



**DESCRIPTIVE STUDY OF THE UNITED NATIONS
DEVELOPMENT PROGRAMME (UNDP)
COLLABORATION PROJECT WITH THE KOREA
ENERGY MANAGEMENT CORPORATION (KEMCO)
ON INTEGRATED BIOGAS TECHNOLOGY IN
LUMAJANG, EAST JAVA (2009-2011)**

By

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Faculty of International Relations, Communication and Law
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THESIS ADVISER RECOMMENDATION LETTER

This thesis entitled “**DESCRIPTIVE STUDY OF THE UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP) COLLABORATION PROJECT WITH THE KOREA ENERGY MANAGEMENT CORPORATION (KEMCO) ON INTEGRATED BIOGAS TECHNOLOGY IN LUMAJANG, EAST JAVA (2009-2011)**” prepared and submitted by Jendra Prahasta in partial fulfillment of the requirements for the degree of Bachelor in the Faculty of International Relations, Communication and Law has been reviewed and found to have satisfied the requirements for a thesis fit to be examined. I therefore recommend this thesis for Oral Defense

Cikarang, Indonesia, 29th August 2014

Recommended and Acknowledged by,

Hendra Manurung, SIP., MA.

Thesis Adviser

PANEL OF EXAMINER APPROVAL SHEET

The Panel of Examiners declare that the thesis entitled “Descriptive Study of the United Nations Development Programme (UNDP) Collaboration Project with the Korea Energy Management Corporation (KEMCO) on Integrated Biogas Technology in Lumajang, East Java (2009-2011)” that was submitted by Jendra Prahasta majoring in International Relations from the Faculty of International Relations, Communication, and Law was assessed and approved to have passed the Oral Examinations on 5 September 2014.

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Hendra Manurung, SIP., MA.
Thesis Adviser

DECLARATION OF ORIGINALITY

I declare that this thesis entitled “**DESCRIPTIVE STUDY OF THE UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP) COLLABORATION PROJECT WITH KOREA ENERGY MANAGEMENT CORPORATION (KEMCO) ON INTEGRATED BIOGAS TECHNOLOGY IN LUMAJANG, EAST JAVA (2009-2011)**” is, to the best of my knowledge and belief, an original piece of work that has not been submitted, either in whole or in part, to another university to obtain a degree.

Cikarang, Indonesia, 29th August 2014

Jendra Prahasta

ABSTRACT

Title: *Descriptive Study of the United Nations Development Programme (UNDP) Collaboration Project with Korea Energy Management Corporation (KEMCO) on Integrated Biogas Technology in Lumajang, East Java (2009-2011)*

The issues of renewable energy and climate change have become some of the most discussed issues in the modern era. The urgency for a renewable energy as the alternative for the commonly used non-renewable energy and the threat imposed by the ever changing climate as the result of global warming have become the concern of many countries, resulting in these countries working together to solve this issues. The United Nations Development Programme, a development body under the United Nations, strives to help their member states to face such issues.

This study would like to explain the implementation of the United Nations Development Programme's Switch to Biogas project with cooperation from the Korea Energy Management Corporation. This study is significant in describing the implementation of the United Nations Development Programme's Switch to Biogas project in Lumajang, East Java in collaboration with the Korea Energy Management Corporation. The study would like to explore more on the role of donor in the project as well as the implementation of the project itself.

The study takes 2009 until 2011 as the timeframe since the Switch to Biogas project was conducted during that time. This research is a descriptive and analytical research which collects information from literature study and field research.

Keywords: United Nations Development Programme, Korea Energy Management Corporation, renewable energy, climate change, cooperation

ABSTRAK

Judul: Studi Deskriptif Proyek Kolaborasi United Nations Development Programme (UNDP) dengan Korea Energy Management Corporation (KEMCO) dalam Teknologi Biogas Terintegrasi di Lumajang, Jawa Timur (2009-2011)

Isu energi yang dapat diperbaharui dan perubahan iklim merupakan beberapa dari isu yang sering dibicarakan dalam era modern. Mendesaknya kebutuhan akan energi yang dapat diperbaharui sebagai alternatif untuk energi yang tidak dapat diperbaharui yang sering digunakan serta ancaman yang berasal dari perubahan iklim sebagai dampak dari pemanasan global telah menjadi kekhawatiran beberapa negara, yang menghasilkan terbentuknya kerjasama antar beberapa negara untuk menghadapi masalah ini. United Nations Development Programme, sebuah badan pembangunan di bawah Perserikatan Bangsa Bangsa, bertekad untuk membantu para negara anggotanya menghadapi masalah-masalah ini.

Penulisan ini bertujuan untuk menjelaskan implementasi proyek Switch to Biogas milik United Nations Development Programme yang bekerja sama dengan Korea Energy Management Corporation. Penelitian ini signifikan dalam menjelaskan implementasi proyek Switch to Biogas milik United Nations Development Programme yang berkolaborasi dengan Korea Energy Management Corporation di Lumajang, Jawa Timur. Penelitian ini bermaksud untuk mengetahui lebih lanjut peran donor dalam proyek ini serta proses implementasi proyek tersebut.

Penulisan ini mengambil tahun 2009 sampai 2011 sebagai jangka waktu karena proyek Switch to Biogas dilakukan selama jangka waktu tersebut. Penelitian ini adalah penelitian deskriptif dan analitis yang mendapatkan informasi dari studi literatur dan lapangan.

Kata Kunci: United Nations Development Programme, Korea Energy Management Corporation, energi yang dapat diperbaharui, perubahan iklim, koperasi

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Cikarang, August 2014

Jendra Prahasta

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LIST OF ACRONYMS

BAPPEDA	: Badan Perencanaan dan Pembangunan Daerah
BiRu	: Biogas Rumah
BNI	: Bank Nasional Indonesia
CDM	: Clean Development Mechanism
CPAP	: Country Programme Action Plan
CSR	: Corporate Social Responsibility
GHG	: Greenhouse Gases
Hivos	: Humanistisch Instituut voor Ontwikkelingssamenwerking
KEMCO	: Korea Energy Management Corporation
LoI	: Letter of Interest
REDD	: National Reducing Emissions from Deforestation and forest Degradation
SKPD	: Satuan Kerja Perangkat Daerah
UNDP	: United Nations Development Programme
UNFCCC	: United Nations Framework Convention on Climate Change
UNPDF	: United Nations Partnership for Development Framework

CHAPTER I

INTRODUCTION

I.1 Background of Research

The international environment is a very dynamic environment, especially in this modern era, due to the tremendous growth rate of mankind. New developments are made every day, which eventually leads to the emergence of new issues to be faced, ranging from peace and war to environmental issues that may threaten the existence of humans.

Therefore, this kind of dynamic environment eventually leads to the emergence of non-state actors, such as international organizations, holding the ability to interact and influence states. One of those international organizations with significant importance is the United Nations (UN). Officially recognized on 24 October 1945 as the successor to the League of Nations which has ceased its activities after failing to prevent the Second World War¹, the UN has 193 member countries since its establishment. The purposes of the UN include maintaining international peace and security, developing friendly relations among nations, and achieving international cooperation in solving international problems. To achieve these purposes, the United Nations deployed several bodies; one of them is the United Nations Development Programme (UNDP).

The UNDP is working on more than 170 countries and territories, offering global perspective and local insight to help empower lives and build resilient nations. The UNDP has 4 focus areas: democratic governance, crisis prevention & recovery, poverty reduction, and environment & energy. All focus areas are of main importance, especially the last focus area. Environment and energy has become a major concern in many countries, especially in Indonesia. These countries are coping

¹ <http://www.un.org/en/aboutun/history/index.shtml>

² http://unfccc.int/essential_background/convention/background/items/2536.php

³ Dowling, J.M. 2008. *Future Perspectives on the Economic Development of Asia*. Singapore: World

with issues that are related to the environment and energy, such as pollution, waste management, and renewable energy.

Many factors contribute to the issues of environment and energy; one of them is climate change. Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods².

The impacts of climate change can greatly affect the livelihood of humans, possibly endangering it if no further actions are taken. Not all people may be able to enjoy clean air, clean streets, sceneries, the services of the ocean, and other kinds of public goods due to the degrading quality of the environment, which is also in danger of being overused by humans. The government has to be involved in creating policies and regulations on the usage of public goods³ to avoid being overused by humans, which can worsen the impacts of climate change. Helen Clark, the UNDP Administrator, once stated:

“..therefore, governments need to balance the financing of large-scale energy projects with support for the off-grid, decentralized energy solutions which will meet the needs of the poor..”⁴

One of the projects initiated by the UNDP to face the challenge of climate change is the Switch to Biogas project. The project, implemented from 2009 until 2011 in the Lumajang district, East Java province, aims to enhance the dairy farming community livelihoods on East Java with the introduction of biogas technology and better environmental management in a changing climate. The usage of biogas as an

² http://unfccc.int/essential_background/convention/background/items/2536.php

³ Dowling, J.M. 2008. *Future Perspectives on the Economic Development of Asia*. Singapore: World Scientific Publishing Co. Pte. Ltd.

⁴ Clark, Helen. (2011, December). *Sustainable energy access critical for development in Africa*. Retrieved 9 March 2014 from <http://www.undp.org/content/undp/en/home/ourperspective/ourperspectivearticles/2011/12/29/sustainable-energy-access-critical-for-development-in-africa-helen-clark.html>

alternative energy source has not been widely known and implemented by many people in Indonesia, hoping that this research can encourage the usage of biogas in Indonesia as a way to face the challenges of climate change.

The term “biogas” usually refers to the flammable mixture formed when organic matter – such as food, plant debris, manure, etc. - goes through decomposition process without any oxygen, also known as anaerobic decomposition. The gas created through this process usually consists of 40%-70% methane, carbon dioxide, and traces of other gases. Even though the term “biogas” is inexact and imprecise due to the fact that gas produced from aerobic decomposition is also “biogas” because it is also produced as a result of biodegradation, “biogas” is now used exclusively for the combustible methane-carbon dioxide mixture produced by anaerobic decomposition. Biogas burns cleanly when ignited, similar to liquefied petroleum gas (LPG) or compressed natural gas (CNG)⁵.

In this project, the UNDP cooperates with the Korea Energy Management Corporation (KEMCO)⁶. The KEMCO is a government agency established by the South Korean Ministry of Commerce, Industry, and Energy in July 1980. The objective of the establishment of this corporation is to reduce carbon dioxide emission and to contribute to the sound development of the national economy by implementing projects efficiently for the rationalization of energy use⁷.

