used by NBP. It is recommended to adapt this methodology at the national level.
3. A number of training activities related to biogas technology will be conducted in the years to come. CPMU and PPMUs are now experienced to deliver the training to the target audience. It is necessary to prepare the training package with curriculum, training evaluation and follow up so that the training will be uniform with quality assurance and can also be used by other stakeholders outside the project.
4. LCASP should organize training to increase knowledge on medium scale biogas plants for technicians and masons. Besides this training, courses are also delivered on a methodology for quality control construction and operation of all types of MBP and LBP.
5. For the training, technical drawings must be considered as one of the key material delivered to the technicians and masons for supervision. The training for the biogas users should focus on the effective operation and utilization of biogas and bio-slurry.
6. It is helpful if the training materials can be prepared additionally in electronic/videos and made available in the project website.
7. GoV/ADB MTR highly emphasized on safeguards, environment, and gender, with several agreed actions, however, Gender Specialist is still not yet in LIC Team. Moreover, additional 14,000 SBP have been added targeting the ethnic minorities.
8. Inception report on GIS tasks should be prepared once GIS Specialist is mobilised. It will clarify the tasks to accomplish and will be clear to all stakeholders.

9. Biogas related safety and environmental measures are still not yet at the desired level. Environmental monitoring and biogas safety measures should be strictly followed and recorded.
10. Livestock and crop waste related activities have to be looked at more options for the technological viability.
11. The procurement activities of the project are followed smoothly and will continue with required documents on time.

Management

1. Each Specialist must prepare the work plan (monthly, quarterly and annual) in a timely manner and adjusted, if required, in consultation with the Team Leader and CPMU.
2. Reports should be submitted on time, with specific outputs and if continuing some of the activities for next period, it should be clarified with reasons on the carryover.
3. Specialists should work closely with the counterpart staff and outputs should be based on the agreed activities with the counterpart staff. If any problem to be delayed, it should be reported to CPMU and Team Leader/DTL immediately.
4. Some of the Specialist and Provincial Coordinators are not yet mobilized that has hampered project works especially demonstration proposals of Son La and Ha Tinh Provinces, and gender-related works. In addition, GIS Specialist is also not yet mobilized.
5. There are some variations in the TOR of the Specialists from the actual work conducted especially CSAWMP on crop waste and others. So the review of the TOR is necessary clarifying the tasks of the Specialists.
6. There exist certain gaps in streamlining the contacts among CPMU, PPMU, LIC and companies which affect the progress and quality of work. A long delay in monthly payments of salary to Specialists should overcome to facilitate their activities.

Since the LIC mobilization, LIC Specialists are supporting LCASP in various activities of the components. Installation SBPs are more than the DMF target with LIC technical supports in capacity building, technical supervisions, quality control and monitoring. CPMU and PPMUs are supported on demonstration models and research packages. The year 2016 has been considerably covered on the technical designs and proposal preparations under Component 3. Procurement related technical assistance is followed on a timely manner receiving NOL from ADB. There is a missed opportunity to involve LIC in Component 2, credit lines for biogas value chains, with technical assistance parallel to other components as the implementation of this component is very slow.

Several technical documents and templates are in place for the project that can be used by NBP. Various technical achievements such as biogas pant design by agro-ecological zones,

CO_2 calculation methodology, training packages on various courses, CSAWMP related understating and knowledge among various stakeholders, on-going policy and institutional study on climate smart agriculture and others has contributed to meet a number of milestones of the project.

Given the nature of the technical performance of the Specialists, the project should create an ample opportunity on technical aspects by minimizing administrative requirements to involve.

APPENDICES

Appendix 1: LIC Mobilization Status

No.	Position	Consultant/staff name	Mobilization Date	Remarks
A	**International Consultants**			
1	Team Leader	Mr. Manohar Shrestha	16 Aug 2016	
		Mr. Nguyễn Văn Bộ	06 Jul 2016	Acting Team Leader
		Mr. Don Taylor	01 Feb 2016	
2	CSAWMP	Mr. Henrik Moller	03 Jan 2016	
3	Policy and institutional	Mr. Bùi Bá Bổng	13 Dec 2016	
4	Monitoring & Evaluation	Ms. Nguyễn Thị Lan Hương	04 Nov 2016	
B	**National Consultants**			
1	BVC	Ms. Hồ Thị Lan Hương	26 Nov 2015	
2	Biogas Technology	Mr. Bùi Văn Chính	26 Nov 2015	
3	CSAWMP	Mr. NguyễnVănBộ	09 Dec 2016	
4	Training and Agriculture extension	Ms. Phạm Thị Vượng	16 May 2016	
		Mr. Đặng Trần Tính	26 Nov 15–29 Jan 2016	
5	M&E	Mr. Phạm Văn Bình	14 Dec 2015	
6	Social, Gender and Ethnic Minorities			Not yet mobilized
7		Mr. Hà Hữu Nga	4-20 Jul 16	
8	Environment safeguard	Mr. Tạ Hòa Bình	26 Apr 2016	
		Mr. Trần Yêm	14 Dec 15 –25 Dec 2015	
9	ICT	Mr. Đào Việt Cường	08 Jul 2016	
		Mr.Trần Danh Minh Hoàng	26 Nov 15 – 17 Mar 2016	
10	Policy/Institutional	Ms. Lê Thị Thoa	04 Nov 2016	