The KEMCO is responsible for implementing energy conservation policies and energy improvement measures, as well as climate change mitigation activities. Other major activities of the KEMCO include financial assistance toward energy conservation and efficiency improvement projects, and energy service companies (ESCOs)⁸.

⁵ Abassi, Tasneem, S.A. Abassi, and S.M. Tauseef. (2012). *Biogas Energy*. New York: Springer Science+Business Media

⁶ http://www.id.undp.org/content/indonesia/en/home/operations/projects/environment_and_energy/developing-a-pro-poor-biogas-model-for-dairy-farmers-in-east-jav.html

⁷ <http://www.kemco.or.kr>

⁸ Ibid

I.2 Problem Identification

The UNDP has been established in Indonesia for quite some time, determined to empower lives and help the people to develop. For an intergovernmental organization like the UNDP, a framework is needed as a foundation for the actions and policies that the UNDP has to make in order to achieve its objectives. Each focus areas also require a framework, and due to the differences in policies and geography, a different framework is needed to be implemented by the UNDP in each of its member states.

In the East Java province of Indonesia, dairy farming has attracted substantial interest and proven to enable many people to be lifted out of poverty. However, poor manure management lead to several issues e.g. high amount of greenhouse gas emissions, water pollution, and poor hygiene. Moreover, the dairy farming industry is very vulnerable to climate change since the the industry requires a reliable and substantial supply of water and fodder. The changing climate of East Java can result in decresed productivity for these dairy farmers. Therefore, the Switch to Biogas project was established in order to introduce biogas as an alternative green energy for the dairy farmers. Out of the potential three districts in East Java - Malang, Lumajang, and Probolinggo -, Lumajang district was chosen as the pilot area due to Lumajang having the most number of poor farmers that fits as the target beneficiaries of this project.

In implementing its project, the UNDP often cooperates with other parties. In this Switch to Biogas project, the UNDP partners with the KEMCO who acted as the donor of the project. The KEMCO, as a government agency responsible for dealing with energy conservation and climate change issues, must also have its own framework, policies, and interest.

The writer sees that the KEMCO has an interest in the UNDP's Switch to Biogas project, and writer intends to find out more on the collaboration between the two organizations. This leads to the question: how does the United Nations

Development Programme's implemented program integrate with the Korea Energy Management Corporation in its targeted project in Lumajang, East Java?

The KEMCO is involved in several projects initiated by the UNDP related to environment and energy issues. Besides the Switch to Biogas project in Indonesia, the KEMCO is also in cooperation with the UNDP's Building Energy Efficiency Project (BEEP), a project with the goal of reducing the annual growth of greenhouse gas (GHG) emissions from the building sector in Ulaanbaatar, Darkhan, and Erdenet cities in Mongolia. In this project, the KEMCO acts as a donor, donating US\$ 340.000⁹.

Realizing the UNDP as one of the United Nations bodies that include environment & energy as one of their focus points, it is interesting to see how they implement the framework that they have in response to the threat of climate change in Indonesia through this Switch to Biogas project. The involvement of the KEMCO as a donor in this project makes it more interesting to find out how it can implement their own interest in correlation with those of the UNDP.

The writer decided to describe and analyze on the collaboration between the UNDP and the KEMCO because the writer wanted to elaborate on how both international agencies manage to cooperate based on their own framework and reach mutual agreement. The writer decided to explore further on the Switch to Biogas project under the UNDP and the Korean Energy Management Corporation cooperation.

Through all the background that has been described, the writer has identified that there is a concerned problem of using biogas as an alternative energy source in Lumajang, East Java, which is related to climate change. Therefore, the writer will focus on exploring and examining this issue. There will be only one focus, which will concentrate on elaborating the UNDP collaboration project with the KEMCO on integrated biogas technology in Lumajang, East Java, Indonesia. The research focus

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http://www.undp.org/content/mongolia/en/home/operations/projects/environment_and_energy/building-energy-efficiency-project--beep-.html

will identify the multilateral cooperation among the UNDP, the KEMCO, and the local government of Lumajang, East Java, Indonesia.

I.3 Statement of Problem

This research is about to describe how the UNDP's Switch to Biogas project with the support of the Korea Energy Management Cooperation can be implemented in Lumajang. Based on what has been identified above, the statement of problem of this research as follows:

“How does the United Nations Development Programme's Switch to Biogas project with the support of the Korea Energy Management Corporation implemented in Lumajang?”

I.4 Research Objectives

The research objectives in this research, according to C.R. Kothari (2004) in his book *Research Methodology*, are classified as descriptive objectives. Kothari described thesis that aims to portray accurately the characteristics of a particular individual, situation or a group as a descriptive thesis¹⁰. Based on the background stated above, the objective of this thesis is: To describe the implementation of the United Nations Development Program's Switch to Biogas project in Lumajang with the support of the KEMCO.

I.5 Significance of the Study

The significance of the study of this topic as follow:

1. To describe the implementation of the United Nations Development Programme's Switch to Biogas project in Lumajang, East Java in collaboration with the Korea Energy Management Corporation.

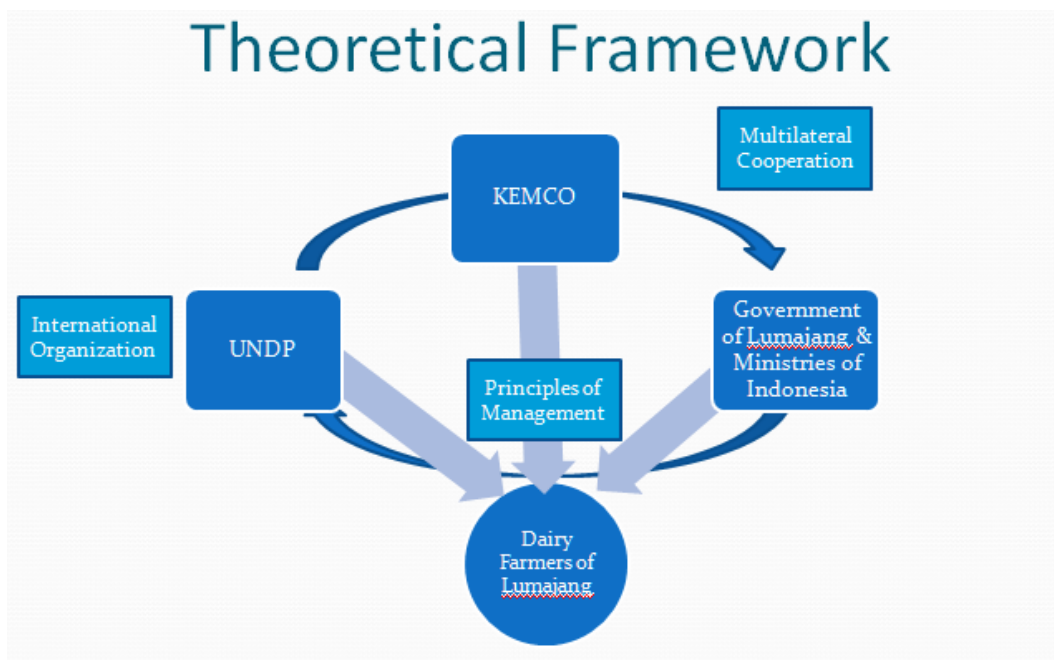
¹⁰ Kothari, C.R. (2004). *Research Methodology, Methods and Techniques (Second Revised Edition)*. New Delhi: New Age International Ltd. P. 2.

2. Provide information on how the United Nations Development Programme implemented project integrates with the Korea Energy Management Corporation on the Switch to Biogas project.
3. Provide information on the planning phase, initiation phase, implementation & monitoring phase, and the results of the Switch to Biogas project.

I.6 Theoretical Framework

There are several theories that can give better understanding on the collaboration between the United Nations Development Programme and the Korea Energy Management Corporation.

Figure I.1. Theoretical Framework



Source: Researcher Analytical Framework

I.6.1. Functions of Management

In 1916, Henri Fayol wrote a book entitled “Administration Industrielle et Generale” or General and Industrial Administration, in which he developed his concept of administration based largely on his own management experience as a director in a coal mining company. His ideas were later used by many as the basic principles of management up until today.

Fayol considers management to consist of six functions: forecasting, planning, organizing, commanding, coordinating, and controlling¹¹, but the most widely accepted functions of management are those given Koontz and O’Donnell¹² which consists of:

- Planning

Planning is deciding in advance what to do, when to do & how to do. It involves selecting objectives, strategies, policies, programs, and procedures for achieving them,

- Organizing

Organizing involves the establishment of a structure of roles through determination and enumeration of the activities required to achieve the goals that have been set. It is considered as a tool for accomplishing the goals of an enterprise

- Staffing

Staffing is the process of manning the positions provided by the organization structure and keeping it manned. Through staffing, the enterprise acquires the necessary manpower to achieve the enterprise’s goals through several processes such as appraising, selecting, and training candidates.

¹¹ Fayol, Henri. 1966. *Administration Industrielle et Générale: Prévoyance, Organisation, Commandement, Coordination, Contrôle*. Retrieved 3 June 2014 from <http://www.mindtools.com/pages/article/henri-fayol.htm>

¹² Koontz H., O’Donnell C. (1972). *Principles of Management: An Analysis of Managerial Functions*. McGraw-Hill. Retrieved 3 June 2014 from http://dcss.fmp.ueh.edu.ht/pdf/Koontz_Odonnell_1972_functions_manager.pdf

- Directing

The process of directing involves superiors leading and guiding their subordinates. Superiors are expected to give orientation to subordinates and have a continuing responsibility to guide them toward improved performance.

- Controlling

Controlling is the measuring and correcting of activities carried out by subordinates to ensure that it is going according to plans. This process enables the enterprise to evaluate the performance of its subordinates and make adjustments based on the results to enable them to achieve their goals.

Based on the functions of management stated above, the writer aim to further explore the management process carried out by the UNDP in the Switch to Biogas project. Remembering that the UNDP is involved with many entities in this project, including the KEMCO as the donor of this project and both the national and local government of Lumajang, the writer wants to find out how did the UNDP manage the project.

I.6.2. Multilateralism

Multilateralism can be defined as the cooperation between multiple countries in order to solve an international issue. It is in contrast with unilateralism in which, instead of one state working alone to confront a certain international issue, more than two states work together to consult and confront an international issue together. Ruggie (1992) argues that the term “multilateral” is an adjective that modifies the noun institution. The multilateral form is distinguishable from other forms because it coordinates behavior among three or more states on the basis of generalized principles of conduct¹³.

¹³ Ruggie, John G. (1992). *Multilateralism: the Anatomy of an Institution*.

The writer sees that this theory suits with the writer's research because multiple countries are involved in the Switch to Biogas Project, namely Indonesia and South Korea. In this project, the UNDP Indonesia achieved an agreement with the KEMCO to become the donor of a pilot biogas project to be implemented in Lumajang, East Java, Indonesia, which also involve the local government of Lumajang and multiple ministries of the Indonesian government e.g. the Ministry of Energy and Mineral Resources and the Ministry of Agriculture.

In this situation, the local government of Lumajang as the designated area for this pilot project and the multiple ministries represent Indonesia, the KEMCO represent South Korea, while the UNDP represent the multinational body that implemented the Switch to Biogas program as a way to tackle the issue of climate change that both Indonesia and South Korea are interested in to solve.

I.6.3. International Organizations

This theory is necessary to understand because it explains the behavior of the international organizations in the realm of international relations. Samuel Barkin in his book *International Organization: Theories and Institutions*, defined international organizations as inclusive intergovernmental organizations that are created by agreement among states. Based on that definition, the United Nations is considered an intergovernmental organization as it was created by a treaty signed by its member states. These intergovernmental organizations were created with the purpose of dealing with problems faced by the member states in common. Barkin argued that international organizations cannot replace sovereign states as the central actors in global governance, but they are changing the way international relations work¹⁴.

This theory is relevant with the writer's thesis because the writer sees that the UNDP, which is a body under the United Nations, is an international organization

¹⁴ Barkin, J.S. (2006). *International Organization: Theories and Institutions*. New York: Palgrave Macmillan

that is created to help its member states to develop and overcome issues that they may face in development.

I.7 Research Methodology

This research is a Descriptive research. According to Kothari (2004), the purpose of a descriptive research - often called as an *Ex post facto research* – is description of the state of affairs as it exists at present. The main characteristic of this method is that the researcher does not hold any control over the variables, meaning that the researcher can only report what has happened or what is happening¹⁵. The definition above suits the writer's research since the writer does not hold any control over the collaboration project between the UNDP and the Korean Energy Management Corporation.

To collect the information necessary for this research, the writer uses two types of methods:

a) Library Research

The writer analyzes reports and documents that are related to the research. The UNDP usually creates project documents, project reports, and publications about its projects. Publications usually contain the summarized information about the project, including the background of the project, the process of the project, and the result. The project reports and project documents usually contain more complete information on the project, which the writer has to acquire with permission.

¹⁵ Kothari, C.R. (2004). *Research Methodology, Methods and Techniques (Second Revised Edition)*. New Delhi: New Age International Ltd.

b) Field Research

Interviews with people who are involved in the project are necessary to gain more thorough information on the project that may not be available in the reports or publications.

I.7.1. Research Time and Place

Place of research:

- Adam Kurniawan Library
- University of Indonesia Library
- United Nations Development Programme Country Office in Menara Thamrin, Jakarta
- United Nations Development Programme Indonesia website
- Korea Energy Management Corporation website
- Lumajang district website

I.7.2. Research Instruments

a) Internet

The internet is the most important tool for the writer, as it enables the writer to access many kinds of information that is necessary for the research from the writer's laptop.

b) Journals and Publications

The writer was able to receive important and valuable information that contribute to the contents of this thesis.

c) Project reports and documents

The United Nations Development Programme usually creates written project documents and reports of its projects. The UNDP's Switch to Biogas project report and project document provides substantial and important

information regarding the project, making it a valuable research instrument for the writer to complete his research.

d) Interviews

The writer decided to conduct interviews as a mean to understand the project further and to obtain information that are not available in the project report. In this research, the writer interviewed the UNDP Indonesia's Programme Manager for Sustainable Energy.

I.8 Scope and Limitations of Study

The scope and limitation of this thesis are the followings:

- a) This thesis will focus on the Switch to Biogas project established by the United Nations Development Programme with the support of the Korea Energy Management Cooperation.

I.9 Thesis Outline

This thesis consists of 5 chapters:

I.9.1. Chapter I – Introduction

The first chapter of this thesis intends to introduce readers to the issue and the writer's purpose of writing this paper. This chapter also includes other essential information such as problem identification, research questions, significance of study, theoretical framework, definition of terms, and the thesis outline.

I.9.2. Chapter II – Literature Review

In this chapter the writer reviews literatures that the writer uses as guidance or reference during the writing of this thesis. Literatures that the

writer reviewed include theses on programs conducted by bodies under the United Nations in Indonesia and a handbook on biogas.

I.9.3. Chapter III

In this chapter, the writer would like to give a better understanding on the frameworks of the UNDP in Indonesia, as well as the vision and mission of the KEMCO and the Lumajang Government

I.9.4. Chapter IV – Analysis

The writer will discuss the Switch to Biogas project established in Lumajang, East Java from 2009 until 2011. In this chapter the writer will discuss the planning phase, initiation phase, implementation & monitoring phase, and the results of the project. The writer would also like to give his own evaluation of the project.

I.9.5. Chapter V – Conclusion

In this chapter the writer would like to give the conclusion of this paper. The writer also would like to give his recommendations.

CHAPTER II

LITERATURE REVIEW

In this chapter, the writer would like to review several literatures that the writer uses as guidance or reference during the writing of this thesis.

The first two literatures are theses that discuss the involvement of a United Nations body in a program established in Indonesia. The writer would like to use them as a comparison with the writers' thesis.

The first thesis that the writer would like to review is entitled **The Implementation of Indonesia-Norway Bilateral Cooperation: The First Phase of National REDD+ Program (2010-2011)** made by Riski Muda Farsyah, a batch 2010 President University student majoring in International Relations, for his Bachelor of Arts in International Relations degree.

In his thesis, Riski described the implementation of the National Reducing Emissions from Deforestation and forest Degradation (REDD+) program by the government of Indonesia through the cooperation with the government of Norway in the preparation phase, which is from 2010 to 2011. In the first chapter of his thesis, Riski described the background on the thesis starting with a subject overview, followed by his review of literatures and conceptual framework, scope and limitation of the study and the thesis outline.

Next, he described in the second chapter of his thesis the current situation of deforestation and forest degradation in Indonesia, its development since the last few decades, and lastly the factors that caused it. He also discussed the current situation of GHG emissions in Indonesia and where the sources come from.

Then, in the third chapter of his thesis he discussed the history, policies, and mechanisms of REDD+ as a United Nations product as well as the main actors that should be involved in the program. Moreover, he described the background of Indonesia-Norway partnership in REDD+, the cooperation mechanism, and the expected outcome that both countries targeted.

After that, in the fourth chapter Riski discussed the implementation of the first phase of the REDD+ program, which is the preparation phase. Riski discussed the implementation of consultation and development of REDD+ national strategy, establishment of the REDD+ task force, the funding instrument for the program, the MRV (Measurement, Reporting, and Verification) framework, and the selection of the pilot province of the program. Finally, Riski explained the conclusion of his research along with several recommendations on his fifth and last chapter¹⁶.

The second thesis that the writer would like to review is entitled **Roles of UNDP in Disaster Management: The Case of Nias Earthquake 2005-2009** made by Putri Dwinatalis Baeha, a batch 2009 President University student majoring in International Relations, for her Bachelor of Arts in International Relations degree. She introduced the issue and the purpose of her thesis in the first chapter, followed by essential information of the thesis such as problem identification, research question, the significance of the study, literature review, research methodology, and definition of terms.

In the second chapter, Putri explained the profile of the United Nations and the United Nations Development Programme, followed by the discussion on the history of Disaster Recovery in the UNDP, the relation between development and Disaster Recovery, and the type of Disaster Recovery framework and policies used by the UNDP.

¹⁶ Farsyah, Riski M. (2014). *The Implementation of Indonesia-Norway Bilateral Cooperation: The First Phase of National REDD+ Program (2010-2011)*.

Next, Putri discussed the UNDP's disaster management in the 2005 Nias earthquake. In this chapter, she introduced the profile of the Nias island followed by an overview on the Disaster Recovery coordination, actors, and mechanism on the Nias earthquake. Then, she focuses on the UNDP's effort in Nias, the obstacles faced, the response from the Nias people, and lastly the key results. The thesis ends with the last chapter, in which Putri discussed her conclusion of her thesis as well as her recommendations¹⁷.

From the literatures reviewed above, the writer would like to compare them with the writer's own thesis. The theses that are reviewed by the writer both include the involvement of a United Nations body, which is similar to the writer's thesis. The thesis made by Riski Muda Farsyah focuses on describing a project established based on the bilateral cooperation of two countries, namely Indonesia and Norway, which was implemented through the United Nations Reducing Emissions from Deforestation and forest Degradation (REDD+). The thesis made by Putri Dwinatalis Baeha, on the other hand, focuses on describing the actions taken by the UNDP Indonesia in response to the Nias earthquake that occurred on 2005. The writer's own thesis aims to describe the implementation of the United Nations Development Program's Switch to Biogas project in Lumajang with the support of the Korea Energy Management Corporation

Both theses that have been reviewed are detailed and informative, providing the writer with information and reference for the writer's own theses. However, both of the theses that have been reviewed do not elaborate on the involvement of a donor(s) in the program.

Riski's thesis discuss about the bilateral cooperation between Indonesia and Norway in the form of REDD++. The funding for this program is provided by stakeholders such as the United States of America, the United Kingdom, Norway, Japan, France, and Australia.

¹⁷ Baeha, Putri D. (2013). *Roles of UNDP in Disaster Management: The Case of Nias Earthquake 2005 – 2009*.

Putri's thesis, on the other hand, discuss about the roles that the UNDP have in managing the Nias earthquake disaster. It is stated that a funding agency, the Multi-Donor Fund (MDF) for Aceh and Nias, was formed in the wake of the disaster as a pool for international donations. The writer found that both writers do not elaborate on the involvement of the donor(s) in the project, only stating the amount of funds and the parties that participated as the donor(s) of the project.