11	Procurement	Mr. Nguyễn Ngọc Long	14 Nov 2016	
12	GIS			Not yet mobilized
C	**Provincial Coordinators**			
1	Lào Cai	Ms. Đặng Thị Phương Lan	04 Jan 2016	
2	Sơn La			Not yet mobilized
		Mr. Lương HữuThành	04 Jan 2016–23 Jun 2016	
3	Phú Thọ	Mr. Nguyễn Đình Vinh	15 Dec 2015	
4	Bắc Giang	Mr. Bùi Thế Hùng	04 Jan 2016	
5	Nam Định	Mr. Tống Khiêm	04 May 2016	
		Mr. Phùng Quốc Quảng	04 Jan 2016 –28 Apr 2016	
6	Hà Tĩnh			Not yet mobilized
		Mr. Hồ Quang Đức	09 May 2016–30 Oct 2016	
7	Bình Định	Mr. Lê Ngọc Hùng	04 Jan 2016	
8	Tiền Giang	Ms. Bùi Thị Lan Hương	04 Jan 2016	
9	Bến Tre	Ms. Bùi Thị Phương Loan	04 Jan 2016	
10	Sóc Trăng	Mr. Đào Văn Thông	04 Jan 2016	
D	**LIC Staff**			
1	Office Manager/Project Secretary	Nguyen Khue	01 Dec 2016	
		Hoang Thu Hong	26 Nov 15 – 30 Nov 16	
2	Interpreter	Mr. Lê Giang	03 Jan 2017	
		Ms. Bùi Hương Quỳnh	01 Dec – 31 Dec 2016	
		Ms. Trần Thị Lương	23 Aug – 21 Oct 2016	
		Mr. Tiêu Đình Hòa	18 Jan – 30 Jul 2016	

Appendix 2: Technical Documents Prepared (2016)

No	Document Name	Document Nature	Completion Month	Remarks
Biogas Technology				
1	Pilot on collecting slurry from household biogas digesters to produce organic fertilizer in Binh Dinh	Technical document	January	
2	Basic design of demonstration proposal on utilization of manure separator for livestock waste treatment	Technical document	July	
3	Types of small biogas plants that are applied in LCASP (design, operation and maintenance)	Technical document	September	
4	Technical document on the sedimentary tank system that connects to medium biogas	Technical document	October	
5	Training materials on various biogas topics (for masons and technicians)	Training document	October	For PPMU, Lao Cai
6	The utilization of separator for manure treatment to collect solid waste for producing organic fertilizer	Technical Document	October	
7	The system of biogas generator-calculated method of generator capacity and economic effect of demonstrations	Report	December	
CSAWMP				
1	Slurry collection from household BPs and livestock waste	Technical document	January	
2	Detail plan development for demonstration and research topics of Ha Tinh Province	Technical document	January	
3	Demonstration pilot proposal in livestock waste treatment (various farms, Ha Tinh)	Technical document	February	
4	Budget calculation for the demonstration on utilization of manure separator	Technical document	March	
5	Using manure separator for livestock waste treatment and economic effect (various livestock farm size)	Technical document	June	
6	Using biogas effluence as liquid fertilizer for crops in individual	Technical document	June /July	

	households and groups			
7	Research Package 26 TOR	Document	June-Nov	
8	Research Package 27 TOR	Document	Sep – Nov	
9	Various templates for the demonstration proposals	Technical document	August/ September	
10	Rational to increase SBG targets in addition to DMF target	Report	September	
11	Research Package 28 TOR	Technical Document	October	
12	Research Package 29 TOR	Technical Document	October	
13	Research Package 30 TOR	Technical Document	October	
14	Instruction document for provincial consultants on data collection identifying power supply option for the models under P34 and P36	Technical Document	Oct/Nov	
15	Preliminary design of manure separator model (P33), comprehensive management (P34) and generator model (P36) for Hà Tĩnh	Technical Document	Oct/Nov 2016	
16	Detailed design for demonstration locations under Packages 33, 34 and 36 of Hà Tĩnh	Technical Document	Oct/Nov	
17	Report of international CSAWMP Specialist (three reports)	Report	Jan, Oct, Dec	
18	Research and Demo training list	Report	November	
19	Demonstration proposals for various farms of Son La province	Technical document	November/ December	
20	Report linking beneficiaries between output 1 and output 3 for biogas use options	Technical report	December	
Training				
1	Training lectures for researchers in biogas value chain and carbon credits	Technical document	June	
2	Master Training Plan	Technical document	July	
3	Summary report of the TNA (done in 2014)	Technical document	September	
4	Seven topics of training/extension related to 5 demonstrations of the	Technical document	October	

	project sent to PC for finalizing bidding packages			
5	Update the training plan and corresponding budget	Technical document	December	
6	Update the master training plan and the corresponding budget	Technical document	December	
7	Training report on the gender and ethnic minority	Report	December	
8	Training report on Biogas Value Chain for researchers	Report	December	
Environmental Safeguards				
1	Bidding Package 14 on environmental equipment	Technical document	May-Oct	
Other Reports				
1	Inception Report	Report	July	
2	LIC Quarter Report 1	Report	May	
3	Mid-term Report	Report	September	
4	LIC Quarter Report 2	Report	October	
5	LIC Quarter Report 3	Report	October	
6	LIC Quarter Report 4	Report		Submitted in 2017
7	Specialist's monthly reports and field reports	Report	Monthly	