In this thesis, the writer would like to not only discuss on the Switch to Biogas project implemented by the UNDP with the support of the KEMCO, but also to explain the relationship between the UNDP with the KEMCO itself, which is the only donor of the Switch to Biogas project. The write also aims to explore the influence of the donor in the management of the project, e.g. its involvement in the planning of the project, the funding plans of the project, etc. It is because that donor plays a big role in programs like the Switch to Biogas project, since they are the one(s) to provide the funding which is necessary to run the project. The donor of a project also usually has particular interests in the project that it funded, which may give us

Since the Switch to Biogas project is about the usage of biogas as an alternative energy source for dairy farmers in Lumajang, the writer would like to give a review on a literature about the biogas itself. Biogas usually refers to the gas created through the anaerobic digestion with anaerobic bacteria or fermentation of biodegradable substance such as manure, green waste, and crops.

To understand further on the subject of biogas, there is handbook entitled **Biogas Handbook** written by Teodorita Al Seadi et al (2008) that is written through the joint efforts of a group of biogas experts from Denmark, Germany, Austria and Greece as a part of the BiG>East Project running from September 2007 until February 2010 with the aim of promoting the development of biogas from anaerobic digestion in Eastern Europe.

In this book, the writers explains what is biogas and why we need it through several chapters that explains the advantages of the biogas technologies, the potential

of biogas, the thorough explanation of anaerobic digestion, the main applications of biogas, the utilizations of biogas and digestate, and the components of a biogas plant. The writers also explain on how to start a biogas plant through several chapters that explains how to plan and build a biogas plant, the safety of biogas plants, and the economy of biogas plants.

The writers in this book argue that the production and utilization of biogas provides environmental and socioeconomic benefits for both the society and the farmers involved in the usage of the biogas. For society, biogas can become a renewable energy source, the usage of biogas can reduce greenhouse gas emissions and mitigate global warming, and also contribute to waste reduction. As for the farmers, using biogas as an alternative energy source can lead to additional income and being able to use the digested substrate as fertilizer.

The writers further elaborate on the development of the usage of biogas in the world, e.g. in China there are an estimated number of 18 million rural household biogas digesters in 2006, with the potential estimated of being 145 billion m³. The writers also give an idea on the global potential of biogas production. They stated that according to the European Biomass Association (AEBIOM), Europe can produce biomass based energy from 72 million tons in 2004 to 220 million tons in 2020, with up to 20-40 million hectares of land can be used for energy production in the European Union alone without affecting the European food supply¹⁸.

Based on the review above on the usage of biogas as an alternative source of energy fits with what the UNDP and the KEMCO aim to achieve through the Switch to Biogas project: to create an environmental friendly and renewable energy that can be used to support the economic growth of the poor farmers in Lumajang, East Java.

¹⁸ Seadi, Teodorita Al et al. (2008). *Biogas Handbook*. Denmark: University of Southern Denmark Esbjerg

CHAPTER III

BACKGROUND OF THE UNDP IN INDONESIA, KEMCO, AND THE GOVERNMENT OF LUMAJANG, EAST JAVA

This objective of this chapter is to give the reader insights on the background of the United Nations Development Programme in Indonesia through its legal frameworks in Indonesia, as well as the vision and mission of both the KEMCO, which acts as the donor of this project, and the government of Lumajang, East Java, the local government of the location for this pilot project.

III.1. United Nations Development Programme's Legal Framework in Indonesia

The United Nations Development Programme was established in 1 January 1966 as a result of the adoption of Resolution 2029 (XX) by the General Assembly at its 20th session, which was held in 1965. In the resolution, the General Assembly decided to combine the Expanded Programme of Technical Assistance and the United Nations Special Funds to become the United Nations Development Programme¹⁹.

As a body that will be cooperating with the Indonesian government on development issues, the UNDP must have its own legal framework between them and the Government of Indonesia (GOI). Therefore, the United Nations Partnership for Development Framework (UNPDF) and the UNDP Country Program Action Plan

¹⁹ http://www.un.org/esa/rptc/docs/ECOSOC_res_2029_XX_of_22_11_1965.pdf

(CPAP) were created for each member states of the United Nations, including Indonesia.

III.1.1. United Nations Partnership for Development Framework (UNPDF) 2011-2015 Indonesia

The United Nations Partnership for Development Framework (UNDAF) is a framework created as the result of the collaboration between the United Nations and the Government of Indonesia to identify true and strategic ways in which the UN can support national priorities. The 2011-2015 UNPDF was formulated for 2 years in coordination with BAPPENAS (National Development Planning Agency) to ensure that the outcomes become well aligned with the 2010-2014 National Medium Term Development Plan (RPJMN)²⁰.

There are two outcomes in this framework that the writer would like to underline because of its relation to the Switch to Biogas project:

1. Outcome 2: Sustainable Livelihoods

The socio-economic status of vulnerable groups and their access to decent work and productive sustainable livelihood opportunities are improved within a coherent policy framework of reduction of regional disparities

UN agencies will provide high-quality strategic policy advice and will support national partners through the implementation of

²⁰ United Nations Development Programme. (2011). *United Nations Partnership for Development Framework (UNPDF) 2011-2015 Indonesia*.

innovative and replicable models for generating decent jobs and sustainable economic growth in priority regions and sectors. Specific emphasis will be placed on youth employment and on enhancing agricultural and industrial productivity for the creation of 'green' jobs and for raising competitiveness. Food Security will be another important priority for the UN. Interventions such as improvements in agricultural value chains, strengthening the capacity of Government and providing direct support for affected vulnerable groups will address the complex root causes for hunger²¹.

2. Outcome 5: Climate Change and Environment

Strengthened climate change mitigation and adaptation and environmental sustainability measures in targeted vulnerable provinces, sectors and communities

In alignment with the Government's plans, UN agencies will work with the central government to guide policies and actions on climate change, environmental security, and disaster management, while promoting the South-South cooperation modality. This will be complemented by partnerships with local governments and communities in selected high-priority regions to ensure that vulnerable groups are aware of and engaged in environmental issues. In order to promote green economic development, UN agencies will furthermore support innovative and replicable approaches in the areas of waste management, cleaner and resource efficient technologies, energy efficiency and renewable energy²².

²¹ United Nations Development Programme. (2011). *United Nations Partnership for Development Framework (UNPDF) 2011-2015 Indonesia*.

²² Ibid

The writer found that the establishment of the Switch to Biogas project was able to meet the two outcomes from the United Nations Partnership for Development Framework 2011-2015 stated above.

Through the Switch to Biogas project, the UNDP introduces the biogas technology to the dairy farmers of Lumajang. The usage of biogas is cleaner, efficient, and also renewable compared to the use of fossil fuel or firewood, contributing on reducing the impacts of climate change through lesser carbon emission. The downstream sludge management process conducted after biogas has been produced enable the farmer beneficiaries to sell their sludge to local fish feed and fertilizer company, creating a sustainable source of income for the farmers and at the same time also contribute to the implementation of a zero waste policy.

Moreover, through a microcredit system the farmer beneficiaries will have to pay back to the UNDP the money for the construction of the biogas units with the money they obtain from selling the sludge. After enough money is received from farmer beneficiaries, the UNDP will be able to create another biogas unit for other poor farmers, making it a replicable process.

III.1.2. Country Programme Action Plan (CPAP) 2011-2015 between the Government of Indonesia and the United Nations Development Programme

The United Nations Development Programme Country Programme Action Plan is a framework created by the UNDP and the Government of Indonesia in order to support the realization of the National Medium Term

Development Plan and also the realization of the Millennium Development Goals (MDGs) and the United Nations Conventions and Summits²³.

There are several points in the CPAP that the writer would like to underline because of its relation to the Switch to Biogas project:

4.16 In response to the growing concern regarding the potential impact of climate change on human development and in reversing developmental gains, climate change adaptation and mitigation will be a central focus of UNDP's environment programme over the next five years. Anchored in the national Medium-term Development Plan Priority #8 on energy and Priority #9 on the environment and disaster management, the programme is organized into three clusters: a) climate change adaptation and mitigation; b) renewable energy/energy efficiency; and c) sustainable natural resource management²⁴.

4.18 UNDP will continue to support Indonesia's efforts to access new funding mechanisms by highlighting the needs of communities most vulnerable to the effects of climate change. Working at both the national and local levels, UNDP will aim to strengthen capacities to access and manage existing climate change financing mechanisms including the MLF, GEF, AF, and SCCF. Additionally, UNDP will support efforts to build strong and innovative partnerships with the private sector in order to access private sector resources as one possible source of domestic funding for climate change initiatives²⁵.

²³ United Nations Development Programme. (2011). *Country Programme Action Plan (CPAP) 2011 – 201: The Government of Indonesia and United Nations Development Programme (UNDP)*

²⁴ Ibid

²⁵ Ibid

4.20 UNDP will support the government and key stakeholders in promoting, adopting and managing renewable energy and energy efficiencies approaches in more effective and innovative ways. Support will target (a) improving the national policy and institutional environment and incentive systems to facilitate and enable wide scale adoption and investments in renewable energy and energy efficient technologies across both the public and private sectors; and (b) integrating renewable energy/energy efficiency policies into national and local development plans and climate change strategies. UNDP will also support the government in exploring possibilities for developing public-private partnerships on renewable energy and energy efficiency²⁶.

4.22 UNDP will partner with government, private sector and community-based organizations to ensure that there are coherent and effective policy frameworks, action plans and funding mechanisms in place to manage terrestrial ecosystems in target areas. Special attention will be given to designing, through broad participatory processes, a policy framework and regulations on forest and watersheds management at the national and local levels. UNDP will also provide support to stakeholders in designing innovative models to involve community based and volunteer organizations in the management of terrestrial eco-systems. This is intended to help enhance community ownership and involvement while at the same time supporting the creation of livelihood opportunities²⁷.

The writer finds that the outcomes of the Country Programme Action Plan are in line with the United Nations Partnership for Development Framework

²⁶ United Nations Development Programme. (2011). *Country Programme Action Plan (CPAP) 2011 – 201: The Government of Indonesia and United Nations Development Programme (UNDP)*

²⁷ Ibid

discussed previously, since both frameworks were created to align with the 2010-2014 National Medium Term Development Plan (RPJMN).

Based on the outcomes mentioned above, the implementation of the Switch to Biogas project is suitable with what the United Nations and the Government of Indonesia are trying to achieve in the field of environment and energy. The outcomes from the implementation of the Switch to Biogas project was in line with the efforts to reduce the impacts of climate change and as a way to adapt with the climate change as it introduce biogas as an alternative energy source and also reduce the amount of greenhouse gas emission produced.

The Switch to Biogas project also introduced a microcredit scheme in which the poor target beneficiaries will become able to pay back the loans for the construction of the biogas units. The project also involves not only the government, but also the community and private sectors.

III.2. Vision and Mission of the Lumajang's Local Government

Lumajang is a regency in East Java, Indonesia. It is located south of Probolinggo, west of Jember, and east of Malang, bordering the Indian Ocean to the south. Farming is one of the major occupations of the Lumajang regency, which is known as the producer of pisang agung and pisang kirana. According to 2013 agricultural census, as much as 168.127 farms are owned by households, 17 farms are owned by incorporated agricultural companies, and 3 farms are owned by neither household nor incorporated agricultural company. The number of farms has decreased by 15.8% since 2003, falling from 199.718 to 168.127. The population of cows and bulls in Lumajang, either for business or non-business purposes, is 162.986 in 2013. There is a 23.1% decrease in the population of cows and bulls since 2003²⁸.

²⁸ Badan Pusat Statistik Kabupaten Lumajang. (2013). *Angka Sementara Hasil Sensus Pertanian 2013*. Lumajang

The vision of the local government is “To create a prosperous and dignified Lumajang community”, while its missions are:

1. To improve the welfare of the community through the improvement of the regional economy with environmentally sustainable utilization of natural resources, creating conducive business environment, and the improvement of the knowledge and skills of the economic actors.
2. To improve the dignified community through the improvement of good governance with the enhancement of human resources and apparatus professionalism.
3. To improve the community’s quality of life through the improvement of religious life, quality of education, social care, and poverty reduction²⁹.

III.3. Vision and Mission of the Korea Energy Management Corporation

The Korea Energy Management Corporation was established in 1980, with the objective of implementing projects efficiently for the rationalization of energy use, thereby reducing carbon dioxide emission and contributing to the sound development. The current CEO of KEMCO is Byun Jong Rip, who was inaugurated in June 2013³⁰.

The visions of the KEMCO are:

- 1. Creating**, expressing the strong will of the KEMCO to create a highly efficient, low carbon energy society that can sustain low carbon, green growth.

²⁹ www.lumajang.go.id

³⁰ www.kemco.or.kr

2. **Green Life Style: Low Carbon Emission**, meaning that to create a culture that actively responds to climate change by minimizing greenhouse gas emission caused by energy use through energy saving & by using clean energy.
3. **Smart Life Style: High Energy Efficiency & Saving**, meaning to create advanced environments for energy use and cultures that enable leading comfortable lives by establishing a sound culture using highly efficient and very clean energy³¹.

³¹ www.kemco.or.kr

CHAPTER IV

SWITCH TO BIOGAS PROJECT ANALYSIS

This chapter discusses about the implementation of the Switch to Biogas project. The writer would like to discuss the 4 phases in this project: planning, initiation, implementation & monitoring, and results. In addition to the discussion of the 4 phases, the writer would like to give an evaluation at the end of this chapter.

The writer sees that the implementation of this project was in accordance to the high amount of emission produced by Indonesia, which according to the Indonesia National Council of Climate Change (DNPI) emitted 2.3 gigatons (1 gigaton = 1 billion tons) of greenhouse gas in 2005 and the potential to reach 2.8 gigatons by 2020 if there are no action taken to reduce the emission³². The achievement of the Millennium Development Goals can also be achieved through this project, since environmental sustainability becomes a main goal in this project.

The objective of this project is to give dairy farmers of Lumajang access to biogas as a way to improve their livelihood through the use of a renewable and environmental friendly energy. Installation of biogas units will help farmer beneficiaries to gain access to biogas for daily activities, while the downstream sludge management process introduced in this project will help farmer beneficiaries to gain additional income and stimulate the local business through the participation of local fish feed and fertilizer factories.

The writer would like to elaborate on the management process of this project. As stated above, the writer has identified the implementation of the project that has been divided into 4 phases. The first phase is the planning phase, in which the strategies to be implemented in the project were created. Next, the initiation phase is

³² <http://www.downtoearth-indonesia.org/id/story/dnpi-mengumumkan-angka-potensi-pengurangan-emisi-co2>

a phase for preparing the tools needed for the implementation of the strategy. The next phase is the implementation and monitoring phase, in which the strategies that has been planned were carried out while ensuring that the project progress according to plan. The last phase is the assessment on the results of the project.

In this Switch to Biogas project, the collaboration between the UNDP, the KEMCO, and the government of Indonesia can be seen as an example of a multilateral cooperation, in which multiple countries could cooperate in order to solve a common issue. The parties involved in this project were able to bring together their own interests and achieved an agreement to cooperate with each other by carrying out decisions as a way to solve an issue that these parties have in common.

The presence of the UNDP as the initiator of the Switch to Biogas project is a part of its role as an international organization that works on the development of its member states. By implementing programs like the Switch to Biogas project, the UNDP is fulfilling its purpose as a development agency under the United Nations to help member states in the development sector.

Table IV.1 Steps and Actors in the Switch to Biogas project

	Steps	Actors
1	Plsnning	UNDP, KEMCO
2	Initiation	UNDP, PT Bumi Harmoni Indoguna, Government of Indonesia
3	Implementation and Monitoring	UNDP, PT Bumi Harmoni Indoguna, Farmer Beneficiaries, Local Entrepreneurs, Private Sectors, Government of Indonesia

4	Results	UNDP, KEMCO, Government of Indonesia
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Source: Researcher Analytical Framework

IV.1. Planning

The planning of this program was started when the UNDP Indonesia conducted discussions with the UNDP Country Office in South Korea, which was followed by the UNDP South Korea contacting the Korea Energy Management Corporation in joining the discussion. From the discussion, both parties shared their interests: the UNDP was interested in enhancing the livelihoods of the dairy farming community through the introduction of biogas and better environmental management in a changing climate, while the Korea Energy Management Corporation was interested in implementing carbon trading in Indonesia to reduce the amount of greenhouse gas emission produced³³.

The discussion between the three parties took place during early 2009 for several months, which resulted in the UNDP Indonesia proposing to establish a pilot project using biogas and observe the significance of the emission reduction from this biogas intervention. During the discussion, the UNDP Indonesia created a concept note for this project which includes not only access to biogas, but also the impact of climate change to dairy farms, climate change impact assessment, the cost-benefit analysis of the project, and the model design that targets poor farmers as the project's beneficiaries. This concept note would later become the foundation for the Switch to Biogas project.

³³ Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

After an agreement has been achieved between the UNDP and KEMCO, the funding for the project was allocated by the KEMCO. The KEMCO became the only donor for this Switch to Biogas project due to their common interest with the UNDP. The UNDP wanted to develop a portfolio on renewable energy related to mitigation and adaptation, and they saw that this establishment of biogas as the best method because it targeted poor people as its beneficiaries and also mitigation process can be achieved through the introduction of biogas³⁴.

The expected outputs for this project, along with the implementation strategy and activities, are:

1. The development of a durable and acceptable (socially, economically, and environmentally) biogas unit that has been tested in the field and has increased accessibility,

Access to affordable energy is one of the most important aspects for the development of rural areas, especially in dairy farming in which energy is needed not only for regular household activities but also for other activities related to dairy farming e.g. processing fodder and feed, transportation, and cooling facilities.

The project aims to test and initiate the up scaling of safe and reliable bio gas in East Java through a process of design, testing, and field trials. The UNDP will work with daily cooperative(s) in East Java of which some have been active in developing biogas through their own resources. The focus target of this project will be farmers with less than 4 livestock³⁵.

The expected activity results of this output include:

³⁴ Ibid

³⁵ United Nations Development Programme. (2009). Switch to Biogas Project Document. P.5

1. The development of a household energy planning approach which supports the transition to the use of renewable energy. The UNDP will seek cooperation with universities, research agencies, and cooperatives to design the model.
2. The development of a robust and economically viable biogas unit that has been designed, tested and piloted which fits local needs, requirements for a Clean Development Mechanism (CDM), and national building codes. Cooperatives, universities, research agencies, consultancy firms, and SML enterprises will be invited to submit proposals to develop a robust and economically viable biogas unit.
3. The development of a financing mechanism consisting of microloans and subsidies at the cooperatives. The project will work together with dairy cooperatives that already have microloan programs to support their members, developing the structure & protocol for biogas unit microloan programs for their members.
4. The development of at least one technology to process sludge in an environmentally friendly and economically profitable way. The project will invite universities, research agencies, consultancy firms, and SML enterprises in the development.
5. The construction and servicing of 15 biogas units facilitated by bringing together suppliers and households, in which the progress will be monitored for 6 months³⁶.

2. Carbon financing mechanisms have been employed to promote wider adoption of household based biogas

³⁶ United Nations Development Programme. (2009). Switch to Biogas Project Document. P.6

Based on the current condition, the UNDP concluded that financial support is required since the required biogas technology with a good environmental performance is economically not feasible. A prefeasibility study was conducted, with results showing that the project can generate sufficient carbon emission reductions meaning that there's potential to exploit the Clean Development Mechanism (CDM) to provide financial support. A conservative estimate indicates that one biogas unit (BGU) able to generate at least 5 tonnes of CO²e every year.

The Clean Development Mechanism (CDM) is a carbon trading mechanism introduced by the United Nations Framework Convention on Climate Change (UNFCCC) under the Kyoto Protocol with the purpose of allowing emission-reduction projects in developing countries to earn certified emission reduction (CER) credits for each tons of CO² reduced³⁷.

A group of cooperatives will establish an association which acts as the CDM project holder and will play a key-role in bringing in the required farmers' network and administrative and financial capacity. The UNDP will work with these cooperatives on preparing the CDM project idea and if successful will implement the CDM project later on³⁸.

The expected activity results of this output include:

1. The preparation of a complete feasibility studies that result in the decision on whether or not a CDM project shall be pursued. The aim of this assessment is to assess whether or not CDM is possible under the current conditions.

³⁷ <http://cdm.unfccc.int/about/index.html>

³⁸ United Nations Development Programme. (2009). Switch to Biogas Project Document. P.7

2. The organization of a seminar to inform the cooperatives and households about CDM opportunities³⁹.

3. Climate change impact assessment on dairy farming in East Java has been made providing inputs to mid to long term policies and business plans

Other than the availability of natural resources, the climate plays a large role in dairy farming. Most recent studies indicate that rain fall patterns are changing, along with a slight rise in temperature – meaning that this has become a great difference compared to the past in which climate is considered as a constant factor. This leads to the climate having to be treated differently as a dynamic parameter that constantly changes, resulting in the need for local and national governments to review and adjust its development policies to minimize the negative impacts and create opportunities for a sustainable dairy farming development in East Java and other regions⁴⁰.

The expected activity results of this output include:

1. The conduction of a climate change impact assessment for the East Java region. The aim of this assessment is to review the relationship between dairy farming and the climate variables based on the climate change trend in East Java for the last 100-150 years and an experimental downscale forecasting result for the East Java region.
2. The development of an anticipatory strategy that includes an initial set of concrete options for farmers to adapt to climate change by

³⁹ Ibid. P.8

⁴⁰United Nations Development Programme. (2009). Switch to Biogas Project Document. P.8

the local stakeholders. The UNDP will invite key stakeholders, such as dairy sector representatives, local governments, NGOs, private sector/private sector associations, and representative of farmer groups, to discuss the findings of the assessments⁴¹.

The timeframe for this project was from 2009-2011, since the UNDP analyzed that for a pilot project, 2 years was sufficient. A pilot project that runs for too long has the potential to become ineffective. Moreover, if the UNDP was planning to have this project to be replicated by the government of Indonesia and also to find out whether or not this project is viable for CDM, this project have to be done as soon as possible considering the condition of the climate change.

In this project, the KEMCO gave the UNDP full authority over the project because the KEMCO believed in the UNDP's quality to deliver the expected results. The KEMCO was only interested in the final result of the project and did not get involved too much in the project itself. As a donor, however, the KEMCO was still involved in decision making with UNDP after assessing the progress of the project and also had the right to question actions that has been taken in the project that did not correspond with the project document that has been agreed between UNDP and KEMCO, unless UNDP had a strong reason behind the changing of action(s) taken. Both parties could then discuss and reach an agreement to revise the project document.

The modality in this project is categorized as Direct Implementation Modality (DIM). A direct implementation modality is the modality whereby UNDP takes on the role of the Implementing Partner, which gives the UNDP the technical and administrative capacity to mobilize and apply the required inputs to reach the expected outputs and also the overall management responsibility and accountability for project implementation.

⁴¹ Ibid. P 8-9

IV.2. Initiation

After this project has received a signed agreement with the KEMCO, the UNDP opened a call for bids to find a company that will act as the project management unit for this project. Due to the small size of this pilot project, the UNDP decided to open a tender instead of forming its own project management unit. In this tender, the UNDP has prepared a list of assignments that have to be done by the winner of the tender. The participants of this tender must prepare their own technical and financial proposal to explain the method used by them to achieve the expected outputs. The UNDP also asked the winner of the tender to have several experts in the team, such as experts in microcredit, biogas, and rural development⁴².

From the bidding process, a company named PT Bumi Harmoni Indoguna went through as the winner of the bid. PT Bumi Harmoni Indoguna is a construction company whose qualifications include environment consulting services and landscape architecture services. Projects that PT Bumi Harmoni Indoguna have handled include agriculture and rural agreement and preparing the environmental impact analysis (EIA) documents for the construction of the South Jakarta mayor's office⁴³.

The UNDP appointed PT Bumi Harmoni Indoguna because it has the desired qualifications for the project, such as experience in rural development and working with technology appropriate for rural areas. The appointment of PT Bumi Harmoni meant that the UNDP will act as the party that supervises and conducts quality control of the project. The payment scheme for PT Bumi

⁴² Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

⁴³ <http://bumiharmoni.com/>

Harmoni was based on the reports by PT Bumi Harmoni that has been reviewed and given feedback by the UNDP several times until satisfactory results were achieved, in which the payment will be made⁴⁴.

After PT Bumi Harmoni Indoguna has been appointed as the project management unit of the project, the first assignment was to initiate assessments to acquire baseline information, such as the existing biogas design, the technology preference of the target beneficiaries, common practices of the farmers related to manure management, household expenditure for cooking, and willingness of target beneficiaries to pay for biogas technology. The result of the assessments that has been conducted was used to determine the suitable pilot site and also as the base for designing the biogas technology and microcredit system for this project⁴⁵.

The Switch to Biogas project chose the East Java province as the pilot site because of the presence of poor dairy farmers there and the growing concern in the changing climate. The introduction of biogas units in the area that has no proper quality and sludge management also become another concern. Based on the result of the assessments that has been conducted, Lumajang was chosen as the most appropriate pilot site. Compared to the other potential locations in East Java, Lumajang has the most number of dairy farmers which has the potential to reduce a large amount of biomass. The large number of poor households that still use firewood for their daily needs compared to other potential locations was also another reason why Lumajang was chosen as the location for this project. The target beneficiaries for this project were dairy farmers with less than 4 livestock units⁴⁶. Dairy farmers with less than 4 livestock units are selected as beneficiaries because they are very prone compared to farmers with more cattle. Cattle for

⁴⁴ Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

⁴⁵ UNDP. (2012). *SWITCH to BIOGAS: Assisting Dairy Farming Communities to Gain Access to Biogas and Improve Environmental Practices Final Report September 2009-2011*

⁴⁶ Based on interview with Verania Andria, Programme Manager for Sustainable Energy UNDP Indonesia, January 27 2014, 5.00 pm via phone

them are very important because cattle produce milk which is their source of income – the loss of even one cattle to farmers with less than 4 cattle will have a greater affect to their income compared to farmers with more than 4 cattle.

After the site for the pilot project has been selected, the UNDP conducted multi-stakeholder consultations in order to socialize the project and to select the target beneficiaries. The stakeholders in this project include:

1. Government: the Ministry of Energy and Mineral Resources (national government) then the regional development planning agency (BAPPEDA) and the regency of Lumajang (local government).
2. Dairy Sector Representatives, which include local cooperatives and farmer groups that become the target beneficiaries
3. Private sectors, such as Nestlé and Bank Negara Indonesia (BNI). Nestlé become interested in the Switch to Biogas project because the dairy farmers of Lumajang which become the target beneficiaries for this project are suppliers for Nestlé, while BNI's interest in the progress came as a part of its Corporate Social Responsibility (CSR).

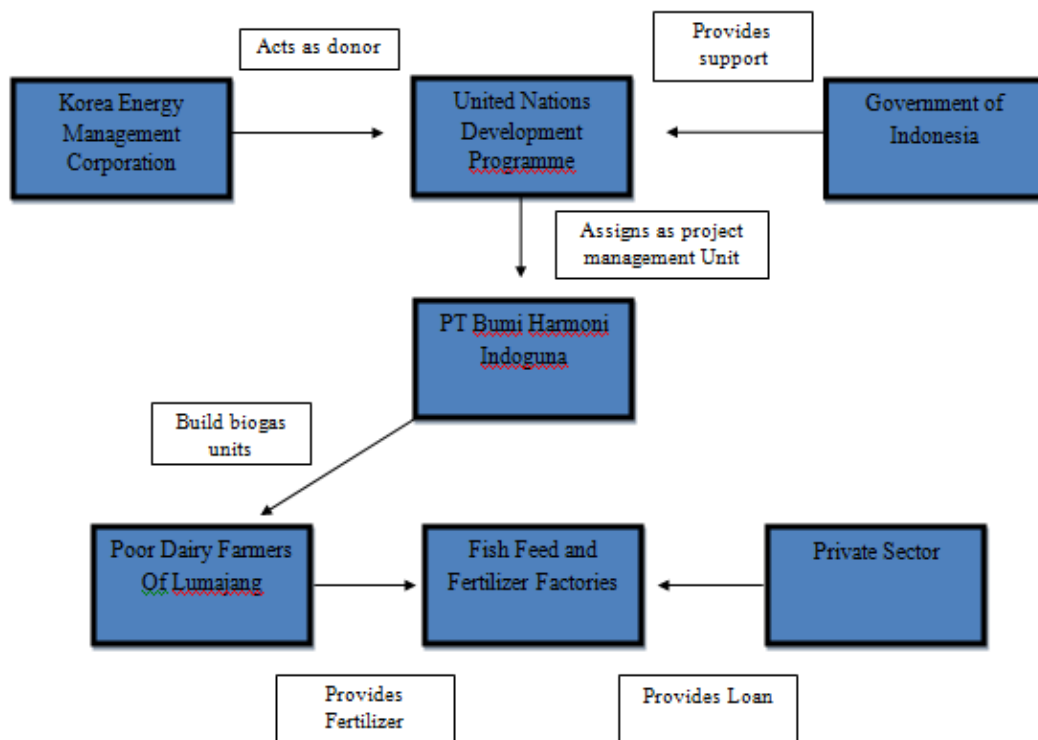
In holding discussions with stakeholders, the UNDP first held stakeholder discussions at the national level with the Ministry of Energy and Mineral Resources and also conducted similar discussions with the Humanist Institute for Co-operation with Developing Countries (Hivos), a Dutch organization for development that have their own biogas program called Biogas Rumah (BiRu). The BiRu program is managed and implemented by Hivos with technical assistance from SNV (Netherlands Development Organization). The BiRu program's objective is to disseminate domestic biogas units as a local, sustainable energy source through the development of a commercial, market oriented sector in several Indonesian provinces⁴⁷. The discussion between the UNDP and Hivos

⁴⁷ <http://www.biru.or.id/en/index.php/biru-program/>

was conducted to see where the UNDP and Hivos can synergize their biogas projects⁴⁸.

Next, the UNDP held discussions at the community level with local cooperatives and farmer groups. After the target beneficiaries have been identified, the UNDP asked their willingness to participate and legitimized it through the signing of a Letter of Interest (LoI). After the signing of the LoI, the implementation phase was started⁴⁹.

Figure IV.1: Project Scheme



Source: Researcher Analytical Framework

⁴⁸ Based on interview with Verania Andria, Programme Manager for Sustainable Energy UNDP Indonesia, January 27 2014, 5.00 pm via phone

⁴⁹ UNDP. (2012). *SWITCH to BIOGAS: Assisting Dairy Farming Communities to Gain Access to Biogas and Improve Environmental Practices Final Report September 2009-2011*

The figure above explains the relationship between the actors involved in the project. The UNDP acts as the body that established the Switch to Biogas project, with funding from the KEMCO and support of the Government of Indonesia, both national and local governments. The UNDP appointed PT Bumi Harmoni Indoguna which acted as the project management unit of this program, PT Bumi Harmoni Indoguna established the biogas units for the target beneficiaries of this project, which were the dairy farmers of Lumajang. The dairy farmers of Lumajang with the help of PT Bumi Harmoni Indoguna were able to produce biogas and the sludge produced as the waste from the process were sold to local fish feed and fertilizer factories, which was established with the help of loans from private sectors.

The writer thinks that the initiation phase was a crucial phase in the project, as the project management unit for this project was appointed in this phase. PT Bumi Harmoni Indoguna was appointed as the project management unit because of the company's experience in rural development and handling several projects related to the environment. With such experience, it is expected that PT Bumi Harmoni can carry out their tasks well.

Stakeholder meetings are also an important action to take, so that the UNDP can gain support from potential stakeholders such as the government and private sectors and also gain better understanding on the dairy farmers of Lumajang which were the potential beneficiaries for this project.

IV.3. Implementation & Monitoring

Before the Switch to Biogas project was implemented, several households in East Java have already invested in biogas units. However, these biogas units that have been established were not based on standardized designs, resulting in

inefficient biogas production and technical problems. Moreover, no sludge management process was available, resulting in households having the biogas units to dump the waste into the environment. Therefore, the implementation of the Switch to Biogas project can help households in not only East Java but in other rural areas to gain access to high quality biogas units with proper sludge management. Moreover, the UNDP also conducted a Climate Change Impact Assessment and emission reduction calculation for as a part of the project which will contribute to the development of the dairy farming in East Java.

As the project management unit of this project, PT Bumi Harmoni was held responsible for the construction of the biogas units for the target beneficiaries. The consulting company assigned the help of Prof. Muhammad Junus from Brawijaya University as the expert in biogas, who has his own biogas design and formula for fish feed and fertilizer. Prof. Muhammad Junus gave the construction guideline, supervise the process of construction, and involve the locals in the building of the biogas units as a form of capacity building⁵⁰.

15 biogas units as big as 10 m³ were constructed in the Senduro sub-district of Lumajang, each unit constructed with the assistance of the farmer beneficiaries. Each biogas units were used by 2-3 farmer households, with the total of 37 farmer households being empowered by the 15 biogas units⁵¹.

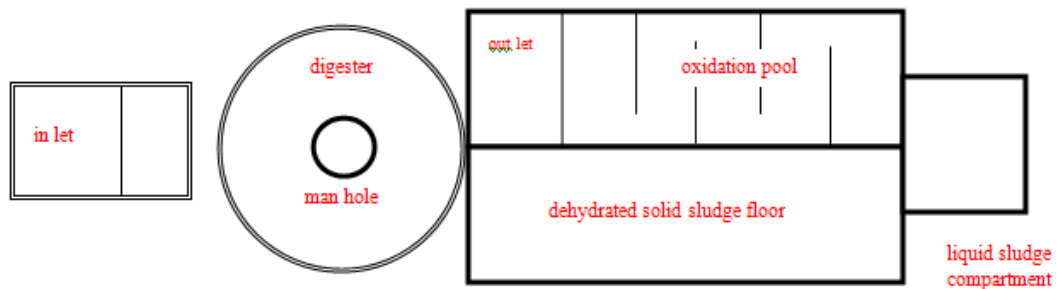
The construction of one biogas unit took approximately 4 to 5 days. The newly built biogas units can be used approximately 1-1½ weeks after the construction has finished. The biogas units were able to produce biogas approximately a week after the materials has been inserted into the unit, under the condition that the amount of the raw materials inserted was correct. Usually failure in producing biogas was caused by incorrect amount of raw materials inserted into the unit, such as too much water or manure. In the implementation

⁵⁰ Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

⁵¹ UNDP. *SWITCH TO BIOGAS: From Biogas Energy into Environmental Friendly Business*.

of this program, most biogas units were able to produce biogas within 1-1½ week after the ingredients has been inserted.

Figure IV.2: Biogas Model



Source: SWITCH TO BIOGAS: From Biogas Energy into Environmental Friendly Business, 2012

The figure above describes the model of the biogas unit used in this project. The ingredients were inserted and decomposed in the digester. The gas produced can be used by the beneficiaries for daily activities, while the sludge produced can be processed and sold to fish feed and fertilizer factories. In this model, the manhole can be used as an entrance for people to maintain and clean the digester. The sludge will be oxidized in the oxidation pool, then the solid sludge will be dried on the floor while the liquid sludge will be contained in the compartment⁵².

The beneficiaries were given training for a week on how to use biogas for utensils, such as stove and gas lamps that has been provided by the UNDP, and also training on maintenance after the biogas has been successfully produced. The beneficiaries were also given a hotline number to call PT Bumi Harmoni Indoguna in case they face problems in operating the biogas unit⁵³.

⁵² UNDP. *SWITCH TO BIOGAS: From Biogas Energy into Environmental Friendly Business*.

⁵³ Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

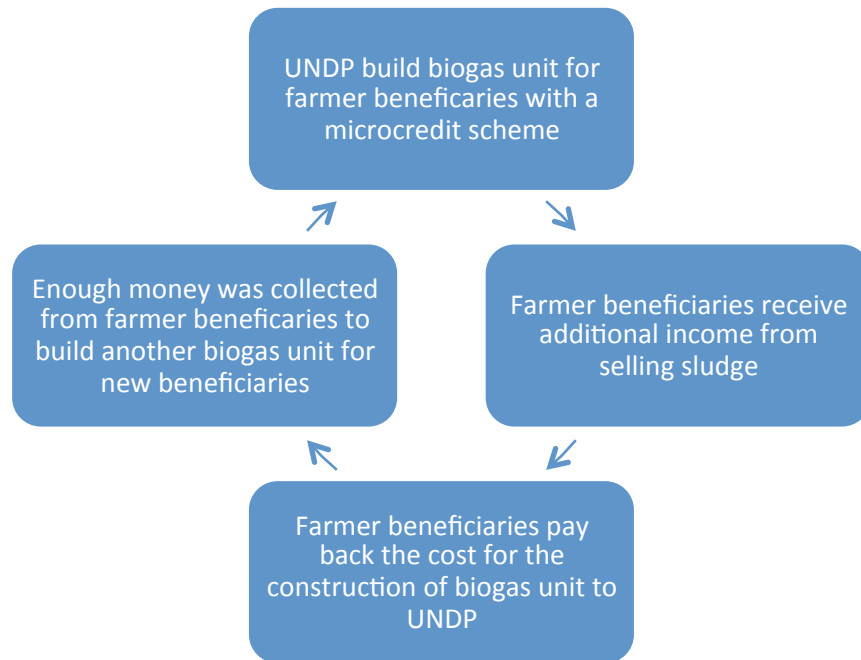
Following the production of sludge as waste from the biogas producing process, the UNDP's next step in this project was to design the model for the downstream sludge management. The objective of the downstream sludge management was to ensure that the sludge produced by the farmers will not be dumped to the environment but instead processed to become ingredients for fish feed and fertilizer. This way, the biogas scheme will be able to become a zero waste scheme and the farmers will be able to receive additional income.

The most important part in this downstream sludge management was the implementation of a microcredit system for the target beneficiaries. In this microcredit system, the farmers were expected to be able to pay the loan for the construction of the biogas unit, which cost IDR 10 million for each unit. To be able to pay back the money used for constructing the biogas unit, the farmers will have to sell the sludge produced by their biogas units. The sludge from the biogas unit will come in two forms: wet and dry sludge, in which both are the main ingredients for fertilizer and fish feed respectively. The farmers will sell the sludge to local fish feed and fertilizer factories run by local entrepreneurs that have been funded by private sectors.

Some of the money received from selling the sludge will be used by the farmers to pay back to the UNDP. The amount of money to be paid by the farmer beneficiaries was IDR 10.000 per day. The farmer beneficiaries were expected to be able to pay their loans back in 2½ – 3 years. If all of the 37 beneficiaries households were able to pay the loan on time, in 2.8 months a new biogas unit could be built for another household⁵⁴. By using this microcredit system, the UNDP will be able to sustainably replicate this biogas scheme for other households.

⁵⁴ UNDP. (2012). SWITCH TO BIOGAS: From Biogas Energy into Environmental Friendly Business.

Figure IV.3: UNDP Microcredit System



Source: Researcher Analytical Framework based on the United Nations Development Programme microcredit system implemented in the Switch to Biogas project in Lumajang, East Java

Before the microcredit system can be implemented, the UNDP had to conduct a research to find the best sludge mixture for producing fish feed and fertilizer. In conducting this research, the UNDP received help from the regent of Lumajang together with the help Local Government Unit (SKPD) of Agriculture and Fishery which provided UNDP land to be used as demonstration plots⁵⁵.

To complete the cycle of the waste management, local fish feed and fertilizer businesses were needed as the buyers of the sludge produced from the biogas units. The UNDP conducted road shows around the pilot area to find local entrepreneurs that were willing to start a business on fish feed and fertilizer

⁵⁵ Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

factories. In order to increase the financial capacity of the local fish feed and fertilizer business, the UNDP linked the local business to the Corporate Social Responsibility (CSR) funding from Bank Nasional Indonesia as a part of its development for a green banking concept⁵⁶.

Even though the most operational process were done by PT Bumi Harmoni Indoguna as the project management unit of this project, the UNDP still have to monitor the progress of the project to ensure that everything goes as planned and to overcome any problems that the project might face in the process.

Once every 3 months, the UNDP send a team to Lumajang to monitor the project. The number of visits intensified when the project was in the phase of building the biogas units and holding consultations with the locals. Ms. Verania Andria, the current Programme Manager for Sustainable Energy at the Environment Unit, was involved in monitoring the substance and the implementation on the field. In this monitoring process, the UNDP occasionally invited people from the Ministry of Environment, Ministry of Energy and Mineral Resources, and the Ministry of Agriculture as a part of the UNDP's advocacy policy.

As a part of the agreement between the UNDP and the KEMCO, the UNDP was required to send reports on the progress/update of the project. Reports were sent to the KEMCO once a year. The contents of the report include the progress of the project, obstacles faced in the project, and the recommended policy to countermeasure the situation⁵⁷. Even though the KEMCO did not get involved directly on the implementation phase of the project, the KEMCO was still able to influence decision making through responding to the reports sent by the UNDP.

⁵⁶Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

⁵⁷Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

In the implementation phase, the UNDP faced several problems. The problems faced by the UNDP during this phase include:

1. The sludge produced by the biogas units were not able to dry quickly due to the high rainfall intensity in Lumajang. The sludge have to be dried before it is processed into fish feed. The UNDP solved this issue by using bamboo to cover the sludge when rain came and also have the sludge dried when it arrived at the fish feed factory.
2. The UNDP needed a year of research with the help of Brawijaya University using the demonstration plots provided to test the best dosage of sludge mixture to be used as fertilizer and fish feed⁵⁸. Since the microcredit system needed the additional income for the farmer beneficiaries from the selling of sludge, the downstream sludge management scheme cannot be implemented until the microcredit process have started. This eventually led to the delay of the downstream sludge management process.
3. The UNDP had difficulties in convincing the potential beneficiaries to become part of the Switch to Biogas project. This is caused by the availability of various types of biogas units that have been introduced by local institutions using various financing schemes. Some farmers found other biogas initiatives to have better financing schemes than the one offered by the Switch to Biogas project, while some farmers have lost their interest in biogas units due to their bad past experience with initiatives that introduced biogas scheme with poor technology⁵⁹.

⁵⁸Ibid

⁵⁹ UNDP. (2012). *SWITCH to BIOGAS: Assisting Dairy Farming Communities to Gain Access to Biogas and Improve Environmental Practices Final Report September 2009-2011*.

The writer would like to highlight on the downstream sludge management process which, according to the writer's personal opinion, was the most interesting part of the project. The UNDP not only able to implement a zero waste policy through the sludge processing, but at the same time also able to start a sustainable supply chain in which the farmer beneficiaries were able to sell the sludge as the materials for fish feed and fertilizer in parallel with their usage of biogas.

That supply chain empowered local entrepreneurs running the fish feed and fertilizer factories, and the some of the money that the beneficiaries acquired from selling the sludge were used to pay the loan back to the , which after some time enough money will be collected to be used to construct another biogas unit for new farmer beneficiaries. However, it is a pity that the downstream sludge management process couldn't be implemented on time due to the long process for government procurement procedures as well as the research on the formula for the best sludge mixture which took longer than expected.

IV.4. Results

The results based on each expected outputs are:

1. By the end of the project, the UNDP has installed 15 biogas digesters, with each unit receiving manure from 3-5 cows to produce 2-4 m³ biogas/day that can be used by 2-3 households for cooking for a total of 10 hours/day. The farmer beneficiaries have also received training on operating and maintaining the biogas unit as well as processing the sludge to make it economically viable.

However, by the end of the program the downstream sludge management was not yet able to collect enough money from the farmers to

replicate another biogas unit. This delay was caused by the time needed for the research on the best sludge mixture to be used as fertilizer and fish feed took longer than expected, accompanied by the long process of government procurement procedures for purchasing equipment needed to start the factories. The infrastructure for the fish feed and fertilizer production and the product composition were confirmed in February 2011⁶⁰.

2. The UNDP used the UNFCCC methodology AMS III.R “Methane recovery in agricultural activities at households/small farm level (version 2.0)” and methodology AMS I.C “Thermal energy for the user with or without electricity” to calculate the amount of emission reduction from the application of the biogas units in the Switch to Biogas project.

The assessment for the potential amount of emission was conducted through household survey, targeting the households that became beneficiaries of the Switch to Biogas project. Since the manure management practices and the composition of the dairy cow population vary among farmer households, the UNDP decided to conduct the assessment based on a majority practice in which the manure was dumped into the pits and the number of cows was totaled from the 38 households.

Based on the calculation, the UNDP found out that 15 biogas digesters used by the farmer beneficiaries have the potential to reduce as much as 1,513 tons of CO² equivalents every year, with each digester having the potential to reduce 100 tons of CO² every year. Based on the results, the UNDP concluded that the installation of biogas units and the waste management of this project have potential to be a Clean Development

⁶⁰ UNDP. (2012). *SWITCH to BIOGAS: Assisting Dairy Farming Communities to Gain Access to Biogas and Improve Environmental Practices Final Report September 2009-2011*.

Mechanism (CDM) project if the number of biogas units is significantly multiplied⁶¹.

3. A climate change impact assessment to the dairy farming in East Java was produced. The assessment was made by analyzing the historical climate data, such as rainfall, temperature, and humidity, from the past 18 demonstrating the effects of climate variability to the livelihoods of farmers. The creation of the climate change impact assessment for the East Java region was also as a part of UNDP's advocacy policy with the Ministry of Agriculture.⁶².

As an exit strategy, at the end of the project the UNDP composed the overall best practice from the project for the Ministry of Energy and Mineral Resources to be used for improving the biogas scheme of the Biogas Rumah (BiRu) program, especially in the sludge management process. One of the main differences between the Switch to Biogas project with the Biogas Rumah (BiRu) project was in the sludge management process – the BiRu biogas scheme did not have any sludge management process in it. Therefore, the UNDP gave recommendations to the Ministry of Energy and Mineral Resources to add sludge management into the BiRu program with the very least adding containers for the sludge produced to prevent nitrates from contaminating soil.

Moreover, at the end of the project, the UNDP integrated the Switch to Biogas project with the BiRu program. With this, the farmer beneficiaries under the

⁶¹ UNDP. (2012). *SWITCH to BIOGAS: Assisting Dairy Farming Communities to Gain Access to Biogas and Improve Environmental Practices Final Report September 2009-2011*.

⁶² <http://www.id.undp.org/content/dam/indonesia/docs/envi/project/BIOGAS%20Results%20Sheet.pdf>

Switch to Biogas project can ask for assistance from the cooperatives under the BiRu biogas program⁶³.

In May 2012, a national workshop to disseminate the success stories of the Switch to Biogas project was held in Jakarta, inviting the Lumajang district government, relevant line ministries, banking institutions, and private sectors with agricultural interest. At the end of the workshop, the Ministry of Energy and Mineral Resources has initiated a collaboration with Ministry of Cooperative and Small and Medium Enterprises to support economic opportunity development under the BiRu program⁶⁴.

The writer thought seeing this project has the potential of becoming a CDM project, the integrated biogas scheme used in the Switch to Biogas project should be replicated in many regions of Indonesia, so that Indonesia can spread the usage of clean energy for daily activities as well as contributing to the reduction of the greenhouse gases emission. Seeing that the cost needed to build a biogas unit is relatively cheap and if the microcredit scheme that is included in the project can be carried out as planned, this project can be a way for for not only Indonesia, but also other countries to participate in reducing the amount of greenhouse gases produced by the manure from the dairy farming industries' cattle.

⁶³ Based on interview with Verania Andria, Programme Manager for Sustainable Energy at Environment Unit UNDP Indonesia, March 12 2014, 02.30 pm at Menara Thamrin.

⁶⁴ UNDP. (2012). *SWITCH to BIOGAS: Assisting Dairy Farming Communities to Gain Access to Biogas and Improve Environmental Practices Final Report September 2009-2011*.

CHAPTER V

CONCLUSION

Based on the results of the descriptive study that the writer has made regarding the implementation of the UNDP's Switch to Biogas project in Lumajang, East Java with the support of the KEMCO, the writer came up with several conclusions.

The Switch to Biogas project is a project that integrates the implementation of biogas technology with people empowerment. The UNDP enabled the poor dairy farmers to have access to biogas, enabled them to have increased income from selling the sludge from the biogas, and at the same time help the local economic growth through the establishment of fish feed and fertilizer factories with funding support from private sectors. All of this was possible to achieve through the implementation of the downstream sludge management process. Even though the implementation of this scheme was delayed, replicating this process seems to be possible to be conducted in other places in Indonesia that face similar problem with the dairy farmers of Lumajang as long as the beneficiaries are cooperative.

Other outputs that have been met were also equally important. Based on the assessment conducted by the UNDP, the amount of emission reduction from the implementation of the Switch to Biogas project indicates that this project have the potential to become a Clean Development Mechanism (CDM) project. The writer sees that this means Indonesia can be involved more in earning CDM credits by replicating this project in other areas of the country. The climate change impact assessment that has been created by the UNDP by the end of the project is also a very valuable product, since it can help prepare the dairy farmers of the East Java region to prepare for the challenges of the climate change that they will face in the future. Both the local government and the Ministry of Agriculture can also benefit from this

assessment by being able to create appropriate policies based on the result of the assessment.

From the description above, it can be said that the KEMCO's role in the project was to provide funding for the project and to be involved with the UNDP in the decision making process after assessing the progress of the project. The writer thought that it is understandable for the KEMCO to not be directly and operationally involved in the project due to geographical barriers, since the UNDP can communicate with them through means of information technology.

Moreover, what made the KEMCO interested to become the donor of this project was that the KEMCO's interest in implementing carbon trading in Indonesia to reduce the emission of greenhouse gases and in whether or not the biogas installation and manure management approach implemented through the Switch to Biogas project has the potential to be a Clean Development Mechanism (CDM) project. Therefore, it was the end result that matters to the KEMCO. The writer can conclude that the donor(s) of a project may not be involved too much operationally, however the donor still have the authority to be involved in the decision making process in order for the project to progress accordingly so the objective(s) can be achieved and fulfill the interest of both parties.

The writer sees that in order for this project to achieve its expected outcomes, a good cooperation between the actors is important. In this project, the cooperation between the UNDP and PT Bumi Harmoni Indoguna were good, resulting in PT Bumi Harmoni Indoguna able to carry out the tasks demanded by the UNDP. The cooperation between the UNDP and the local government of Lumajang resulted in the local regent providing land to be used by the UNDP as demonstration plots, which were necessary to help UNDP's research on the sludge mixture. Cooperation with private sectors also ensured that the local fish feed and fertilizer factories have the loans needed for them to be able to operate.

There are several recommendations that the writer would like to make. The first recommendation for the UNDP is on the implementation of the microcredit system in the Switch to Biogas project, which was delayed because the time needed

for researching the best sludge mixture to be used as fish feed and fertilizer. It would be better if the UNDP have already prepared the formula for the best sludge mixture by the time the downstream sludge management process is ready to be implemented, so that the microcredit system won't have to be delayed. The writer hopes that the UNDP learns from this mistake and will be able to apply the downstream sludge management process according to plan in future implementation(s) of integrated biogas technology.

The writer would also like to give a recommendation to the KEMCO in terms of availability in providing information. The writer had difficulties in collecting more information about the KEMCO. The data found on the internet is not sufficient, and the write has already sent emails to the KEMCO seeking for an interview with one of the employees to obtain information regarding the Switch to Biogas project. However, the writer did not receive any reply.

The writer would also like to recommend that the government of Indonesia replicate the integrated biogas scheme in this project to other regions with dairy farming industries to promote biogas as an alternative energy and increase the welfare of the dairy farmers. Seeing that the cost for one biogas unit is relatively affordable, it would be great if the Ministry of Energy and Mineral Resources include the establishment of these integrated biogas scheme in their agenda.

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